East Asian Financial Integration: A Cointegration Test Allowing for Structural Break and the Role of Regional Institutions

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ABSTRACT

This study investigates the progress of ASEAN+3 financial markets integration after the 1997 Asian financial crisis. Adopting a Gregory and Hansen (1996) cointegration test that takes into account structural break of the series, this study finds no significant improvement in the intraregional financial market integration after the crisis. This may imply that measures that were introduced and implemented in the aftermath of the 1997 crisis may have not effectively affect the region's financial market integration. Several factors attribute to this including the differences in the ASEAN+3's institutional and legal frameworks.

Keywords: East Asia, Financial Market Integration, Cointegration, Regional Institutions

INTRODUCTION

The 1997 crisis initiated a regular series of meetings at the cabinet and head-of-governments level among ASEAN countries and their counterparts from China, Korea and Japan, which altogether known as ASEAN+3. The meetings have dealt with issues regarding the financial crisis, its aftermath and the ongoing efforts to support regional economic integration. The region agrees that one way to counter the impact of the crisis and to prevent recurrence of crisis is by enhancing the region's financial market integration. Several measures have been put forward including two major frameworks - Chiang Mai Initiative (CMI) and Asian Bond Market Initiative (ABMI). CMI aims to create a network of bilateral

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swap arrangements among ASEAN+3 countries that enables them to borrow predetermined amounts of their counterparts' reserves to supplement their own in order to address short-term liquidity difficulties. ABMI was established to develop efficient and liquid bond markets in Asia that allows better utilization of Asian savings for Asian investments. However, to the best of our knowledge, there is no study has examined the progress of financial market integration in ASEAN+3 since the incident of the 1997 financial crisis.

The objective of this study is to assess the improvement of ASEAN+3's financial market integration after the 1997 financial crisis. We employ the Gregory and Hansen (1996) residual based test to determine the level of the cointegration in the region's financial market which is represented by the stock and the credit market. This technique takes into account the presence of structural break in the series that could bias the cointegration test results. Although cointegration techniques has been used in several studies of East Asian economic integration (Click & Plummer, 2005; Yang, Kolari & Min, 2003), none of them has taken into account the issue of structural break. Identifying structural breaks in economic data is important because the existence of structural breaks in a series can affect the series' stationary properties and distort any long-run trends inherent in the series (Perron, 1989).

Several cointegration tests that allow a presence of structural break in a series have been introduced. One of them is by sub-sampling either side of the structural break that require sampling break pre-judgment. This procedure has been criticized because the breaking point is determined subjectively exposing to personal bias. In response to this, several methods of cointegration test that endogenously determine the break point have been developed. One of them is the Gregory and Hansen (1996) residual-based test that can accommodate a structural change in the underlying series and their cointegrating relationships.

The results of this study show that both regional credit market and stock market have yet to reach full integration in both pre and post crisis periods. We also do not find a significant improvement in the integration of the regional credit and stock markets between the two periods. This chapter also suggests that low financial market integration in the region could be due to several reasons including differences in the ASEAN+3's institutional and legal frameworks.

LITERATURE REVIEW

East Asian financial market has recorded a rapid growth in their international capital mobility following the region's financial market liberalization in the early 1990s. However, the progress of the intraregional financial integration is increasing at a slow pace as most of the financial market integration in the region occurred more on a global basis (Park, 2002). The level of regional cross border bank credit flow is low while the development of an integrated market in government and corporate bonds is stagnant. The regional equity market also shows no sign of consolidation.

Poonpatpibul, Tanboon and Leelapornchai (2006) state that there are three aspects that show East Asia is more integrated with the developed markets rather than as a regional market. First, financial openness in East Asia still lags behind the developed markets despite its rising level. Second, bank lending and cross-country portfolio investment in East Asia is still significantly lower than that of the European Union counterpart. Third, East Asian overnight interbank interest rate is declining although the rate is still higher than that of the European Union.

Park and Bae (2002) find that East Asia has stronger ties with advanced countries such as the US and Western Europe than with one another. This finding is also supported by Jeon, Oh and Yang (2005) in a study that is based on various tests utilizing cross-country interest rate and stock price data, and Kim, Kim and Wang (2004, 2006), who estimate the degree of East Asia's risk sharing by using a cross-country consumption correlation and formal regression analysis. Bekaert and Harvey (1995), and Eichengreen and Park (2005) have also empirically shown that East Asia's financial market is more integrated with the developed economies over the last decades.

However, several studies show that the intraregional financial market In East Asia is progressing. Click and Plummer (2005) examine the ASEAN-5's (five core ASEAN countries of Indonesia, Malaysia, the Philippines, Singapore and Thailand) stock markets integration using a VAR cointegration technique and utilizing four and half years daily and weekly data from July 1, 1998 to December 31, 2002. Their results suggest that the ASEAN-5's stock markets are integrated after the 1997 Asian financial crisis but the integration is far from complete. Yang, Kolari and Min (2003) examine long run relationship and short-run dynamic linkages among the US, Japanese, and ten Asian emerging stock markets (Hong Kong, India, Indonesia, Korea, Malaysia, Pakistan, the Philippines, Singapore, Thailand and Taiwan) to observe the changes in the level of stock market integration prior, during and after the 1997 Asian financial crisis. Using daily data over January 2, 1995 to May 15, 2001 and employing vector autoregression (VAR) technique of generalized impulse response analysis, they find that both long-run cointegrated relationships and short-run causal linkages among these markets were strengthened during the crisis. In addition, they find that these markets have generally been more integrated after the crisis than before the crisis.

DATA AND METHODOLOGY

Data

The samples of our study are taken from January 1990 to December 2005 from 8 ASEAN+3 countries namely China, Indonesia, Japan, Korea, Malaysia, the Philippines, Singapore and Thailand. This study uses *monthly money market rate* in measuring credit market integration and *end of the month closed stock exchange index* for the measurement of stock market integration. Both of the series are

obtained from *DataStream*. The data are split into two periods. The first period is the period before the 1997 financial crisis and the second period is the post-crisis period. In order to avoid non-homogeneity in the sample, we do not include the period of crisis in the estimation. In general, the 1997 Asian crisis started in July 1997 and most of the main macroeconomic variables were stabilized in June 1998. Thus, samples from period July 1997 – June 1998 are excluded in the estimation. Therefore, the pre crisis period for this study runs from January 1991 to June 1997 while the post crisis period covers from July 1998 to December 2004.

Zivot and Andrews (1992) Unit Root Test

Stationarity test is a prerequisite for every cointegration test. Many previous studies utilize the ADF unit root test to examine the stationary properties of the time series data. However, this test does not allow for a structural break in the time series data which may have a significant impact on the stationary result. Results of the test are likely to be biased towards not rejecting the existence of a unit root, especially with short time spans of data (Perron, 1989).

To account for structural changes, Perron (1989) introduced a dummy variable to the ADF test. The null hypothesis of the test is a unit root with an exogenous structural break occurring at a particular time T_B and the alternative hypothesis is that the series is stationary with an exogenous change in the trend at that particular time T_B. This procedure, however, received criticism as the exogenous determination of the break time can raise the risk of a wrong period selection. Zivot and Andrews (1992) argue that the exogenous selection of structural break could lead to an over rejection of the unit root hypothesis. They stress that inferring the break point from examination of data can make the conventional critical values for test of parameter invalid. This is supported by Christiano (1992) who indicates that the procedure invalidates the distribution theory underlying conventional testing.

Zivot and Andrews (1992) develop unit root testing procedures that allow the existence of a possible structural break in the series, without predetermining the break point time. Their procedures determine the structural break point endogenously without worrying the problem of selecting a break point subjectively. They show that the endogenous selection of break point had a major impact on the unit root results. They were unable to reject the unit root hypothesis for four of the Nelson and Plosser (1982) series, which was rejected by Perron (1989).

This study performs a unit root test for both pre- and post-crisis money market rates and stock prices using Zivot and Andrews's procedure. There are three models to test for a unit root. The first model or *Model A* (equation 1) allows a one-time change in the level of the series. The second model or *Model B* (equation 2) permits a one time change in the slope of the trend function. The third model or *Model C* (equation 3) combines one-time changes in the level and the slope of the trend function of the series.

Model A: $\quad \Delta y_t = c + \alpha y_{t-1} + \beta_t + \gamma DU_t + \sum_{j=1}^{k} d_j \Delta y_{t-j} + \varepsilon_t$ (1)

Model B: $\quad \Delta y_t = c + \alpha y_{t-1} + \beta_t + \vartheta DT_t + \sum_{j=1}^{k} d_j \Delta y_{t-j} + \varepsilon_t$ (2)

Model C: $\quad \Delta y_t = c + \alpha y_{t-1} + \beta_t + \vartheta DU_t + \gamma DT_t + \sum_{j=1}^{k} d_j \Delta y_{t-j} + \varepsilon_t$ (3)

The equations are similar to the ADF unit root test but with an inclusion of the dummy terms. DU_t is an indicator dummy variable for a mean shift occurring at each possible break-date (TB) while DT_t is the corresponding trend shift variable. Formally,

$$DU_t = \begin{cases} 1 \dots\dots if \to t \succ TB \\ 0 \dots\dots otherwise \end{cases}$$ (4)

and

$$DT_t = \begin{cases} t - TB \dots\dots if \to t \succ TB \\ 0 \dots\dots otherwise \end{cases}$$ (5)

To determine the number of k, this study follows the procedure used in Zivot and Andrews (1992) by starting backwards from a maximum lag of 12. The appropriate number of lags is determined when the value of i is chosen such that t-statistic of θ_i is greater than 1.6 in absolute value, and the statistics for θ_{i+n} for n > 0 is less than 1.6. The decision of unit root hypothesis rejection is determined by the generated critical values. Asymptotic distributions of the minimum t-statistics and critical values for rejecting the null hypothesis are provided by Zivot and Andrews (1992).

According to Perron (1989), most time series can be sufficiently modelled either by *Model A* or *Model C*. Consequently, many subsequent studies focus on these two models in their time series analyses. Sen (2003) reveals that the application of *Model A* leads to a substantial power loss if in fact the break occurs in *Model C*. However, if the break occurs in *Model A* but *Model C* is used, the loss in power is minimal. This suggests that *Model C* is superior to *Model A*. Thus, this study focuses on *Model C* in the analysis of unit root.

Gregory and Hansen (1996) Cointegration Test

Gregory and Hansen (1996) extend Engle and Granger's (1987) procedure by allowing a structural break in either the intercept or the intercept and the co-integrating coefficient at an unknown time. They propose residual based tests for

the null hypothesis of no co-integration with structural break against the alternative assumptions. The revision of the model produced these three following simple specifications with two variables:

Model C: Level shift
$$y_t = \mu_0 + \mu_1 \varphi_1 + \alpha x_t + \omega_t \tag{6}$$

Model C/T: Level shift with trend
$$y_t = \mu_0 + \mu_1 \varphi_1 + \beta_t + \alpha x_t + \omega_t \tag{7}$$

Model C/S: Regime shift
$$y_t = \mu_0 + \mu_1 \varphi_1 + \alpha_1 x_t + \alpha_2 \varphi_t x_t + \omega_t \tag{8}$$

Each of the models has a dummy variable φ_t to allow for a structural break. The dummy variable is defined as:

$$\varphi_t = \begin{cases} 1 ...... if \rightarrow t \succ \tau \\ 0 ...... otherwise \end{cases} \tag{9}$$

where τ denotes the structural breaking point in the series. The value of τ is determined using a grid search procedure with all values in the central 80% of the sample being considered. The residual ω_t, produced by the model at each value of τ is saved and employed in the following Dickey-Fuller testing equation:

$$\text{ADF*} = \Delta \hat{\omega} = (p - 1)\hat{\omega}_t + \upsilon_t \tag{10}$$

The minimum value obtained for the *t*-statistics of (ρ-*1*) is declared as the test statistics for each model. Gregory and Hansen have tabulated critical values by modifying the Mackinnon (1991) procedure. The null hypothesis of Gregory and Hansen tests is that there is a unit root in the residuals and hence there is no cointegration while the alternative hypothesis is that there is no unit root in the residuals and hence there is cointegration with a single unknown break. The null hypothesis is rejected if the statistic *ADF** is smaller than the corresponding critical value. The test statistics can also be measured using the Philip test statistics that are denoted as Z^*_α and Z^*_t. These three models can be easily extended to occupy more than one explanatory variable.

RESULTS AND ANALYSIS

Zivot and Andrews (1992) Unit Root Test

The results of the Zivot and Andrews (1992) unit root test on the money market rate series are presented in Table 1 while the results of stock prices series unit root

test are presented in Table 2. For money market rate series in the pre-crisis period, the Zivot and Andrews unit root test fails to reject the null hypothesis of a unit root at the 5 percent significance level in four countries - Japan, Korea, Singapore and Thailand. This means that the market rate series in these four countries are non-stationary. In the post-crisis period, the results show that money market rates series are non-stationary only in the Philippines and Singapore.

Table 1 Zivot and Andrews (1992) Unit Root Test on Money Market Rates

Country	Pre Crisis			Post Crisis		
	Lags	t-statistics	Break point	Lags	t-statistics	Break period
China	2	-6.39**	May 93	1	-5.11*	Oct 04
Indon	2	-7.59**	Jul 94	2	-5.70**	Oct 04
Japan	1	-3.39	Apr 92	2	-5.25*	Mar 01
Korea	1	-4.16	Oct 92	3	-6.27**	Jul 01
Malaysia	2	-5.95**	Jan 94	2	10.29**	Oct 99
Philippines	1	-6.70**	Jun 94	3	-4.05	Jan 02
Singapore	2	-3.69	Apr 93	1	-4.90	Sep 01
Thailand	1	-4.78	Jan 94	1	-8.64**	Jul 03

Note: * (**) represents significant at 5 (1) percent levels.

Table 2 Zivot and Andrews (1992) Unit Root Test on Stock Prices

Country	Pre Crisis			Post Crisis		
	Lags	t-statistics	Break point	Lags	t-statistics	Break period
China	1	-3.99	May 93	1	-5.19*	Jul 01
Indon	1	-3.82	Dec 95	3	-3.81	Jun 02
Japan	1	-4.09	Mar 92	1	-2.42	Apr 00
Korea	1	-3.81	Nov 93	1	-2.66	May 04
Malaysia	2	-5.20*	Aug 93	1	-4.58	Jun 00
Philippines	1	-4.74	Oct 93	1	-3.24	Jun 02
Singapore	1	-4.19	Aug 93	3	-3.92	Jul 03
Thailand	1	-3.39	Dec 95	1	-4.13	Feb 00

Note: * (**) represents significant at 5 (1) percent levels.

For stock prices, in the pre-crisis period, the Zivot and Andrews unit root tests fails to reject the null hypothesis of a unit root at 5 percent significance level in all countries except Malaysia. This shows that all the countries' stock prices are non-stationary except Malaysia. In the post-crisis period, the test shows that all stock prices are non-stationary except China's.

190

The break points determined by Zivot and Andrews are not consistent between series. For the money market rate, the break points in the pre-crisis period vary between October 1992 and July 1994, while in the post-crisis period, they vary between October 1999 and October 2004. For stock prices, the break points in the pre-crisis period range between March 1992 and December 1995, while in the post-crisis period, between February 2000 and May 2004.

Gregory and Hansen (1996) Cointegration Test

The Gregory and Hansen cointegration test can only be performed on non-stationary series with identical order of integration, $I(n)$. For money market rate series, the Zivot and Andrews unit root test finds 4 non-stationary series in the pre-crisis period - Japan, Korea, Singapore and Thailand. In the post-crisis period, only two series of the Philippines and Singapore are non-stationary.

For stock prices series, the tests find that all of the countries are non-stationary except Malaysia in the pre-crisis period and China in the post-crisis period. Since Gregory and Hansen's technique is a single equation model, every non-stationary series is used as a dependant variable one at a time while the rest of the non-stationary series enter the model as independent variables.

This study closely follows the set up used by Gregory and Hansen. The lag length K is selected on the basis of a *t-test* following a procedure similar to Perron and Vogelsang (1992). The K_{max} is set to 6 and then test downward (reducing K) until the last lag of the first difference included is significant at the 5 percent level using normal critical values.

Tables 3 and 4 present the results of the Gregory and Hansen cointegration test on money market rate series in the pre- and post-crisis periods, respectively.

In the pre crisis period, only two countries have significant statistics Korea and Thailand. Korea records significant Z_t* statistics at 5 percent significance level in model C and C/T. Thailand, on the other hand, registers significant ADF* statistics and Z_t* statistics at 5 percent significance level in all three models - model C, model C/T and model C/S. This results show that not all of the countries are significantly cointegrated with the other countries in the model. With this and the fact that not every ASEAN+3 country is included in the cointegration test suggest that ASEAN+3's money market rates are not fully cointegrated in the pre-crisis period.

In the post-crisis period, only two series are found to be non-stationary, the Philippines and Singapore. The results of the Granger and Hansen cointegration test find that Singapore's Z_t* statistics are significant at the 5 percent significance level in model C and model C/S implying significant cointegration of Singapore to the Philippines. However, using the Philippines as a dependant variable does not yield any significant Z_t* statistics. Nonetheless, the ADF* statistics in all three models are significant at 5 percent significance level. This shows that there is full cointegration between these two countries.

191

Table 3 Gregory and Hansen (1996) Cointegration Test on Money Market
Rate (Pre-crisis)

		ADF*	Zt*	Zα*
Japan	Model C	-4.32	-4.48	-31.33
	Model C/T	-4.32	-4.35	-31.35
	Model C/S	-4.76	-4.31	-29.19
Korea	Model C	-5.48 *	-5.55 *	-45.16
	Model C/T	-5.28	-5.73 *	-49.11
	Model C/S	-5.39	-5.73	-48.12
Singapore	Model C	-4.37	-4.39	-32.65
	Model C/T	-5.55	-4.65	-35.44
	Model C/S	-4.55	-4.66	-35.90
Thailand	Model C	-5.49 *	-5.57 *	-45.87
	Model C/T	-5.83 *	-5.91 *	-49.19
	Model C/S	-6.35 *	-6.41 *	-55.36

Note: * (**) denotes significant at 5 (1) percent confidence levels.

Table 4 Gregory and Hansen (1996) Cointegration Test on Money Market
Rate (Post-crisis)

		ADF*	Z_t*	Z_α*
Philippines	Model C	-5.22 **	-3.76	-25.26
	Model C/T	-5.23 *	-4.05	-27.03
	Model C/S	-5.81 **	-3.92	-26.26
Singapore	Model C	-4.50	-4.77 *	-31.32
	Model C/T	-4.74	-4.70	-31.34
	Model C/S	-4.67	-5.00 *	-31.88

Note: * (**) denotes significant at 5 (1) percent confidence levels.

The results of the Granger and Hansen test for money market rates in both pre- and post-crisis periods and together with the fact that not all countries are included in the cointegration test show that ASEAN+3's credit markets are not fully cointegrated. There is some degree of integration among some countries but no full integration is observed in the credit market.

Tables 5 and 6 present the results of the Gregory and Hansen cointegration test on ASEAN+3's stock prices in the pre- and post-crisis periods. Malaysia and China are excluded in the test for the pre- and post-crisis periods, respectively, because their time series are found to be stationary in the Zivot and Andrew unit root test. Therefore, for each period, only seven countries are included in the Granger and Hansen cointegration test. This means that there are six regressors for each single equation. However, asymptotic critical values provided by Gregory and Hansen (1996) are only up to 4-regressors. Since the aim of our study is to investigate the existence of full cointegration in the system, we refer our results for models that

have four or more regressors to the critical values of 4-regressors. Since higher number of regressors has higher critical values (see Table 1 in Gregory and Hansen (1996)), the insignificance of a series based on 4-regressors critical value means that the series is also insignificant if based on critical values of higher number of regressors. The existence of one insignificant statistics among the series can be used as an indicator of the absence of full integration in the system.

In the pre-crisis period, three countries, Indonesia, Singapore and Thailand, do not have significant cointegration test statistics of ADF^*, Z_t^* and Z_α^*, in all C, C/T and C/S models. The cointegration statistics in each of these countries are lower than the critical value of 4-regressors equation, which definitely must be lower than the critical values of 6-regressors equation. Therefore, this study can conclude that these three series are not significantly cointegrated with the other countries. Thus, there is no full cointegration in ASEAN+3's stock markets in the pre-crisis period, or in the economic sense, the ASEAN+3's stock markets are not fully integrated in the pre-crisis period.

Table 5 Gregory and Hansen (1996) Cointegration Test on Stock Prices (Pre Crisis)

		ADF*	Zt*	Zα*
China	Model C	-5.03	-5.65	-44.90
	Model C/T	-5.74	-6.10 *	-49.39
	Model C/S	-6.31	-7.49 **	-65.35
Indonesia	Model C	-5.08	-5.12	-32.88
	Model C/T	-5.03	-5.21	-36.37
	Model C/S	-5.60	-5.62	-40.99
Japan	Model C	-5.68 *	-5.72 *	-46.44
	Model C/T	-5.73	-5.77	-47.06
	Model C/S	-6.07	-6.20	-52.20
Korea	Model C	-5.06	-5.05	-40.99
	Model C/T	-5.84 *	-5.88 *	-49.04
	Model C/S	-6.29	-6.47 *	-54.51
Philippines	Model C	-5.42	-5.87 *	-44.24
	Model C/T	-5.02	-4.98	-36.30
	Model C/S	-6.05	-6.09	-48.04
Singapore	Model C	-5.04	-5.05	-38.62
	Model C/T	-5.04	-5.05	-38.62
	Model C/S	-5.29	-5.73	-46.69
Thailand	Model C	-5.09	-5.12	-41.98
	Model C/T	-5.59	-5.63	-47.51
	Model C/S	-5.58	-5.72	-46.82

Note: * (**) denotes significant at 5 (1) percent confidence level using 4-regressors critical value.

In the post-crisis period, Japan has non-significant ADF^*, Z_t^* and Z_α^*, in all *C*, *C/T* and *C/S* models. Since the critical value used is for 4-regressors model, the results means that there is at least one country that is not cointegrated to the other six countries. This implies that there is no full stock market integration in ASEAN+3 after the 1997 financial crisis. This finding is parallel to Forbes and Rigobon (2002) who examine the impact of various crisis events such as the 1997 Asian crisis, the 1994 Mexican crisis and the 1987 US stock market crash, on stock market co-movement. They find that cross-market linkages did not change significantly either in the pre- or post-crisis, which means that stock markets are significantly interdependent.

Table 6 Gregory and Hansen (1996) Cointegration Test on Stock Prices (Post Crisis)

		ADF*	Zt*	Zα*
Indonesia	Model C	-6.41 **	-5.68 *	-38.73
	Model C/T	-6.82 **	-5.86 *	-45.79
	Model C/S	-7.65 **	-7.28 **	-68.68
Japan	Model C	-4.76	-4.67	-38.60
	Model C/T	-4.56	-4.21	-34.39
	Model C/S	-5.69	-5.67	-53.24
Korea	Model C	-4.26	-4.29	-34.18
	Model C/T	-4.70	-4.78	-37.45
	Model C/S	-6.95 **	-6.45 *	-58.48
Malaysia	Model C	-6.11 **	-5.98 *	-52.34
	Model C/T	-7.22 **	-7.26 **	-66.97 *
	Model C/S	-6.96 **	-7.03 **	-65.13
Philippines	Model C	-5.07	-5.09	-40.47
	Model C/T	-5.36	-5.39	-44.54
	Model C/S	-7.13 **	-7.25 **	-68.34
Singapore	Model C	-6.13 **	-6.28 **	-54.32
	Model C/T	-6.52 **	-6.58 **	-58.44
	Model C/S	-7.31 **	-7.71 **	-72.06
Thailand	Model C	-5.49	-5.60 *	-45.70
	Model C/T	-6.23 *	-6.29 *	-53.57
	Model C/S	-6.73 *	-6.77 *	-60.37

Note: * (**) denotes significant at 5 (1) percent confidence level using 4-regressors critical value.

DISCUSSION

The results of the Gregory and Hansen (1996) cointegration tests suggest that both regional credit markets and stock markets have yet to reach full integration in both

pre and post crisis periods. The use of this test does not indicate any significant improvement in the level of credit market and stock market integration between these two periods. The results are not really a surprise although many efforts have been taken to foster economic relationship among the member countries.

Several factors contribute to the low integration and the absence of full integration in ASEAN+3's financial market. First is that the process of financial integration in the region is only in its early stages. The region focused more on trade activities in its early years of economic cooperation. The activities on the financial integration have only intensified after the 1997 financial crisis. Second is that the process of integration in the region is weakly institutionalized. The process is a multi-polar which is not driven by an alliance of key nations unlike France and Germany in the Europe, or by hegemonic powers unlike the United States in the Western Hemisphere. Third is the small size of financial sector in most of the regional countries except Japan and Singapore. For example, the sizes of banking sector in the region are small which have inadequate and system and administration structure. This hinders the development of regional capital markets especially in countries where financial systems are primarily oriented.

Other than the above three factors, the low degree of financial integration is also attributed by the differences in the regional institution such as the legal system, tax system, corporate governance and perception of corruption in the individual ASEAN+3 countries.

Institutional Differences

The differences of the ASEAN+3 legal and institutional frameworks can have an impact on the degree of the region's financial integration. Some of the institutional difference indicators used in studies of financial integration include the differences in legal system, tax system, corporate governance and perception of corruption in individual ASEAN+3 countries. These indicators do not reflect the degree of financial integration but they are suggestive in explaining the sources of segmentation.

For institutional differences, this study uses indices constructed by Djankov *et al*. (2001) to discuss how the difference in ASEAN+3's legal systems might affect the region's financial integration. Djankov *et al*. have many indices but we focus on a collection of bounced cheque as an indicator for legal system efficiency. The index of corporate governance is obtained from La Porta *et al*. (1998), who examine three aspects of ASEAN+3's corporate governance - creditor rights, anti-director rights and accounting standards. Corruption perception index is obtained from Transparency International's 2001 Corruption Perception Index, which was released in June, 2001. For tax system, we use the main features of the corporate tax systems to discuss the differences of ASEAN+3's tax system.

The Legal System

Generally, the legal systems of ASEAN+3 countries originate from four different systems. For Malaysia, Singapore and Thailand, their laws are based on the *English legal system*. The legal system in China, on the other hand, originates from the *Socialist legal system*. The legal systems for Japan and Korea originate from the *German legal system* while Indonesia's law originates from the *French legal system*. Different legal systems structurally operate in different ways. For example, legal systems that are based on the English laws which are known as the common law rely on judges, broader legal principles, and oral arguments. On the other hand, the legal systems that are based on the French and German laws, also known as the civil law, rely on professional judges, and the legal and written codes. La Porta *et al*. (1998) suggest that origin of legal systems is one factor that contributes to the differences in judicial efficiency observed across countries. It is argued that common law countries are more efficient in their judicial systems compared to civil law countries (La Porta *et al*., 1998). An efficient judicial system is expected to lower enforcement costs, which in turn have a positive impact on the availability and terms of funding to firms and households. D'Amuri and Marenzi (2005) show that judicial system efficiency improves credit availability and lowers collateral requirements and interest rates. Thus, differences in the origins of the legal systems in ASEAN+3 countries can be a potential factor in the region's low financial integration.

Table 7 Regulation of Dispute Resolution Index and Expected Duration of the Procedure of Collection of A Bounced Cheque

Countries	RDR Index	Duration (days)
China	4.13	180.00
Indonesia	4.38	225.00
Japan	2.79	60.00
Korea	4.00	75.00
Malaysia	3.00	90.00
Philippines	5.50	164.00
Singapore	3.21	46.50
Thailand	3.88	210.00
ASEAN+3 mean	3.86	131.31
Socialist Law	4.13	180.00
Common Law	3.36	115.50
Civil Law	4.17	131.00
French Legal System	4.94	194.50
German Legal System	3.39	67.50

Notes: RDR refer to Regulation of Dispute Resolution
Sources: Djankov *et al*. (2001)

196

Djankov *et al*. (2001) propose a *regulation of dispute resolution* index, which measures the extent of the differences between legal procedures and informal dispute resolution. The index, which is constructed from results of a survey that focuses on the complexity of litigation on the collection of bounced cheques and the eviction of non-paying tenants, ranges from 0 to 7 with a higher value indicating a more regulated dispute. Table 7 presents the regulation of dispute resolution index for ASEAN+3 countries.

Countries with laws originating from French legal system have the highest index, which indicates that their dispute resolutions are more heavily regulated leading to higher expected duration of the dispute. On the other hand, countries with legal systems originating from the Common law have the lowest index values. This is intended as an illustrative example rather than a conclusive one. Overall, it is important to note that there are differences in the legal systems in ASEAN+3 that may act as an obstacle to the integration process of financial markets.

Tax System

The structure of the corporate income tax system and tax incentives offered by the host country can influence the inflow of foreign direct investments and portfolio investments. If expected rates of return from different locations are similar, a lower corporate tax rate could determine the final investment location decision. Therefore, most countries regularly review their tax policies to keep them competitive and attractive to foreign investments. The same applies to ASEAN+3. In order to attract the inflow of investments, these countries compete to have more attractive tax policy which results in the differences in their tax systems.

Different tax legislation can be one of the major obstacles to regional financial integration. Firms from countries with low corporate income tax rate would not be very keen to invest in countries that have a higher rate of corporate tax, but prefer to invest in countries with lower corporate income tax rate or maintain their investment domestically to retain their profit margin. Clearly, an increase in tax rate on multinational firms reduces inward foreign direct investment (Wei, 2000). Thus, a region with relatively higher dissimilarity taxation system is not very likely to have well balanced capital mobility, which consequently lowers the possibility of regional financial market integration.

Table 8 reports the main features of the corporate tax systems in selected ASEAN+3 countries, revealing the differences in the region's tax systems. For example, the corporate income taxation is low in South Korea at 27 percent followed by Malaysia at 28 percent while it is high at 33 percent in China. These differences can be a barrier to further promote financial integration in the region. Although foreign direct investment is rising in China despite its high corporate tax rate, this is mostly due to relatively lower labour and operational cost.

Table 8 Main features of corporate tax systems in selected ASEAN+3 countries

	China	Malaysia	Thailand	Japan	Korea
Standard CIT* rate	33% (state tax of 30% and local tax of 3%)	28%	30%	30%	27%
Inter-company dividends	Fully/partially excluded	Included as part of the taxable income	Fully/partially excluded	Fully/partially excluded	Fully/partially excluded
Dividend withholding taxes	20%	Included as part of the taxable income	10%	Partially included as a part of taxable income for PIT or 20%	Included as part of the taxable income
Capital gains	CIT rate	CIT rate	CIT rate	CIT rate Surtax of 5% on gains from land or similar properties	CIT rate
Treatment of losses	5 years carried forward	Carried forward Indefinitely	5 years carried forward	5 years carried forward: 1 year carried back	5 years carried forward

Note: CIT refer to Corporate Income Taxation.
Source: D'Amuri and Marenzi (2005)

Corporate Governance

Corporate governance is believed to impact upon the behaviour and performance of corporations and its role is seen as increasingly important in shaping the process of integration in the EU. Investors are more interested in investing in a country with credible and well understood corporate governance systems. Well-functioning corporate governance systems improve investors' confidence, reduce cost of capital, and induce more stable sources of financing (Adam *et al*., 2002). In a closely interconnected global economy, investors are ever more demanding and discriminating. In order to promote the development of deep and liquid, and hence more stable financial markets and create a favourable investment climate, a country should create conducive corporate governance mechanisms. Transparent corporate governance is currently seen as a prerequisite for countries wanting to exploit all the benefits of the global capital market and promote increased integration (Adam *et al*., 2002).

This study defines corporate governance as mechanisms that minimize agency conflicts involving managers, with particular emphasis on the legal mechanisms that prevent the expropriation of minority share holders (see Shleifer and Vishny,

1997). A detailed examination of insider ownership in some emerging markets by La Porta *et al*. (1998) suggests that the lack of good governance becomes important when growth prospects deteriorate. The absence of effective shareholder protection can cause a large drop in economic growth when even a mild shock exists. In ASEAN+3, some jurisdictions already employ standards and practices in line with the international norm. However, other countries in the region require full compliance and changes to the national, legal and regulatory framework to improve their corporate governance mechanisms.

We utilize the corporate governance indices by La Porta *et al*. (1998) and argue that this contributes to the low financial market integration in ASEAN+3. Indices are from four aspects of corporate governance namely enforceable minority shareholder rights, anti-director rights, creditor rights and accounting standard, are constructed for each ASEAN+3 country. Except for accounting standards, the indices for some regional countries are above world average while the rest are below. Overall, the corporate governance indices in ASEAN+3 as presented by Table 9 provide mixed results.

Table 9 Corporate Governance Indices in ASEAN+3

	Enforceable minority shareholder rights	Anti directors right	Creditor rights	Accounting standards, 1990
China	n.a	n.a	n.a	n.a
Indonesia	1.0	2	4	n.a
Japan	n.a	4	2	65
Korea	1.0	2	3	62
Malaysia	2.0	4	4	76
Philippines	3.0	3	0	65
Singapore	4.0	4	4	78
Thailand	2.0	2	3	64
World Average	n.a	3	2.3	60.93

Source: La Porta, R., Lopez-de-Silanes, F., Shleifer, A. and Vishny, R. (1998).

Among ASEAN+3 countries, Singapore has the highest indices in all areas. Singapore's indices are also higher than the world average. For other countries, at least one of their indices is below the world average. For example, the index for anti-director rights in Indonesia, Korea and Thailand are 2, below the world average of 3. Japan and the Philippines, on the other hand, score 2 and 0 for creditor rights index, respectively, below the 2.3 world average. For enforceable minority shareholder rights, Indonesia and Korea have a very low index of 1.0, compare to the maximum score of 4.0.

The corporate government indices reveal large variations in the level of regional corporate governance that reflect the lack of adequate disclosure standard. This may seriously undermine the ability of investors to compete for globally mobile

capital. This may impose unnecessary uncertainty to investors operating in the Single Market and, thus, constitute an obstacle to the integrated ASEAN+3 financial markets. According to a report by the European Corporate Governance Network in 1997, international fund managers do not approve obscurity. Therefore, they will demand high risk premiums when disclosure standards are low and they do not invest at all when the disclosure standards are very low.

Corruption

Another aspect that could have negative influence on financial integration is corruption. According to Mauro (1995), corruption can have many detrimental effects on the host countries. In the economic sphere, corruption may reduce growth that is possibly due to reduced domestic investment. In political-economy terms, corruption often contributes to an unfair income or wealth distribution, and can breed political instability. It is argued that an increase in the countries' level of corruption level may reduce inward foreign direct investment (Wei, 2000).

Table 10 presents transparency international's 2001 corruptions perception index (CPI) on ASEAN+3 countries. Perceived corruption in ASEAN+3 is measured to vary from very clean (Singapore, with a score of 9.2 out of 10), to very corrupt (Indonesia, at 1.9). All the countries, except Singapore and Japan, have CPI score at or below 5. Compared to 1997, none of the countries achieved a full one index point improvement in 2001. None of the countries, (except Singapore) improved their world ranking since 1997 though some countries namely China, Japan and Thailand, show some improvement in the index score.

Table 10 Transparency International Corruption Perceptions Index

	2001	World Rank*	1997**	World Rank**
China	3.5	57	2.9	41
Indonesia	1.9	88	2.7	46
Japan	7.1	21	6.6	21
Korea	4.2	42	4.3	34
Malaysia	5	36	5	32
Philippines	2.9	65	3.1	40
Singapore	9.2	4	8.7	9
Thailand	3.2	61	3.1	39

Source: Asia Pacific Bulletin #14. Website: http://www.asiapacific/ca/apbn/bulletin.cfm.

The index suggests that perceived corruption level varies among ASEAN+3 countries. In general, countries can be grouped into three groups based on the level of CPI. High CPI group consists of Singapore and Japan, average CPI group consists of Malaysia and Korea, and low CPI group consists of China, Indonesia, the Philippines and Thailand. As corruption can be costly, investors are less keen

to invest in countries that have relatively lower CPI index, all other conditions remain similar. In this case, regional investors will prefer to invest in countries that have better CPI such as in developed countries like the Western Europe or the US. This may contribute to the stronger ties between several East Asian countries and the developed countries than those among the East Asian countries (Park & Bae, 2002).

CONCLUSION

This study measures the progress of financial market integration in ASEAN+3 using credit market and stock market as indicators. The results of the Gregory and Hansen (1996) cointegration test indicates that both the region's credit markets and stock markets are partially integrated which suggests that regional financial integration exists in ASEAN+3 but the level is considerably low. There is no clear sign that the 1997 financial crisis had a positive influence on the region's financial market integration whcih may imply that the measures that have been implemented and planned by ASEAN+3 have yet been successful to improve the region's economic integration.

Several factors are likely to have contributed to low ASEAN+3's financial market integration. Those are the early stages of regional financial market integration in ASEAN+3 where individual countries still maintain domestic controls and restrictions that hinder integration, the weakly institutionalized process of integration in ASEAN+3 without an alliance of key nations or a hegemonic power as in Europe and Western Hemisphere, and, the small size of financial institutions in the region that have inadequate systems and administration structures to manage a huge amount of investment from foreign investors.

Differences in the legal and institutional framework in the region are argued to be another factor for the low degree of ASEAN+3's regional financial market integration. The legal systems in ASEAN+3 originated from four different legal systems that have markedly different levels of efficiency. Efficient judicial system facilitates financial market integration by lowering enforcement cost, which in turn lead to the availability and the terms of funding to firms and households. The differences in the region's tax systems, the relatively inferior corporate governance systems in some of the countries and the considerably high perceived corruption levels in many of the countries have clear adverse consequences for the region's financial market integration.

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