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Global and Regional Sources of Risk in Major ASEAN Stock Markets.

Hawati Janor and Ruhani Ali

While many studies have focused on the influence of global returns on Asian emerging markets, this study establish evidence on the influence of regional returns as well. The motivation attributed to the increasing evidence that these markets are regionally integrated. By employing both simple and multiple regressions this study examines the global and regional risk in explaining risk-return relationship on ASEAN-5 stock markets. The empirical evidence suggest that while both global and regional risk factors are significant components of systematic risk that explain the risk return relationship for these markets, regional risk factors has the largest impact except Singapore. The model that incorporate both global and regional risk factors best explained the returns for all the markets. In addition, the findings also suggest that the choice of proxy for the global returns and the financial crisis have implications on the risk return relationship on ASEAN-5 stock markets.

Field of Research: ASEAN stock markets, risk return relationship, global risk, regional risk.

1. Introduction

The risk return relationship in ASEAN stock markets have been the subject of recent research interest. Such interest attributable in part to the growth of these countries' equity markets led by factors such as above average growth rates and financial liberalization measures. These factors have provided impetus for international investment and portfolio diversification in these countries, specifically in the ASEAN 5 economies namely Malaysia, Indonesia, Singapore, Philippines and Thailand (Clare & Priestley, 1998). Studies by Bailey and Stulz (1990) and Clare and Priestley (1998) have identified these countries as an important market in improving diversification and provide substantial benefit to global investors for the fact that they are uncorrelated among them and also with developed markets.

Hawati Janor, Senior Lecturer, School of Business Management, Faculty of Economics and Business, Universiti Kebangsaan Malaysia, MALAYSIA. E-mail: hawati@pkrisc.cc.ukm.my
Ruhani Ali, Associate Profesor, School of Management, Universiti Sains Malaysia, MALAYSIA. E-mail: ruhani@usm.edu.my

There is however, some conflicting evidence on pricing factors that explain the risk return relationship in emerging equity markets specifically in ASEAN countries (De Groot & Verschoor, 2002). Study by Girard, Rahman and Zaher (2003) have observed that Malaysian market appear to have become more segmented suggesting the importance of local risk factors whereas Indonesia has become more integrated with the world markets suggesting the importance of global risk factors. Bekaert and Harvey (1995) show that emerging markets are influenced by both global and local risk factors. In contrast study by De Santis and Imrohoroglu (1997) shows that neither the local risk nor the world market risk are priced on emerging stock markets. Thus it is not clear which risk factors explain returns on these markets, hence examining their risk return relationship is worth to be explored further.

Most of the above studies have focused on the role of global risk factors in explaining variations in stock returns, however, with increasing evidence that these markets are regionally integrated (Ibrahim, 2000; Click and Plummer, 2005), such evidence may have implications on the risk return relationships of these stock markets. With regional integration, returns of these markets may also be priced by regional risk. Two issues materialize from the above discussions. First, with the evidence of global and regional integration, it is hard to reconcile the component of systematic risk that explain the risk return relationship for ASEAN stock markets. Second, if both global and regional risk factors are priced, it is not clear which risk factor has the largest impact on ASEAN stock returns. A thorough understanding of the sources of risk in equity markets is valuable to investors who need to know the risk associated with their investment since they must be compensated for bearing risk (Jan, Chou & Hung 2000); and useful for other important financial market activities such as asset allocation and the development and implementation of regulatory framework (Hashmi and Tay, 2007).

The objective of this study is to examine the risk return relationship in ASEAN 5 stock markets that consider the implication of the global and regional integration, specifically we would like to unveil the relative importance of global versus regional risk factors in explaining returns in these markets. In addition, we also examine possible impacts of structural break such as the financial crisis on the observed relationship. Previous studies on asset pricing such as De Lint's (2002), Girard et al. (2003) and Soydemir (2005) have documented that financial crises have an impact on the model used in their studies. The study on ASEAN-5 is relevant since these markets are highly representative of an emerging market with rapid growth in terms of market capitalization, trade volume and number of listed companies. These countries have initiated financial liberalization process during the early 1980s (Koo & Maeng, 2005) and such attempts may have great impact on the degree of integration between these financial markets and the world financial markets. In addition, the increased economic cooperation in accordance with the ASEAN agreement, the closer proximity and cultural factors

(Sharma and Wongbangpo, 2002) may lead to regional integration of these markets. A detailed analysis of risk return relationship in these markets will undoubtedly shed light on other emerging markets with similar characteristics. The rest of the paper is organized as follows. Next section contains the literature review. Section 3 discusses the data and methodology followed by the findings in Section 4. Concluding remarks and the implications of the study are presented in Section 5.

2. Literature Review

Many studies have examined asset pricing on emerging markets that allows for the implication of financial market integration but the findings are inconclusive. For example, De Santis and Imrohoroglu (1997) employs the Capital Asset Pricing Model (CAPM) to study stock returns and volatilities of a group of emerging equity markets under different degrees of integration and found that global risk is not priced. In contrast, Bekaert and Harvey (1995) examine similar market as De Santis and Imrohoroglu (1997) and found that global integration was substantial for the entire period of study (1975 to 1992) not only for Malaysia, which had less investment restrictions, but also for Korea and Taiwan, which had substantial foreign ownership restrictions. In the case of Thailand, a large shift in the degree of integration was noted in 1987 when foreign ownership restrictions were relaxed.

Beside being influenced by the US as evidenced by Bekaert and Harvey (1995), ASEAN stock returns may also be influenced by Japan, Hong Kong and China stock markets. Previous studies have provided evidence on the influence of Japan on ASEAN countries. For example, Tavlas and Ozeki (1992) examined the role of yen in the region and found Asian Central Banks in the course of the 1980s to have increased their holdings of yen from 13.9 per cent of their foreign exchange reserve portfolios to 17.5 per cent. In addition, the yen is also being used more widely to invoice trade and finance in Asia. The countries that incurred large international debts in the 1970s and early 1980s subsequently shifted the composition away from dollar-denominated debt towards yen-denominated debt. Study by Masih and Masih (1999) have found the leading role of Hong Kong in Southeast Asia using data for the period February 1992 to 1997. Their study includes world's most advanced stock markets as well as four emerging Asian stock markets (Hong Kong, Thailand, Singapore and Malaysia) to examine the long and short term dynamic linkages among international and Asian emerging stock markets. For China, Ba (2003) have found evidence of the increasing influence of China on Southeast Asian countries. Ba highlighted factors such as economic and political development between these markets and China as the reasons for such evidence.

Most of the above studies have focused on the role of global risk factors in explaining stock returns on emerging markets. With increasing evidence that these markets are regionally integrated (Ibrahim, 2000; Click & Plummer, 2005), there are possibilities that their returns are influenced not only by global risk but

also regional risk. Ibrahim (2000) used cointegration techniques to examine financial integration in ASEAN-5 stock markets namely Indonesia, Malaysia, Philippines, Singapore and Thailand for the period January 1988 to June 1997 and found integration among these markets. Similarly, Click and Plummer (2005) examine stock market integration in ASEAN 5 markets but under different time period (aftermath of the Asian financial crisis). They found that these markets are not completely segmented by national borders and conclude that these markets are integrated. Our study incorporate the above findings on the global and regional integration by examining both the global and regional risk in the risk return relationship in these markets.

Studies on asset pricing also have documented that major events such as the financial crises may have an impact on the model. The most recent study by Soydemir (2005) on asset pricing of Asian markets revealed that the inclusion of the Asian currency crisis year increased the persistence of shocks and processing of new information on the region. The estimation results provide evidence in favor of the view that the Asian currency crisis altered investor behavior in international equity returns. In addition, studies on similar capital markets by Girard et al. (2003) observed that while Japan and Malaysia appear to have become more segmented as a result of the financial crisis, Indonesia and Korea have become more integrated with the world markets. Another study by De Lint (2002) on similar issue focusing on Mexico and six Asian countries (Indonesia, Korea, Malaysia, Philippines, Singapore and Thailand) indicates that during stable periods investors are mainly concerned about global risk factors, whereas close to a crisis they also include local factors in their information sets in forming expectations about future excess returns.

3. Data And Methodology

With increasing evidence of international financial market integration, .the capital asset pricing model (CAPM) of Sharpe (1964) and Lintner (1965) has been extended by several authors such as Adler and Dumas (1983) to the International CAPM (ICAPM). The empirical specification of the ICAPM assuming fully integrated world financial markets can be written as:

$$r_{it} = \alpha_i + \beta_i^W r_{w,t} + \in_{it}; \forall_i \qquad (1)$$

where r_{it} and $r_{w,t}$ represent the excess market returns of country i and the world portfolio over an international risk free rate, and $\in_{it}$ represents the country specific residuals that are orthogonal to the world market. β_i^W the beta of the market portfolio i is measured by the covariance of its excess returns with that of the world market portfolio. Following Phylaktis and Ravazzolo (2000), we use stock returns instead of excess returns to examine the following model (Model 1):

$$r_{it} = c + \beta_{iG} r_{Gt} + \varepsilon_{it} \quad (2)$$

where r_{it} is ASEAN-5 individual market's index return, r_{Gt} is global risk represented by the world; US; Japan; China or Hong Kong market return, β_{iG} is the covariance with the global risk. With the evidence that ASEAN-5 stock markets are regionally integrated, the returns may be explained by regional risk, thus to consider this issue we also run the model below by choosing regional risk as the component representing the market risk in equation 1 (Model 2) .

$$r_{it} = c + \beta_{iR} r_{Rt} + \varepsilon_{it} \quad (3)$$

where r_{Rt} is regional risk represented by the world; US; Japan; China or Hong Kong market return, β_{iR} is the covariance with the regional risk. To allow for possibility that ASEAN-5 stock markets are both globally and regionally integrated, next we run another model, whereby the source of risk of the expected return of country i index is affected by its covariance with both the world and regional market portfolio returns (Model 3):

$$r_{it} = c + \beta_{iG} r_{Gt} + \beta_{iR} r_{Rt} + \varepsilon_{it} \quad (4)$$

Data

We examine monthly stock returns for 5 major ASEAN countries namely Malaysia, Indonesia, Thailand, Singapore and Philippines spanning over 23 years from January 1986 through December 2006. Almost all study on ICAPM for emerging markets such as Bekaert and Harvey (1995) and Phylaktis and Ravazzolo (2000), among others use monthly data. The data are collected from Datastream. The return on asset i is: Ri = (Ending value-Beginning value)/ Beginning value). For world stock return we use Morgan Stanley Capital International (MSCI) world, U. S, Japan, Hong Kong and China stock market index. Most studies have used MSCI world index and the U. S index (Phylaktis and Ravazzolo, 1997; 2000) to capture the impact of world market risk on return. Besides these two measures, this study also used Japan stock market index since there are signs that Japanese financial influence is increasing in East Asia (Tavlas and Ozeki, 1992, Phylaktis, 1997). Based on these evidences, by including Japan, Hong Kong and Chinese stock market, hopefully this study will provide a more accurate picture of the significant drivers of price or returns changes in Asian region specifically on ASEAN-5 economies.,For regional returns, the study follow the regional index used by Heaney and Hooper (1999, 2000) whereby they constructed a unique regional index for each country examined that consists of an equally weighted index sample countries excluding the country subject to analysis.

4. Findings

Table 1 reports the summary statistics of monthly returns of all the indexes for the whole period and also for the two sub-periods. Overall, mean returns in ASEAN-5 are higher than the mean return in regional indexes and in most of global indexes except China. As expected, the standard deviation in ASEAN-5 indexes are higher than regional indexes and the global markets except China. China has the highest mean returns for the whole period (0.016) and before the crisis (0.029) and the highest standard deviation for the whole period (0.147) and before the crisis (0.217). The results show that mean returns and standard deviation for all the indexes before the crisis are higher than during the whole period and after the crisis.

The correlations between market returns are reported in Table 2. In all the cases the correlations between ASEAN-5 stock returns and regional index are higher than correlations with the global indexes except Singapore (correlations with Hong Kong is higher after the crisis). Such high correlations might be due to the similarity in the characteristics of most markets in the ASEAN region (Masih & Masih, 1999) and correctly reflect the weight that these markets have on their respective indexes. For the global markets, while all ASEAN 5 markets are nearly uncorrelated with China, their correlations with Hong Kong are the most significant. When financial crisis is considered, while Malaysia and Singapore have the highest correlations with regional index before the crisis and the lowest after the crisis; Indonesia, Philippines and Thailand have the highest correlation with regional index after the crisis and the lowest before the crisis. The findings suggest the importance of considering the impact of financial crisis on returns of these markets.

The results of regression Model 1 is shown in Table 3. The results show that for the whole period, global market risk is statistically significant (1% level) for all the proxy (US, world, Japan and Hong Kong) except China, for all ASEAN-5 markets. Among all the proxy used, Hong Kong is the best proxy selected based on the adjusted R^2 that significantly influence all the ASEAN-5 stock returns whereas China does not have any influence on these returns. However, the results slightly differ when we divided the data into sub-periods. Before the crisis, similar results are documented for all the markets except Indonesia, whereby Hong Kong is the only market that has influenced on Indonesian stock returns (5% level). Similarly, Hong Kong is the best proxy selected based on the adjusted R^2 and again China does not have any influence on these returns. After the crisis, the results are similar to the results for the whole period except Malaysia, whereby all the proxy for global risk including China has significant influenced on the market. After the crisis, while Hong Kong still is the best proxy that significantly influence Singapore returns, US becomes the best proxy that significantly influence Malaysia, Indonesia and Thailand whereas Japan is the best proxy that significantly influence Indonesian returns. Overall the influence of global returns on ASEAN -5 returns are rather significant.

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Table 1: Summary statistics of ASEAN-5, global and regional stock returns for the whole period, before and after crisis.

	Mal	Ind	Phil	Sing	Thai	World	US	Japan	HK	China	Rm	Ri	Rp	Rs	Rt
Summary statistics for the whole period (January 1986 – December 2006)															
Mean	0.007	0.013	0.012	0.007	0.006	0.006	0.008	0.001	0.010	0.016	0.008	0.008	0.008	0.006	0.008
Med	0.010	0.012	0.007	0.013	0.009	0.011	0.012	0.005	0.013	0.006	0.012	0.010	0.011	0.011	0.010
Max	0.294	0.694	0.439	0.248	0.284	0.139	0.124	0.183	0.265	1.020	0.290	0.253	0.255	0.352	0.253
Min	-0.429	-0.379	-0.342	-0.522	-0.356	-0.184	-0.245	-0.214	-0.566	-0.373	-0.463	-0.453	-0.482	-0.327	-0.46
SD	0.083	0.096	0.098	0.076	0.097	0.046	0.044	0.062	0.082	0.147	0.079	0.078	0.078	0.083	0.078
Skew	-0.534	1.123	0.174	-1.432	-0.324	-0.524	-1.155	-0.361	-1.521	2.578	-0.993	-0.998	-1.125	-0.437	-1.01
Kurt	6.810	14.559	5.842	12.459	4.416	4.309	7.441	3.502	13.228	18.95 1	8.974	8.858	9.788	6.614	8.919
JBera	163.73	1450.2	85.76	1021.5	25.35	29.39	262.07	8.085	1191.0	2236. 6	414.5	400.58	534.78	144.6	408.7
ADF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.018	0.0	0.0	0.000	0.000	0.000	0.000	0.000
Summary statistics before crisis (January 1986 – June 1997)															
Mean	0.012	0.017	0.022	0.010	0.010	0.010	0.009	0.003	0.016	0.029	0.013	0.013	0.013	0.013	0.013
Med	0.016	0.011	0.018	0.015	0.012	0.015	0.011	0.006	0.017	0.008	0.017	0.012	0.013	0.014	0.012
Max	0.247	0.694	0.439	0.210	0.261	0.124	0.139	0.183	0.265	1.020	0.197	0.197	0.200	0.222	0.199
Min	-0.429	-0.198	-0.342	-0.522	-0.356	-0.245	-0.184	-0.214	-0.566	-0.373	-0.463	-0.453	-0.482	-0.325	-0.46
SD	0.080	0.094	0.108	0.077	0.093	0.043	0.045	0.067	0.084	0.217	0.074	0.074	0.075	0.074	0.074
Skew	-1.153	2.966	0.145	-2.399	-0.623	-1.593	-0.431	-0.384	-2.345	1.827	-1.935	-1.862	-2.084	-0.781	-1.87
Kurt	9.169	22.294	5.408	18.868	5.035	11.082	5.407	3.744	18.779	9.658	14.684	14.195	16.108	6.012	14.29
JBera	247.58	2325.8	33.589	1568.67	32.494	430.77	37.331	6.529	1546.7	185.1	864.76	794.535	1079.89	65.70	806.7
ADF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.038	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Summary statistics after crisis (July 1998 – December 2006)															
Mean	0.009	0.014	0.005	0.011	0.009	0.002	0.002	0.001	0.008	0.007	0.011	0.011	0.011	0.009	0.011
Med	0.010	0.022	0.004	0.014	0.009	0.007	0.008	0.008	0.012	0.002	0.012	0.011	0.011	0.011	0.011
Max	0.294	0.250	0.332	0.248	0.266	0.092	0.108	0.097	0.253	0.278	0.290	0.242	0.244	0.265	0.242
Min	-0.285	-0.341	-0.299	-0.205	-0.244	-0.158	-0.137	-0.149	-0.147	-0.144	-0.216	-0.219	-0.213	-0.308	-0.22
SD	0.075	0.087	0.080	0.068	0.088	0.045	0.047	0.055	0.067	0.070	0.074	0.069	0.069	0.072	0.069
Skew	0.210	-0.564	0.131	-0.025	0.043	-0.687	-0.565	-0.434	0.399	0.870	-0.027	-0.118	-0.122	-0.080	-0.12
Kurt	6.368	5.228	6.461	5.777	4.336	3.974	3.219	2.517	4.058	4.994	6.315	5.993	5.871	7.632	5.982
JBera	48.966	26.514	51.203	32.793	7.621	12.053	5.633	4.195	7.463	29.76	46.728	38.318	35.287	91.28	38.05
ADF	0.000	0.000	0.000	0.000	0.022	0.002	0.060	0.123	0.024	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Mal=Malaysia; Ind=Indonesia; Phil=Philippines; Sing=Singapore; Thai=Thailand; US=United States; HK=Hong Kong, Rm, Ri, Rp, Rs and Rt are regional returns for Malaysia, Indonesia, Philippines, Singapore and Thailand respectively, Med= median; Max=maximum; Min=minimum; SD=standard deviation; Skew=skewness; Kurt=kurtosis; JBera=Jarque-Bera; Prob=probability; ADF=Augmented Dickey Fuller

Table 2: Correlations between ASEAN-5, global and regional stock returns for the whole period, before and after crisis.

Correlatons for the whole period (January 1986 – December 2006)

	Mal	Ind	Phil	Sing	Thai	US	World	Japan	HK	China	Rm	Ri	Rp	Rs	Rt
Mal		0.351	0.473	0.738	0.582	0.483	0.419	0.272	0.607	0.059	0.749	0.825	0.824	0.945	0.824
Ind		1.000	0.378	0.338	0.406	0.242	0.216	0.212	0.266	0.048	0.351	0.360	0.348	0.380	0.356
Phil			1.000	0.526	0.496	0.337	0.328	0.242	0.438	0.087	0.583	0.580	0.540	0.591	0.578
Sing				1.000	0.629	0.630	0.567	0.407	0.744	0.022	0.981	0.969	0.971	0.723	0.969
Thai					1.000	0.428	0.394	0.335	0.525	-0.062	0.649	0.654	0.649	0.605	0.643
US						1.000	0.817	0.425	0.575	0.022	0.611	0.602	0.605	0.456	0.603
World							1.000	0.667	0.556	0.028	0.576	0.563	0.565	0.408	0.563
Japan								1.000	0.318	0.014	0.400	0.390	0.390	0.291	0.389
HK									1.000	0.066	0.746	0.746	0.747	0.594	0.745
China										1.000	0.031	0.042	0.039	0.074	0.045
Rm											1.000	0.990	0.988	0.763	0.990
Ri												1.000	0.999	0.840	1.000
Rp													1.000	0.831	0.999
Rs														1.000	0.838
Rt															1.000

Correlations before crisis (January 1986 – June 1997) and after crisis (July 1998 – December 2006)

	Mal	Ind	Phil	Sing	Thai	US	World	Japan	HK	China	Rm	Ri	Rp	Rs	Rt
Mal	1	0.202	0.430	0.859	0.612	0.546	0.447	0.307	0.658	0.022	0.860	0.914	0.914	0.956	0.913
Ind	**0.474**	1.000	0.235	0.216	0.266	0.108	0.013	0.029	0.199	0.076	0.214	0.212	0.199	0.242	0.208
Phil	**0.444**	**0.595**	1.000	0.443	0.387	0.245	0.258	0.163	0.385	0.124	0.515	0.508	0.450	0.625	0.506
Sing	**0.542**	**0.584**	**0.672**	1.000	0.631	0.650	0.545	0.398	0.718	0.048	0.986	0.978	0.981	0.836	0.978
Thai	**0.523**	**0.507**	**0.692**	**0.711**	1.000	0.355	0.307	0.275	0.533	-0.100	0.644	0.650	0.644	0.669	0.632
US	**0.469**	**0.412**	**0.492**	**0.670**	**0.565**	1.000	0.723	0.386	0.538	-0.016	0.628	0.622	0.628	0.519	0.623
World	**0.397**	**0.427**	**0.413**	**0.648**	**0.506**	**0.920**	1.000	0.731	0.477	0.015	0.571	0.558	0.563	0.449	0.559
Japan	**0.202**	**0.449**	**0.362**	**0.460**	**0.391**	**0.508**	**0.594**	1.000	0.248	-0.034	0.410	0.393	0.397	0.298	0.392
HK	**0.417**	**0.337**	**0.478**	**0.715**	**0.524**	**0.671**	**0.697**	**0.465**	1.000	0.082	0.718	0.719	0.718	0.651	0.717
China	**0.213**	**0.095**	**0.034**	**0.069**	**0.037**	**0.131**	**0.111**	**0.186**	**0.175**	1.000	0.054	0.052	0.047	0.032	0.059
Rm	**0.576**	**0.588**	**0.704**	**0.982**	**0.748**	**0.667**	**0.641**	**0.419**	**0.727**	**0.092**	1.000	0.992	0.989	0.869	0.992
Ri	**0.680**	**0.602**	**0.693**	**0.968**	**0.751**	**0.676**	**0.640**	**0.416**	**0.718**	**0.132**	**0.989**	1.000	0.998	0.916	1.000
Rp	**0.680**	**0.595**	**0.673**	**0.967**	**0.745**	**0.675**	**0.640**	**0.414**	**0.719**	**0.135**	**0.987**	**1.000**	1.000	0.899	0.997
Rs	**0.945**	**0.510**	**0.488**	**0.552**	**0.560**	**0.493**	**0.409**	**0.268**	**0.400**	**0.259**	**0.587**	**0.699**	**0.699**	1.000	0.913
Rt	**0.680**	**0.601**	**0.691**	**0.968**	**0.746**	**0.676**	**0.639**	**0.415**	**0.718**	**0.133**	**0.989**	**1.000**	**1.000**	**0.698**	1.000

Notes: Mal=Malaysia; Ind=Indonesia; Phil=Philippines; Sing=Singapore; Thai=Thailand; US=United States; Rm, Ri, Rp, Rs and Rt are regional returns for Malaysia, Indonesia, Philippines, Singapore and Thailand respectively. Figures in bold are correlation coefficients after the crisis.

Table 3: Model 1: $r_{it} = c + \beta_{iG} r_{Gt} + \varepsilon_{it}$

	January 1986- December 2006					January 1986- June 1997 (before crisis)					July 1998 – December 2006 (after crisis)				
Country	c	B1	Adj. R2	DW	F-Stat.	c	B1	Adj. R2	DW	F-Stat.	c	B1	Adj. R2	DW	F-Stat.
Mal: US	-0.0003 (-0.07)	0.919 0.70)***	0.230	1.8 1	75.76	0.002 (0.272)	1.003 (7.56)***	0.29	2.1 5	57.2	0.007 (1.03)	0.792 (5.31)***	0.212‡	1.73	28.1 9
Mal: World	0.002 (0.01)	0.765 (7.28)***	0.172	1.8 1	53.03	0.005 (0.767)	0.797 (5.81)***	0.194	1.9 8	33.7	0.008 (1.11)	0.636 (4.33)***	0.149	1.83	18.7 4
Mal: Japan	0.0063 (1.22)	0.365 (4.45)***	0.070	1.8 5	19.83	0.011 (1.67)*	0.361 (3.74)***	0.087	1.9 7	14.01	0.008 (1.14)	0.277 (2.07)**	0.031	1.78	4.27
Mal: HK	0.001 (0.14)	0.617 (12.06)***	0.37‡	2.0	145.4 8	0.002 (0.4)	0.624 (10.16)***	0.43‡	2.1 8	103.2	0.004 (0.61)	0.469 (4.58)***	0.165	1.9	21
Mal: China	0.004 (0.64)	0.031 (0.81)	- 0.002	1.7 6	0.65	0.01 (1.35)	0.063 (0.19)	-0.01	2.1 6	0.036	0.007 (0.96)	0.229 (2.18)**	0.036	1.69	4.75
Ind: US	0.009 (1.53)	0.529 (3.94)***	0.055	1.7 4	15.55	0.015 (1.81)*	0.235 (1.26)	0.004	1.6 6	1.58	0.012 (1.52)	0.80 (4.52)***	0.161	1.76	20.4 4
Ind: World	0.010 (1.72)*	0.453 (3.494)***	0.043	1.7 3	12.21	0.017 (2.07)**	0.028 (0.15)	- 0.007	1.6 3	0.02	0.013 (1.60)	0.787 4.73***	0.175	1.75	22.3 5
Ind: Japan	0.013 (2.16)**	0.327 (3.42)***	0.042	1.7 2	11.73	0.017 (2.13)**	0.04 (0.33)	- 0.007	1.6 3	0.11	0.013 (1.70)*	0.707 (5.02)***	0.193‡	1.69	25.2 2
Ind: HK	0.010 (1.72)*	0.31 (4.35)***	0.067 ‡	1.8 1	18.96	0.014 (1.71)*	0.223 (2.35)**	0.032 ‡	1.7 2	5.54	0.010 (1.23)	0.437 (3.58)***	0.105	1.71	12.8 5
Ind: China	0.008 (1.21)	0.028 (0.66)	- 0.003	1.6 8	0.44	0.008 (0.959)	0.024 (0.658)	- 0.008	1.4 4	0.43	0.013 (1.49)	0.119 (0.96)	-0.001	1.61	0.92
Phil: US	0.01 (1.12)	0.755 (5.66)***	0.110	1.7 9	32.01	0.016 (1.71)*	0.613 (2.94)***	0.053	1.8 2	8.62	0.003 (0.47)	0.877 (5.65)***	0.234‡	1.90	32
Phil: World	0.008 (1.35)	0.706 (5.49)***	0.104	1.7	30.10	0.017 (1.80)*	0.626 (3.10)***	0.06	1.7 3	9.61	0.004 (0.57)	0.7 (4.54)***	0.163	1.8	20.6 1
Phil: Japan	0.012 (1.98)**	0.383 (3.94)***	0.055	1.6 9	15.50	0.021 (2.33)**	0.261 (1.91)*	0.019	1.7 1	3.66	0.005 (0.64)	0.524 (3.89)***	0.123	1.69	15.1 1
Phil: HK	0.07 (1.29)	0.523 (7.68)***	0.188 ‡	1.8 4	58.95	0.014 (1.64)	0.497 (4.85)***	0.142 ‡	1.8 7	23.48	0.0004 (0.06)	0.569 (5.45)***	0.221	1.95	29.6 6
Phil: China	0.006 (1.03)	0.05 (1.2)	0.002	1.8 1	1.44	0.016 (1.55)	0.05 (1.083)	0.002	2.0 9	1.17	0.005 (0.62)	0.0039 (0.34)	-0.009	1.68	0.12
Sing: US	-0.001 (-0.29)	1.1 (12.81)***	0.395	1.9 9	164.0 1	-0.002 (-0.41)	`.16 (9.95)***	0.42	2.1 4	98.93	0.008 (1.67)*	1.02 (9.03)***	0.443	2.03	81.4 7
Sing: World	0.0013 (0.322)	0.948 (10.85)***	0.318	1.8 1	117.6 9	0.001 (0.24)	0.941 (7.5)***	0.291	1.8 5	56.9	0.009 (1.79)*	0.934 (8.51)***	0.414	1.82	72.3 1
Sing:	0.01	0.501	0.162	1.8	164.0	0.008	0.455	0.152	1.8	25.37	0.01	0.567	0.203	1.86	26.8

Japan	(1.50)	(7.03)***		9	1	(1.39)	(5.04)***		3		(1.69)*	(5.18)***			7
Sing:	0.0004	0.692	0.551	1.9	307.8	-0.0006	0.66	0.51‡	1.8	143.8	0.005	0.725	0.507‡	2.24	104.
HK	(0.12)	(17.55)***	‡	6	9	(-0.12)	(11.99)***		2		(0.97)	(10.24)***			9
Sing:	0.006	0.01	-	1.9	0.09	0.008	0.012	-	2.0	0.18	0.001	0.067	-.005	1.80	0.48
China	(1.13)	(0.3)	0.005	2		(1.34)	(0.42)	0.011	2		(1.5)	(0.69)			
Thai:	-0.001	0.949	0.18	1.7	55.77	0.002	0.763	0.12	1.6	19.52	0.007	1.107	0.31‡	2.0	46.8
US	(-0.15)	(7.47)***		9		(0.23)	(4.42)***		8		(0.93)	(6.85)***			7
Thai:	0.001	0.840	0.152	1.7	45.88	0.004	0.639	0.087	1.5	14.03	0.008	0.94	0.25	2.0	34.3
World	(0.19)	(6.77)***		4		(0.50)	(3.75)***		9		(1.03)	(5.86)***			4
Thai:	0.006	0.525	0.109	1.8	31.46	0.008	0.379	0.069	1.6	11.06	0.009	0.622	0.145	2.0	18.0
Japan	(0.99)	(5.61)***		0		(1.10)	(3.33)***				(1.08)	(4.25)***			6
Thai:	0.0002	0.622	0.272	7.8	94.58	0.0003	0.59	0.279	1.3	53.5	0.003	0.685	0.267	2.26	37.8
HK	(0.04)	(9.73)***	‡	6		(0.042)	(7.31)***	‡	8		(0.46)	(6.15)***			6
Thai:	0.0008	-0.04	-	1.9	0.72	-0.002	-0.339	-	1.6	0.75	0.009	0.046	-0.009	2.06	0.13
China	(0.11)	(-0.85)	0.001	5		(-0.18)	(-0.87)	0.003	9		(1.01)	(0.367)			

Notes: Mal=Malaysia; Ind=Indonesia; Phil=Philippines; Sing=Singapore; Thai=Thailand; US=United States.
*, ** and *** denote significance at 10%, 5% and 1% level respectively
‡ indicates the best proxy selected based on the adjusted R^2
Figures in parentheses are t-values

The results of regression Model 2 is provided in table 4. All coefficients are statistically significant [1% level except Indonesia (5% level before the crisis)], showing that regional return strongly explain deviations in ASEAN-5 stock returns for the whole period and also for the two sub-periods. Table 5a, 5b, and 5c provides results for Model 3 for the whole period and the two sub-periods respectively. Table 5a shows that only regional risk has significant influence on Indonesia and Philippines whereas both global and regional risks significantly explain returns on Singapore (for all the proxy of global risk except China), Malaysia (only when Hong Kong is used as proxy for global risk) and Thailand (only when Japan is used as proxy for global risk). For these three markets, the coefficients show that while the regional risk are more dominant in influencing returns for Malaysia and Thailand compared to global risk, a different result is found for Singapore whereby the global risk is more dominant in influencing its returns compared to the regional risk. However, different findings are observed for the two sub-periods.

Before the crisis, only regional risk has significant influence on Malaysia, Indonesia and Philippines whereas both global and regional risks significantly explain returns on Singapore (for all the proxy of global risk except China) and Thailand (only when Hong Kong is used as proxy for global risk). For these two markets, the coefficients show that the regional risk is more dominant in influencing their returns compared to global risk. After the crisis, only regional risk has significant influence on Philippines and Thailand whereas both global and regional risks significantly explain returns on Malaysia (only when China is used as proxy for global risk), Indonesia (only when Japan and Hong Kong are used as proxy for global risk) and Singapore (for all the proxy of global risk except China). For these three markets, the coefficients show that while the regional risk is more dominant in influencing returns for Malaysia and Indonesia compared to global risk, a different result is found for Singapore whereby in most of the cases the global risk is more dominant in influencing its returns compared to the regional risk.

For Singapore market, it is grouped under Newly Industrialized Countries (NICs) and it may be influenced more by the global markets compared to the regional market. and this could be part of the reasons of such findings. Table 6 provides a comparison between simple and multiple regression based on the adjusted R^2 as the goodness-of-fit measure. For all of the cases, the best model is Model 3. The adjusted R^2 for this model are higher than Model 1 and Model 2. While the model best explained the returns for Malaysian, Philippines and Singapore before the crisis compared to the whole period and after the crisis as shown by the highest adjusted R^2 , it best explained the returns for Indonesia and Thailand after the crisis.

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Table 4: Model 2 : $r_{it} = c + \beta_{iR} r_{Rt} + \varepsilon_{it}$

	January 1986- December 2006					January 1986- June 1997 (before crisis)					July 1998 – December 2006 (after crisis)				
Country	c	B1	Adj R2	DW	F-stat	c	B1	Adj R2	DW	F-stat	c	B1	Adj R2	DW	F-stat
Mal	-1.72E-05 (-0.0049)	0.789 (17.85)***	0.56	2.12	318.55	-3.23E-05 (-0.01)	0.919 (19.58)***	0.737	2.04	384	0.002 (0.33)	0.586 (7.05)***	0.326	2.07	49.75
Ind	0.0097 (1.7007)*	0.443 (6.09)***	0.126	1.84	37.03	0.014 91.73)*	0.272 (2.52)**	0.038	1.70	6.35	0.005 (0.77)	0.754 (7.54)***	0.356	1.72	56.85
Phil	0.0071 (1.350)	0.675 (10.11)***	0.288	2.07	102.27	0.014 (1.67)*	0.652 (5.86)***	0.197	2.06	34.3	-0.004 (-0.61)	).774 (.11)***	0.448	2.37	83
Sing	0.0035 (1.0479)	0.663 (16.50)***	0.521	2.13	272.35	-0.001 (-0.30)	0.87 (17.7)***	0.7	1.97	313.1	0.006 (1.06)	).52 (6.62)***	0.30	2.23	43.78
Thai	-2.57E-05 (-0.0054)	0.805 (13.24)***	0.411	1.2	175.17	-0.001 (-0.09)	0.796 (9.47)***	0.394	1.64	89.59	-0.001 (-0.022)	0.944 !!.21)***	0.55	2.19	125.58

Notes: Mal=Malaysia; Ind=Indonesia; Phil=Philippines; Sing=Singapore; Thai=Thailand; Adj=Adjusted; DW=Durbin Watson; F-stat=F-statistics
*, **, *** denotes significance at 10%, 5% and 1% level respectively

Table 5a: Model 3: $r_{it} = c + \beta_{iG} r_{Gt} + \beta_{iR} r_{Rt} + \varepsilon_{it}$

Period: January 1986 – December 2006						
Country	c	B_{iG}	B_{iR}	Adjusted R2	DW	F-stats
Mal: US + R	-0.0004 (-0.11)	0.078 (0.77)	0.762 (13.65)***	0.559	2.12	159.31
Mal: World + R	0.0001 (0.03)	-0.035 (-0.37)	0.800 (14.77)***	0.558	2.13	158.78
Mal: Japan + R	-8.61E-05 (-0.02)	-0.045 (-0.73)	0.803 (16.63)***	0.559	2.13	159.22
Mal: HK + R	-0.0004 (-0.11)	0.111 (1.75)*	0.702 (10.64)***	0.56‡	2.5	162.1
Mal: China + R	-0.001 (-0.12)	0.02 (0.70)	0.709 (12.23)***	0.439	2.07	75.35
Ind: US + R	0.009 (1.61)	0.088 (0.54)	0.414 (4.55)***	0.124	1.84	18.61
Ind: World + R	0.01 (1.66)*	0.042 (0.28)	0.43 (4.86)***	0.123	1.84	18.48
Ind: Japan + R	0.01 (1.73)*	0.131 (1.32)	0.403 (5.1)***	0.129	1.84	19.44
Ind: HK + R	0.01(1.7)	-0.007 (-0.06)	0.449 (4.09)***	0.122	1.83	18.44
Ind: China + R	0.004 (0.81)	0.015 (0.42)	0.631 (8.43)***	0.27‡	1.96	35.79
Phil: US + R	0.007 (1.30)	0.04 (0.26)	0.662 (7.88)***	0.286	2.07	50.98
Phil: World + R	0.007 (1.29)	0.074 (0.54)	0.651 (8.03)***	0.292	2.07	51.13
Phil: Japan + R	0.007 (1.36)	0.059 (0.64)	0.657 (9.05)***	0.29	2.07	51.22
Phil: HK + R	0.007 (1.28)	0.094 (0.98)	0.602 (6.00)***	0.288	2.06	51.6
Phil: China + R	0.002 (0.48)	0.0349 (1.13)	0.805 (12.76)***	0.463‡	2.23	82.78
Sing: US + R	-0.007 (-0.21)	0.661 (8.82)***	0.505 (12.78)***	0.634	2.31	217.15

Sing: World +R	0.001 (0.26)	0.545 (7.50)***	0.541 (13.59)***	0.608	2.12	194.58
Sing: Japan + R	0.004 (1.10)	0.264 (4.90)***	0.606 (15.07)***	0.565	2.12	160.71
Sing: HK + R	0.001 (0.2)	0.452 (10.79)***	0.4 (9.65)***	0.672‡	2.02	257.5
Sing: China + R	0.005 (1.22)	-0.012 (-0.49)	0.543 (11.95)***	0.426	2.16	71.47
Thai: US + R	-0.001 (-0.15)	0.141 (1.05)	0.757 (9.93)***	0.411	1.98	88.16
Thai: World + R	-0.0004 (-0.08)	0.101 (0.81)	0.776 (10.47)***	0.45‡	1.98	87.79
Thai: Japan + R	0.0002 (0.039)	0.157 (1.91)**	0.756 (11.52)***	0.417	1.97	90.35
Thai: HK + R	-0.001 (-0.1)	0.122 (1.42)	0.709 (7.79)***	0.413	1.97	88.94
Thai: China + R	-0.004 (-0.66)	-0.058 (-1.59)	0.836 (11.1)***	0.39	2.15	62.18

Mal=Malaysia; Ind=Indonesia; Phil=Philippines; Sing=Singapore; Thai=Thailand; US=United States; HK=Hong Kong, R=regional
*, **,*** denotes significance at 10%, 5% and 1% level respectively
‡ indicates the best proxy selected based on the adjusted R^2

Table 5b: Model 3: : $r_{it} = c + \beta_{iG} r_{Gt} + \beta_{iR} r_{Rt} + \varepsilon_{it}$

Period: January 1986 – June 1997 (Before Asian Financial Crisis)

Country	c	B_{iG}	B_{iR}	Adjusted R2	DW	F-stats
Mal: US + R	-0.0001 (-0.04)	0.017 (0.17)	0.912 (15.09)***	0.736	2.03	190.4
Mal: World + R	0.001 (0.14)	-0.116 (-1.22)	0.959 (16.81)***	0.739‡	2.03	193.2
Mal: Japan + R	-1.32E-04 (-0.04)	-0.065 (-1.14)	0.943 (18.35)***	0.738	2.04	192.8
Mal: HK + R	-0.001(-0.13)	0.08 (1.35)	0.854 (12.71)***	0.739‡	2.09	193.8
Mal: China + R	0.001 (0.13)	-0.005 (-0.24)	0.873 (9.65)***	0.545	2.01	46.57
Ind: US + R	0.014 (1.76)*	-0.086 (-0.37)	0.304 (2.20)**	0.032	1.7	3.22
Ind: World + R	0.015 (1.92)*	-0.324 (-1.52)	0.382 (2.95)***	0.047	1.67	4.35
Ind: Japan + R	0.014 (1.711)*	-0.09 (-0.70)	0.305 (2.59)**	0.034	1.7	3.41
Ind: HK + R	0.013 (1.647)	0.107 (0.79)	0.184 (1.183)	0.035	1.71	3.48
Ind: China + R	-0.0003 (-0.04)	0.015 (0.49)	0.123 (6.05)***	0.317‡	1.71	18.61
Phil: US + R	0.015 (1.75)*	-0.155 (-0.63)	0.708 (4.94)***	0.193	2.05	17.27
Phil: World + R	0.014 (1.64)	0.016 (0.07)	0.646 (4.79)***	0.191	2.05	17.03
Phil: Japan + R	0.014 (1.657)*	-0.0306 (-0.227)	0.663 (5.45)***	0.191	2.06	17.06
Phil: HK + R	0.013 (1.55)	0.165 (1.16)	0.519 (3.25)***	0.199	2.05	17.87
Phil: China + R	0.003 (0.41)	0.031 (1.16)	1.234 (9.54)***	0.546‡	2.35	46.75
Sing: US + R	-0.005 (-1.38)	0.528 (6.02)***	0.71 (13.86)***	0.759‡	2.17	215.6
Sing: World + R	-0.003 (-0.912)	0.366 (4.25)***	0.771 (14.87)***	0.73	2.07	185.3
Sing: Japan + R	-0.001 (-0.31)	0.187 (3.43)***	0.819 (16.53)***	0.719	2.05	174.96
Sing: HK + R	-0.003 (-0.872)	0.277 (5.32)***	0.665 (11.27)***	0.748	1.86	202.44
Sing: China + R	0.001 (0.29)	0.006 (0.33)	0.655 (10.25)***	0.577	1.71	52.75
Thai: US + R	0.0002 (0.03)	-0.133 (-0.73)	0.845 (7.84)***	0.392	1.65	44.9

Thai: World + R	0.0001 (0.02)	-0.141 (-0.84)	0.843 (8.31)***	0.393	1.65	45.04
Thai: Japan + R	-0.001 (-0.08)	0.045 (0.45)	0.78 (8.51)***	0.391	1.64	44.63
Thai: HK + R	-0.002 (-0.25)	0.182 (1.73)*	0.648 (5.40)***	0.403‡	1.54	46.94
Thai: China + R	-0.012 (-1.45)	-0.052 (-1.42)	0.927 (6.17)***	0.328	1.73	19.59

Mal=Malaysia; Ind=Indonesia; Phil=Philippines; Sing=Singapore; Thai=Thailand; US=United States; HK=Hong Kong
*, ** and *** denote significance at 10%, 5% and 1% level respectively
‡ indicates the best proxy selected based on the adjusted R^2

Table 5c: Model 3: $r_{it} = c + \beta_{iG} r_{Gt} + \beta_{iR} r_{Rt} + \varepsilon_{it}$

Period: July 1998 – December 2006 (After Asian Financial Crisis)

Country	c	B iG	B iR	Adjusted R2	DW	F-stats
Mal: US + R	0.003 (0.43)	0.257 (1.44)	0.483 (4.35)***	0.332	2.0	26.09
Mal: World + R	0.002 (0.36)	0.076 (0.44)	0.555 (5.11)***	0.32	2.1	24.78
Mal: Japan + R	.002 (0.3)	-0.065 (-0.53)	0.606 (6.60)***	0.321	2.06	24.83
Mal: HK + R	0.002 (0.33)	-0.005 (-0.04)	0.59 (4.85)***	0.319	2.07	24.63
Mal: China + R	0.001 (0.17)	0.174 (2.0)**	0.571(6.94)***	0.35‡	2.02	27.61
Ind: US + R	0.005 (0.77)	0.017 (0.08)	0.746 (5.47)***	0.35	1.72	28.15
Ind: World + R	0.006 (0.83)	0.132 (0.69)	0.70 (5.34)***	0.353	1.75	28.51
Ind: Japan + R	0.006 (0.95)	0.378 (2.83)***	0.629 (5.92)***	0.40‡	1.75	34.4
Ind: HK + R	0.006 (0.8)	-0.254 (-1.73)*	0.930 (6.54)***	0.369	1.72	30.48
Ind: China + R	0.005 (0.75)	0.02 (0.2)	0.751 (7.42)***	0.35	1.72	28.17
Phil: US + R	-0.003 (-0.55)	0.122 (0.68)	0.721 (6.24)***	0.445	2.36	47.51
Phil: World + R	-0.004 (-0.63)	-0.051 (-0.31)	0.796 (7.17)***	0.443	2.37	41.17
Phil: Japan + R	-0.003 (-0.54)	0.146 (1.25)	0.726 (7.80)***	0.451‡	2.32	42.51
Phil: HK + R	-0.004 (-0.61)	-0.014 (-0.11)	0.784 (6.38)***	0.443	2.31	41.1
Phil: China + R	-0.003 (-0.50)	-0.066 (-0.73)	0.783 (9.11)***	0.446	2.36	41.64
Sing: US + R	0.006 (1.35)	0.80 (6.53)***	0.276 (3.63)***	0.504	2.35	52.29
Sing: World + R	0.007 (1.40)	0.731 (6.63)***	0.325 (4.51)***	0.509	2.15	53.28
Sing: Japan + R	0.006 (1.22)	0.415 (4.20)***	0.435 (5.76)***	0.40	2.22	34.34
Sing: HK + R	0.003 (0.69)	0.60 (8.45)***	0.30 (4.53)***	0.588‡	2.39	72.96
Sing: China + R	0.006 (1.12)	-0.077 (-0.92)	0.54 (6.62)***.	0.30	2.22	22.27
Thai: US + R	-0.006 (-0.122)	0.22 (1.24)	0.849 (7.44)***	0.555	2.14	63.91
Thai: World + R	-0.001 (-0.169)	0.090 (0.56)	0.905 (8.23)***	0.549	2.17	62.51
Thai: Japan + R	-0.001 (-0.15)	0.156 (1.35)	0.892 (9.68)***	0.556‡	2.12	64.21
Thai: HK + R	-0.001 (-0.22)	-0.032 (-0.25)	0.966 (7.94)***	0.548	2.19	62.23
Thai: China + R	-0.001 (-0.85)	-0.079 (-0.94)	0.954 (11.23)***	0.552	2.26	63.16

Mal=Malaysia; Ind=Indonesia; Phil=Philippines; Sing=Singapore; Thai=Thailand; US=United States; HK=Hong Kong
*, ** and *** denote significance at 10%, 5% and 1% level respectively
‡ indicates the best proxy selected based on the adjusted R^2

Table 6: Comparison of the model based on adjusted R^2

	Whole period (January1986-December 2006)			Before crisis (January 1986-June 1997)			After crisis (July 1998-December 2006)		
Country	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Mal	0.37	0.56‡	0.56‡	0.43	0.737	0.739‡	0.212	0.326	0.35‡
Ind	0.067	0.126	0.27‡	0.032	0.038	0.317‡	0.193	0.356	0.40‡
Phil	0.188	0.288	0.463‡	0.142	0.197	0.546‡	0.234	0.448	0.451‡
Sing	0.551	0.521	0.672‡	0.51	0.7	0.759‡	0.51	0.30	0.588‡
Thai	0.272	0.411	0.45‡	0.279	0.394	0.403‡	0.31	0.55	0.556‡

Notes: Mal=Malaysia; Ind=Indonesia; Phil=Philippines; Sing=Singapore; Thai=Thailand
‡ indicates the best model selected based on the adjusted R^2

5. Conclusions

This study examines the global and regional risk factors in explaining ASEAN-5 stock returns variation motivated by the evidence found on the global and regional integration of these markets. The results suggest that both global risk factor proxy especially by major world financial market such as the US and Japan and regional risk factors are significant components of systematic risk that explain the risk return relationship for these markets. However, we find evidence that regional risk factors has the largest impact for all the markets except Singapore. Such finding could be due to the status of Singapore which is categorized under Newly Industrialized Countries (NIC), thus it should be more integrated with the global market relative to other ASEAN markets. In addition, the findings also suggest that the choice of proxy for the global returns and the impact of financial crisis have implications on the risk return relationship on ASEAN-5 stock markets. Lastly, investors and portfolio managers in ASEAN-5 markets need to incorporate the disturbances in global as well as in regional market in their information set.

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