Financial Integration between Indonesia and Its Major Trading Partners

Abdul Karim, Bakri and Abdul Majid, M. Shabri and Abdul Karim, Samsul Ariffin

Universiti Malaysia Sarawak, International Islamic University Malaysia, Universiti Teknologi Petronas

14 September 2009

Financial Integration between Indonesia and Its Major Trading Partners

Bakri Abdul Karim[1], M. Shabri Abd. Majid[2] and Samsul Ariffin Abdul Karim[3]

[1]Department of Business, Faculty of Economics and Business, Universiti Malaysia Sarawak, 94300, Kota Samarahan, Sarawak. e-mail: akbakri@feb.unimas.my

[2]Department of Economics, Kulliyyah of Economics and Management Sciences, International Islamic University of Malaysia (IIUM), P.O. Box 10, 50728 Kuala Lumpur, Malaysia. E-mail: mshabri@iiu.edu.my

[3]Fundamental and Applied Sciences Department, Universiti Teknologi Petronas, Bandar Seri Iskandar, 31750 Tronoh, Perak. E-mail: samsul_ariffin@petronas.com.my

Abstract

This study examines stock market integration among the emerging stock market of Indonesia and its major trading partners (Japan, the US, Singapore and China). We employ the newly proposed autoregressive distributed lag (ARDL) approach to cointegration and recent weekly stock market data spanning from July 1998 to December 2007. The results indicate the Indonesian stock market is cointegrated with the stock markets of the US, Japan, Singapore and China. Thus, this implies that the opportunities for international investors to gain benefits from international portfolio diversification in those markets are limited. In addition, any development in Japan, the US, Singapore and China markets should be considered by the Indonesian government in making policies regarding to the stock market of Indonesia.

***Key words**: Stock Market Integration: Portfolio Diversification; Trading Partners*

1. Introduction

The issue of dynamic linkages among stock markets has been extensively researched in the literature of financial economics. Interest in stock market integration arises primarily because financial theory suggests that an integrated regional stock market is more efficient than segmented national capital markets. With an integrated regional stock market, investors from all member countries will be able to allocate capital to the locations in the region where it is the most productive (Click and Plummer, 2005). The degree of linkages or integration among the stock markets provides important implications for the potential benefits of the international portfolio diversification and financial stability of a country (Ibrahim, 2005). Stock market integration tends to create a long-run equilibrium relationship, which ties price movements in national stock indices and could considerably reduce benefits from international portfolio diversification. Based on a survey on the available empirical evidence on market integration across national capital markets, Goldstein and Michael (1993) found that the international links have been increasing over the past decade, especially for the stocks traded actively in the major financial centres. An increasing integration among the national stock markets further implies that international financial instabilities are easily transmitted to domestic financial markets, a phenomenon called 'financial contagion' (Ibrahim, 2005).

Despite voluminous studies on stock market integration in global markets such as Solnik (1974), Arshanapalli *et al.* (1995), Janakiraman and Lamba (1998), Masih and Masih (1999), Daly (2003), Yang *et al.* (2003), Ibrahim (2005), Yusof and Majid (2006) and Majid *et al.* (2008), there is none previous empirical research focusing on whether the Indonesian stock market is integrated with its major trading partners namely Japan, the United States (henceforth US), Singapore and People's Republic of China (henceforth China). In addition, Roll (1995) affirmed that although Indonesia has had an active equity market for a number of years, no empirical studies on this market have appeared in Western scholarly journals. Some other studies included Indonesia in their sample as part of broader studies of stock market integration in Asia Pacific markets (e.g., Janakiraman and Lamba, 1998; Masih and Masih, 1999; Ng, 2002; Daly, 2003; Majid *et al.* 2008).

Table 1. International Trade between Indonesia and its Major Trading Partners, 2000-2007

Year	JPN	US	SING	CHN	Subtotal
Panel A: % Share of exports to countries out of total exports					
2000	23.21	13.67	10.56	4.46	51.89
2001	23.10	13.78	9.52	3.91	50.31
2002	21.07	13.24	9.36	5.08	48.76
2003	22.30	12.11	8.85	6.23	49.49
2004	22.31	12.28	8.39	6.44	49.41
2005	21.08	11.55	9.15	7.78	49.56
2006	19.39	11.48	11.82	7.70	50.39
2007	18.56	10.93	10.54	8.76	48.79
Average	21.38	12.38	9.77	6.29	49.83
Average export growth	7.83	7.99	13.52	23.73	10.63
Average growth total	11.40				
Panel B: % Share of imports from countries out of total imports					
2000	16.10	10.12	11.31	6.03	43.57
2001	15.14	10.37	10.16	5.95	41.63
2002	14.09	8.45	13.10	7.76	43.40
2003	12.99	8.30	12.77	9.08	43.14
2004	13.07	6.96	13.07	8.81	41.92
2005	11.97	6.73	16.41	10.13	45.24
2006	8.76	3.66	29.59	11.24	53.25
2007	8.58	4.08	28.38	12.23	53.27
Average	12.59	7.33	16.85	8.90	45.68
Average . import growth	10.34	6.25	46.33	34.02	26.00
Average growth total	21.17				

Source: Asian Development Bank (2008)

Indonesia is a growing and relatively open economy with trade and foreign direct investment play significant role in driving its economy. The opening of the equity market in Indonesia and other Asian emerging markets during the 1980s has resulted in a rising interest in investing in these markets. This is evidenced by the creation of huge various investment funds that focus on this region by international fund management houses (Hung and Cheung, 1995). We consider whether the Indonesia stock market is integrated with the US, Japan and Singapore stock markets because of the importance of these

economies to Indonesia as trading partners and in terms of investment flows. Taylor and Tonks (1989) noted that a stronger financial integration would be expected among countries that reduce trade barriers and develop stronger economic ties. In addition, Chen and Zhang (1997) also noted that countries with strong economic ties tend to have financial markets that move together. Stronger the bilateral trade ties between two countries, the higher of comovements (Masih and Masih, 1999; Bracker *et al.* 1999). In addition, Kearney and Lucey (2004) noted that the world's economic and financial systems are becoming increasingly integrated due to the rapid expansion of international trade in commodities, services and financial assets. The share of exports and imports from Indonesia to these four countries were relatively high. Table 1 shows the total volume of exports and imports were about 48.79% (USD61.704 billion) and 53.27% (USD60.831 billion) respectively at the end of 1997.

The purpose of the present paper is to examine the stock market integration among Indonesia and its major trading partners, i.e., Japan, the US, Singapore and China. This paper contributes to literature in three ways. First, we examined the stock market integration among Indonesia and its four major trading partners which has not been documented in the previous literature. Second, this paper differs from previous studies because this study employs recent newly developed procedure of autoregressive distributed lag (ARDL) bound testing approach (Pesaran *et al.*2001). Current studies have indicated that the ARDL approach or bound testing approach to cointegration is preferable to other conventional cointegration approaches such as Engle and Granger (1987), Gregory and Hansen (1996), Johansen (1988) and Johansen and Juselius (1990). This methodology to the best of our knowledge goes clearly beyond the existing literature on the subject in Indonesia. Third, this study utilizes recent post-crisis weekly data from July 1998 to December 2007. Thus, this study attempts to partially fill the gap in the literature and to provide recent empirical evidence on stock market integration between Indonesia and its major trading partners (Japan, the US, Singapore and China), adopting ARDL procedure and more recent sample of data.

The rest of the paper is structured as follows. Section 2 provides literature review while Section 3 describes the empirical framework, ARDL and provides the description of the data. Section 4 offers empirical results and discussion. Finally, Section 5 presents concluding remarks.

2. Literature Review

There have been many studies investigating financial integration from different perspectives such as stock markets, bond markets and exchange rates, including regional trade arrangements and Yen bloc. Earlier studies on the stock market integration (See e.g. Grubel, 1968; Levy and Sarnat, 1970; Solnik, 1974) found lower correlations among national stock markets; therefore suggest potential benefits of international portfolio diversification. However, Goldstein and Michael (1993) found evidence that the international stock market linkages have been increasing over the past decade, especially for the stocks traded actively in the major financial centres. The impact of the October 1987 stock market crash and the 1997 Asian financial crisis on stock market integration has also drawn much attention among economists and practitioners for instance Arshanapalli *et al.* (1995); Francis *et al.* (2002); and Yang *et al.* (2003). They noted that the stock markets have become more cointegrated after the crisis.

In recent years, the vast growing economic activities and the increasing investment opportunities in some Asian emerging markets have attracted investors and researchers' attention. Examples of these recent studies include Cheung and Mak (1992), Hung and Cheung (1995), Palac McMiken (1997), Roca *et al.* (1998), Janakiramanan and Lamba (1998), Masih and Masih, (1999), Azman-Saini *et al.* (2002), Ng (2002), Ibrahim (2005), and Majid *et al.* (2008). It is well documented that the US market is the most dominant in influencing variations in other developed and emerging equity markets. For example, Cheung and Mak (1992) noted the US market is a 'global factor' which leads most of the Asian emerging markets. Consistent with Arshanapalli *et al.* (1995), Ibrahim (2005) found evidence that the ASEAN markets respond quickly to shocks in the US regardless of the sample period but seem to be less influenced by the Japanese market. Using monthly data from January 1987 to October 1995 and cointegration approach, Palac McMiken (1997) found with the exception of Indonesia all other ASEAN markets were linked to each other. In contrast, Roca *et al.* (1998) found no evidence of cointegration among them. However, with the exception of Indonesia, these markets had significant short-run linkages. Janakiramanan and Lamba (1998) also found that the Indonesian market was a relatively isolated market. Using Granger non-causality test and weekly data from January 1988 to August 1999, Azman-Saini (2002) found the dominance of the Singaporean market in the region. With the exception of Malaysia, the Indonesian market was affected by other ASEAN markets but did not significantly influence the other markets.

Ibrahim (2005) examined the international linkages of the Indonesian stock market during the pre- and post crisis periods using cointegration and vector autoregression (VAR). He found evidence for lack of cointegration among the Indonesian market, other ASEAN markets and two advanced markets (the US and Japan) during both period. In addition, the Indonesian markets became more segmented from other ASEAN markets but more responsive to the developed markets of the US and Japan during the post-crisis period. Thus, past studies have documented a particularly interesting finding that the Indonesian market seems to be generally segmented from the advanced markets and other ASEAN markets either in the long-run or short-run. However, consistent with Ng (2002), Majid *et al.* (2008) noted that the Asian stock markets are going towards a greater integration either among themselves or with the US and Japan, especially in the post-1997 financial crisis.

McCauley *et al.* (2002) examined the East Asia's bond and loan markets integration for the period of 1999-2002. They found both markets become more integrated. In contrast, in their recent study, Yu *et al.* (2007) found weak bond market integration in the region during 1997 to 2003 period. They noted that the lack of progress might be due to the "local" or "idiosyncratic" factors in some Asian economies. Plummer and Click (2005) argued that the deepening of local bond markets could strengthen the financial integration. As for the exchange rate integration, Aggarwal and Mougoue (1996) documented that Asian currencies are found to be cointegrated, with the influence of the Japanese Yen increasing relative to the US dollar in recent years. Since 1980, economic integration among Japan's neighbours has been intensified and their business cycles have been highly synchronised. These cycles have been closely linked to fluctuations in the Yen/Dollar exchange rate - through changes in the export

competitiveness, inflows of foreign direct investment and intra-Asian income effects (McKinnon and Schnabl, 2003).

Interest in a Yen bloc in Asia has been on the rise because of a deepening economic interdependence between Japan and its neighbours. The onset of the Asian currency crisis, the introduction of the Euro in Europe, and the implementation of Japan's financial reform program have contributed to ongoing discussions on the possibility among policymakers in those countries (Kwan, 2001). With Yen bloc, Japan would become the centre of gravity of the Asian Pacific economy. As the region becomes increasingly integrated, more business activity goes into the gravitational pull of Japan and its corporations. Trade and investment within the region would continue to grow faster than the rest of the world.

3. Empirical Framework

3.1 Autoregressive Distributed Lag (ARDL) Model

The study employs the autoregressive distributed lag (ARDL) bounds test proposed by Pesaran *et al.*(2001) to investigate the cointegration relationship among the Indonesian stock market and the stock markets of its major trading partners namely Japan, the US, Singapore and China. The bounds testing procedure does not require the pre-testing of the variables included in the model for unit roots unlike other techniques such as the Johansen and Juselius (1990) approach. Pesaran and Shin (1995) show that with the ARDL framework, the ordinary least squares (OLS) estimators of the short-run parameters are consistent and the ARDL based estimators of the long-run coefficients are super-consistent in small sample sizes. However, Narayan *et al.* (2004) noted that increasing the number of observations through using high frequency data does not add robustness to the cointegration results because what matters is the length of the period, rather than the number of observations. Additionally, another advantage of the ARDL is the ARDL model takes sufficient number of lags to capture the data-generating process in a general-to-specific modelling framework. It estimates $(p+1)^k$ number of regressions to obtain optimal lag-length for each variable, where p is the maximum lag, and k is the number of variables in the equation (Laurenceson. and Chai, 2003). In addition, the bounds test procedure is simple. As opposed to other multivariate cointegration techniques such as Johansen and Juselius (1990), it allows the cointegration relationship to be estimated by OLS once the lag order of the model is identified (Fosu and Magnus, 2006).

The ARDL procedure involves two stages. In the first stage, we establish a long-run relationship exists among the variables. The second stage involves estimating the long-run and short-run coefficients of equations conditional on whether the variables are cointegrated. Details of the mathematical derivation of the long-run and short-run parameters can be found in Pesaran *et al.* (2001). The long-run multivariate ARDL model employed in this study can be written as follows:

Indonesia:

$$INA_t = \alpha_0 + \beta_1 JPN_t + \beta_2 US_t + \beta_3 SING_t + \beta_4 CHN_t + \varepsilon_t \quad (1)$$

Japan:

$$JPN_t = \alpha_0 + \beta_1 INA_t + \beta_2 US_t + \beta_3 SING_t + \beta_4 CHN_t + \varepsilon_t \quad (2)$$

The US:

$$US_t = \alpha_0 + \beta_1 INA_t + \beta_2 JPN_t + + \beta_3 SING_t + \beta_4 CHN_t + \varepsilon_t \quad (3)$$

Singapore:

$$SING_t = \alpha_0 + \beta_1 INA_t + \beta_2 JPN_t + \beta_3 US_t + \beta_4 CHN_t + \varepsilon_t \quad (4)$$

China:

$$CHN_t = \alpha_0 + \beta_1 INA_t + \beta_2 JPN_t + \beta_3 US_t + \beta_4 SING_t + \varepsilon_t \quad (5)$$

Here *INA, JPN, US, SING* and *CHN* are the natural logs of the stock prices in Indonesia, Japan, the US, Singapore and China respectively, while the ε term is serially independent random error with mean zero and finite covariance matrix. To implement the bound test consider a vector of variables: A_t where $A_t=(y_t,x_t)'$, y_t is the dependent variable and x_t is a vector of regressors. The data generating process of A_t is a p-order vector autoregression. For cointegration analysis, Δy_t is modelled as a conditional error correction model (ECM) as follows:

$$\Delta y_t = \alpha_0 + \pi_{yy} y_{t-1} + \pi_{yx.x} x_{t-1} + \sum_{i=1}^{p} \theta_i \Delta y_{t-i} + \sum_{j=0}^{p} \varphi_j \Delta y_{t-i} + \mu_t \quad (6)$$

Here, π_{yy} and $\pi_{yx,x}$ are long-run multipliers, is the drift. Lagged values of Δy_t and current and lagged values of Δx_t are used to model the short-run dynamic structure. The presence of cointegration is traced by restricting all estimated coefficients of lagged level variables equal to zero. That is, the null hypothesis H_0: = $\pi_{yy} = \pi_{yx.x} = 0$ against the alternative, hypothesis H_a: $\pi_{yy} \neq \pi_{yx.x} \neq 0$. These hypotheses can be examined using the critical values bounds as tabulated in Pesaran *et al.* (2001). The relevant critical value bounds are based on case III with unrestricted intercepts and no trend and number of regressors, *k* are 4. Critical value bounds exist for all classifications of the regressors into purely *I*(1), purely *I*(0) or mutually cointegrated. If the computed *F*-statistic is less than lower bound critical value, then we do not reject the null hypothesis of no integration. However, if the computed *F*-statistics is greater than upper bound critical value, then we reject the null hypothesis and conclude that there exists steady state equilibrium between the variables under study. However, if the computed value falls within lower and upper bound critical values, then the result is inconclusive.

The above model is based on the assumption that the error term is serially uncorrelated. Thus, it is important that the lag order *p* of the underlying model is chosen appropriately (Pesaran *et al*. 2001). The order of the distributed lag on the dependent variable and the regressors is selected using either Akaike Information Criterion (AIC) of the Schwartz Bayesian Criterion (SBC). SBC selects the smallest possible lag length, while AIC selects the maximum relevant lag length. Since we use weekly data, this study will use AIC as the lag selection criterion.

3.2 Data

The data used in this study are weekly stock indices spanning from July 1998 to December 2007. The study employs weekly data instead of higher frequency data to avoid the problem of non-synchronous trading. The daily data contain too much noise and are subject to the problem of non-synchronous infrequent trading (Ibrahim, 2005). Thus, this might lead to erroneous conclusion in the lead-lags relationship among the variables. However, the problem could be reduced if a weekly interval of the indices is used (Hung and Cheung, 1995). The following indices are used to represent the markets: the Jakarta Composite Index (JCI) for Indonesia, the Standard and Poor 500 (S&P 500) Index for the US, the Tokyo Price Index (TOPIX) for Japan, the Singapore Straight Time Index (SSTI) for Singapore and the Shenzhen Stock Exchange Composite Index (SSE-CI) for China. All indices are based on local currency and are collected from the Bloomberg Database. All series are transformed into natural logarithm.

Table 2 presents the descriptive statistics of the data, including sample means, maximums, minimums, standard deviations, skewness, kurtosis as well as the Jarque-Bera statistics and *p*-values. The highest mean return is 0.36 percent in Indonesia while the lowest is 0.03 percent in Japan. The standard deviations range from 2.36 percent in the US (the least volatile) to 3.80 percent in Indonesia (the most volatile). All weekly stock returns, have excess kurtosis (greater than 3), which means that they have a thicker tail and a higher peak than a normal distribution. The Jarque-Bera statistics and *p*-values indicate the rejection of normality on these five markets' weekly return data set. The findings from the preliminary analysis for the Indonesian stock market are in line with the studies of Palac-McMiken (1997), Ibrahim (2005) and Majid *et al.* (2008).

Table 2. Summary Statistics of the Stock Returns

	INA	JPN	US	SING	CHN
Mean	0.0036	0.0003	0.0005	0.0023	0.0026
Maximum	0.1629	0.0730	0.0749	0.1366	0.1140
Minimum	-0.1763	-0.0987	-0.1233	-0.1205	-0.1076
Std. Dev.	0.0380	0.0262	0.0236	0.0295	0.0339
Skewness	-0.0468	-0.2543	-0.5240	0.0824	0.2306
Kurtosis	6.1092	3.1679	5.8085	5.5787	4.1666
Jarque-Bera	199.5693	5.9159	185.3361	137.7150	32.4582
Probability	0.0000	0.0519	0.0000	0.0000	0.0000

Table 3 provides the correlation matrix among weekly market returns. The correlations among various stock markets returns are positively and generally

significantly different from zero. Only the relatively isolated market of China exhibits low and statistically insignificant correlations with the most other markets. We also note that the correlation of Indonesia-Singapore is higher than other Indonesia's trading partners. This might be due to geographic proximity and close relationship between the two stock markets.

Table 3. Correlation of the Stock Returns

	INA	JPN	US	SING	CHN
INA	1.0000				
JPN	0.2832	1.0000			
US	0.1858	0.3958	1.0000		
SING	0.4254	0.4649	0.4538	1.0000	
CHN	0.1018	0.0845	0.0160	0.1152	1.0000

4. Empirical Results

Before estimating the short- and long-run relationships among the variables, we have to decide on the lag-length on the first difference variables. Pesaran and Shin (1998) noted that ARDL model requires a priori knowledge of the orders of the extended ARDL that is sufficient to simultaneously correct for residual serial correlation and the problem of endogenous regressors. In this study, the order of the distributed lag on the dependent variable and the regressors is selected using AIC with no serial correlation in the model. Based on AIC, the optimal lag-length is found to be three.

The results of the bounds tests for cointegration are reported in Table 4. Narayan *et al.* (2004) noted that another advantage of the ARDL approach is that we can tell which series is the dependent variable from the F-test when cointegration exists. The F-test shows that the null hypothesis of no cointegration among the variable in equation (1), equation (2) and equation (4) cannot be accepted because F_{INA} (.), F_{JPN}(.) and F_{SING}(.) exceed the upper bound critical value at least at 10 percent level. Therefore, there is long-run relationship among the variables when stock prices in Indonesia, Japan and Singapore are treated as the dependent variable. However, for equations (3) and (5) the F-statistic is less than the lower bound critical value and the null hypothesis of no cointegration is accepted.

Table 4. F-statistics for testing the existence of a long-run relationship among variables

Equation	**The computed F-statistics**	**Outcome**
F (INA / JPN, US, SING, CHN)	3.6293*	Cointegration
F (JPN / INA, US, SING, CHN)	5.7398**	Cointegration
F (US / INA, JPN, US, CHN)	2.2991	No Cointegration
F (SING / INA, JPN, US, CHN)	5.8037**	Cointegration
F (CHN / INA, JPN, US,SING)	2.5952	No Cointegration

Note: The relevant critical value bounds are obtained from Pesaran *et al.*(2001), where the critical values in the case of 4 regressors are 2.86 – 4.01 at the 95% significance level and 2.45 – 3.52 at the 90% significance level. * denotes that F-statistics fall above the 90% upper bound and ** denotes above the 95% upper bound.

Following the establishment of the existence of cointegration, in the second stage, we retain the lagged level of variables and estimate equation (1), equation (2) and equation (4) using AIC lag selection criterion (with maximum order set at 3) and estimate the long-run and short-run together with the relevant diagnostic tests for the short-run model. The long-run coefficient estimates are reported in Table 5 while the estimates of the ECM (short-run coefficients) are presented in Table 6. We use ECM to confirm the existence of a stable long-run relationship and cointegration relationship among variables.

Table 5. Estimated Long- run Coefficients using the ARDL model Selected based on AIC
Dependent variables: INA, JPN and SING

Regressors	**INA (ARDL 1,1,3,1,3)**	**JPN (ARDL 2,3,2,1,3)**	**SING (ARDL 1,3,1,2,1)**
INA	-	-0.1026	0.2757***
		(-1.0162)	(7.1243)
JPN	-1.5708	-	0.0964
	(-1.3089)		(0.4775)
US	-0.8548	0.9311***	0.6581**
	(-0.5991)	(3.6364)	(2.3057)
SING	3.8578***	0.5917**	-
	(5.1676)	(2.0985)	
CHN	-0.2466	-0.2692***	0.0748
	(-0.9543)	(-3.0843)	(1.4920)
Constant	-3.7465	-1.6351	-0.0355
	(-0.8113)	(-1.5382)	(-0.0392)

Starting with Indonesia as a dependent variable, the results show that only Singapore has a long-run impact on the stock price index of Indonesia. When Japan is the dependent variable, the results indicate the existence of a long-run impact of the US, Singapore and China on Japan. In the context of Singapore as the dependent variable, the results indicate the existence of a long-run impact of the Indonesia and the US on Singapore. According to Ibrahim (2003), the negative coefficients imply that the markets are competing each other while the positive coefficients imply that the markets are complementary in nature.

Table 6 shows that the coefficients of the ECMs are negative and highly significant at 1% for the three models. This confirms the existence of a stable long-run relationship and indicates to a long-run cointegration relationship among variables. The coefficients of the ECMs are -0.0185, -0.0470 and -0.0607 imply that a deviation from the long-run equilibrium following short-run disturbances is corrected by about 1.85%, 4.70% and 6.07%, respectively after one week. The ECM corresponds to the speed of adjustment to restore equilibrium in the dynamic model following disturbances. The big magnitude of the coefficient on the lagged error-correction term suggests that once shocked, convergence to equilibrium is very big. The performances of our estimated of the error correction representation for ARDL seem to be acceptable. The diagnostic tests perform well, supporting the overall validity of the short-run model.

Table 6. Error Correction Representation of ARDL Model
(Dependent variables: ΔINA, ΔJPN and ΔSING)

Regressors	INA (ARDL 1,1,3,1,3)	JPN (ARDL 2,3,2,1,3)	SING (ARDL 1,3,1,2,1)
ΔINA	-	0.0590*	0.2278***
		(2.0009)	(8.1203)
ΔINA_{t-1}	-	-0.0448	0.0174
		(-1.6226)	(0.6357)
ΔINA_{t-2}	-	-0.0706***	0.0600**
		(-2.6478)	(2.2192)
ΔJPN	0.1347	-	0.2733***
	(1.9631)		(6.1528)
ΔJPN_{t-1}	-	-0.1200***	-
		(-2.8069)	
ΔUS	-0.0624	0.2875***	0.3995***
	(-0.8175)	(5.9641)	(8.4271)
ΔUS_{t-1}	0.0164	0.1275***	0.1783***
	(0.2413)	(2.6615)	(3.9811)
ΔUS_{t-2}	0.2107***	-	-
	(3.2388)		
ΔSING	0.5312***	0.2513***	-
	(8.2964)	(5.7881)	
ΔCHN	0.0572	0.0242	0.0532*
	(1.2520)	(0.8079)	(1.7546)
ΔCHN_{t-1}	-0.0765*	0.0395	-
	(-1.6758)	(1.3152)	
ΔCHN_{t-2}	-0.0782*	0.0466	-
	(-1.7092)	(1.5480)	
Constant	-0.0693	-0.0769	-0.0022
	(-0.8345)	(-1.4228)	(-0.0393)
ECM_{t-1}	-0.0185***	-0.0470***	-0.0607***
	(-2.7319)	(-3.8918)	(-5.1267)
R^2	0.2505	0.3337	0.4478
Adj-R^2	0.2302	0.3128	0.4340
F-statistics	17.7902	21.7213	48.6553
DW-statistics	2.1218	1.9733	2.0626

Interestingly, the results also indicate that Singapore and Indonesia are highly integrated among them both in the short- and long-run. The results are in line with those of Janakiraman and Asjeet (1998) and Ng (2002). Ng (2002) noted that this might be due to geographic proximity and close relationship between the markets. Apart from that, Janakiramanan and Asjeet (1998) provided empirical evidence that the geographically and economically close countries should exhibit higher levels of market integration. In addition, we should note that Singapore and Indonesia are the members of Association of Southeast Asian Nations (ASEAN) which aims to remove trade barriers among its member countries. Taylor and Tonks (1989) noted that a stronger financial integration would be expected among countries that reduce trade barriers and develop stronger economic ties.

5. Conclusion

This paper examines the stock market integration among Indonesia and its major trading partners, i.e. Japan, the US, Singapore and China. The study employs the ARDL approach to cointegration and recent weekly data from July 1998 to December 2007. The results indicate that the Indonesian stock market is integrated with the stock markets of Japan, the US, Singapore and China. Since the examined stock markets are cointegrated, there exists a long-run equilibrium relationship among them. Therefore, in the short run, deviations from this equilibrium will response on the changes in the dependent variable in order to force movements towards long-run equilibrium. The performances of our estimated of the error correction representation for ARDL seem to be acceptable. The diagnostic tests perform well, supporting the overall validity of the short-run model.

The implication of the findings of cointegration among Indonesia and Japan, the US, Singapore and China is that the gains from international diversification for investors with long holding periods in those countries are limited. As far as Market Efficiency Hypothesis (MEH) concerned, our finding that the five markets are cointegrated suggests that each stock price series contains information on the common stochastic trends, thus the predictability of one country's stock prices can be enhanced considerably through utilizing information on the other countries' stock prices.

For the purpose of policy making, any development in Japan, the US, Singapore and China markets should be taken into consideration by the Indonesian authorities to design policies pertaining to its stock market. Therefore, the findings of cointegration between Indonesia and Japan, the US, Singapore and China mean that there is a need for policy coordination among Indonesia and the countries to mitigate the impacts of financial fluctuations. In addition, in order to take advantage of financial integration and interdependence, greater liberalization, including reduction or removal of trade and investment barriers will be necessary. To move towards a greater financial integration among the markets, trade liberalisation and agreements have important and far-reaching implication in the region. Economic cooperation among the neighbours not only strengthens the economic and financial integration but also enhances greater political stability and social cooperation between member nations (Chowdhury, 2005).

Similarly, the extent of integration among the markets will have important bearings on the formulation of the financial policies of multinational corporations. Therefore, knowing the co-movement among the stock markets would give an idea of exchange rate risk between countries. Such knowledge can, therefore, help managers to mitigate international risks and managing economic, transaction and translation of risks.

To further add to the existing literature on market integration in the Asian region, further empirical studies on the issue can cover broader areas of market integration and explore other potential factors accounting for market integration. A further possible extension of the study is to quantify and compare the diversification benefits investors can gain when diversifying their investments across the Asian markets. Since cointegrated tests are only able to detect linear long-run equilibrium relationships, but fail to detect non-linear cointegration (Okunev and Wilson, 1997), a more advanced test is needed to discover the existence of non-linear cointegration among the Asian markets.

REFERENCES

Aggarwal, R. and Mougoue, M. (1996). Cointegration among Asian currencies: evidence of the increasing influence of the Japanese Yen, *Japan and the World Economy*, Vol. 8 No. 3, pp. 291-308.

Akaike, H. (1974). A new look at the statistics model identification, *IEEE Transactions on Automic Control AC*, Vol. 19, pp. 716-723.

Arshanapalli, B., Doukas, J. and Lang, L. (1995). Pre and post-October 1987 stock market linkages between US and Asian markets, *Pacific-Basin Finance Journal*, Vol. 3, pp. 57–73.

Azman-Saini, W.N.W., Azali, M., Habibullah, M.S. and Matthews, K.G. (2002). Financial Integration and the ASEAN-5 Equity Markets, *Applied Economics*, Vol. 34, pp. 2283-2288.

Bracker, K., Dockling, D.S. and Koch, P.D. (1999). Economy determinants of evolution in international stock market integration, *Journal of Empirical Finance*, Vol. 6, pp.1-27.

Chen, N.F. and Zhang, F. (1997). Correlation, trades and stock returns of the Pacific-Basin markets, *Pacific-Basin Finance Journal*, Vol. 5, pp. 559-557.

Cheung, Y.L. and Mak, S.C. (1992). A study of the international transmission of stock market fluctuation between the developed markets and the Asian-Pacific markets, *Applied Financial Economics,* Vol. 2, pp. 43-47.

Chowdhury, M.B. (2005). Trade reforms and economic integration in South Asia; SAARC to SAPTA, *Applied Econometrics and International Development*, Vol. 5 No. 4, pp. 23-40.

Click, R.W. and Plummer, M.G. (2005). Stock market integration in ASEAN after the Asian financial crisis, *Journal of Asian Economics*, Vol. 16, pp. 5-28.

Daly, K.J. (2003). Southeast Asian stock market linkages: Evidence from pre- and post-October 1987, *ASEAN Economic Bulletin*, Vol. 20, pp. 73-85.

Engle, R.F. and Granger, C.W.J. (1987). Cointegration and error correction: representation, estimation, and testing, *Econometrica*, Vol. 55, pp. 251-276.

Fosu, E. and Magnus, F. J. (2006). Bounds testing approach to cointegration: an examination of foreign direct investment trade and growth relationships, *American Journal of Applied Sciences*, Vol. 3, pp. 2079-2085.

Francis, I., Kim, S. and Yoon, J.H. (2002). International stock market linkages: evidence from the Asian financial crisis, *Journal of Emerging Market Finance*, Vol. 1, pp.1-29.

Goldstein, M. and Michael, M. (1993). The integration of world capital markets, IMF Working Paper, International Monetary Fund, Washington, DC.

Gregory, A.W. and Hansen, B.E. (1996). Residual-based tests for cointegration in model with regime shifts, *Journal of Econometrics*, Vol. 70 No. 1, pp. 99-126.

Grubel, H. (1968). International diversified portfolio: welfare gains and capital flows, *American Economic Review*, Vol. 58, pp. 1299-1314.

Hung, B.W. and Cheung, Y. (1995). Interdependence of Asian emerging equity markets, *Journal of Business Finance and Accounting*, Vol. 22 No. 2, pp. 281-288.

Ibrahim, M.H. (2003). Macroeconomic forces and capital market integration: a VAR analysis for Malaysia, *Journal of the Asia Pacific Economy,* Vol. 8 No.1, pp. 19-40.

Ibrahim, M.H. (2005). International linkages of stock prices: the case of Indonesia, *Management Research News*, Vol. 28 No. 4, pp. 93-115.

Janakiramanan, S. and Lamba, A.S. (1998). An empirical examination of linkages between Pacific-Basin Stock Markets, *Journal of International Financial Markets, Institutions and Money*, Vol. 8, pp. 155-173.

Johansen, S. (1988). Statistical analysis of cointegration vectors, *Journal of Economics Dynamic and Control*, Vol. 12, pp. 231-254.

Johansen, S. and Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration with applications to the demand for money, *Oxford Bulletin of Economics and Statistics*, Vol. 52, pp. 169-210.

Kearney, C. and Lucey, B.M. (2004). International equity market integration: Theory, evidence and implications, *International Review of Financial Analysi*s, Vol. 13, pp. 571- 583.

Kwan, C.H. (2001). Yen Bloc: Towards Economic Integration in Asia. Brooking Institution Press, Washington D.C.

Laurenceson, J. and Chai, J.C.H. (2003). Financial Reform and Economic Development in China, Cheltenham, UK: Edward Elgar.

Levy, H. and Sarnat, M. (1970). International diversification of investment portfolios, *American Economic Review*, Vol. 60, pp. 668-675.

Majid, M.S.A, Meera, A.K.M. and Omar, M.A. (2008). Interdependence of ASEAN-5 stock markets from the US and Japan, *Global Economic Review*, Vol. 37 No. 2, pp. 201-225.

Masih, A.M.M. and Masih, R. (1999). Are Asian stock market fluctuations due mainly to intra-regional contagion effects? Evidence based on Asian emerging stock markets, *Pacific- Basin Finance Journal*, Vol. 7, pp. 251–82.

McCauley, R.N., Fung, S-S., and Gadanecz, B. (2002). Integrating the finances of East Asia, *BIS Quarterly Review*, pp. 83-96.

McKinnon, R. and Schnabl, G. (2003). Synchronised business cycles in East Asia and fluctuations in the yen/dollar exchange rate, *World Economy*, Vol. 26, pp. 1067-1088.

Narayan, P., Smyth, R. & Nandha, M. (2004) "Interdependence and dynamic linkages between the emerging stock markets of South Asia", *Journal of Accounting and Finance* Vol. 44, pp. 419-439.

Ng, T.H. (2002). Stock market linkages in South-East Asia, *Asian Economic Journal*, Vol. 16, pp. 353-377.

Okunev, J., and Wilson, P.J. (1997). Using nonlinear test to examine integration between real estate and stock markets, *Real Estate Economics*, Vol. 25, pp. 487-503.

Palac-MicMiken, E.D. (1997). An examination of ASEAN stock markets: a cointegration approach, *ASEAN Economic Bulletin*, Vol. 13, pp. 299-311.

Pesaran, M.H. & Shin, Y. (1995). An autoregressive distributed lag modelling approach to cointegration analysis, *DAE Working Paper No. 9514*, Department of Applied Economics, University of Cambridge.

Pesaran, M.H. and Shin, Y. (1998). Generalized impulse response analysis in linear multivariate models, *Economics Letters*, Vol. 58, pp. 17–29.

Pesaran, M.H., Shin, Y. and Smith, R. (2001). Bounds testing approaches to the analysis of level relationships, *Journal of Applied Econometric*, Vol. 16, pp. 289–326.

Plummer, M.G. and Click, R. (2005). Bond market development and integration in ASEAN, *International Journal of Finance and Economics*, Vol. 10 No. 2, pp. 133-142.

Roca, E.D., Selvanathan, E.A. and Shepherd, W.F. (1998). Are the ASEAN equity markets interdependent, *ASEAN Economic Bulletin,* Vol. 15, 109– 120.

Roll, R. (1995). An empirical survey of Indonesian equities 1985-1992, *Pacific-Basin Finance Journal*, Vol. 3, pp. 159-192.

Solnik, B.H. (1974), Why not diversify internationally, *Financial Analysts Journal*, Vol. 30, pp. 48-54.

Taylor, M.P. and Tonks, I. (1989). The Internationalization of Stock Markets and the Abolition of U.K. Exchange Control, Review of Economics and Statistics, Vol. 71, pp. 332-336.

Yang, J., Kolari, J.W. and Min, I. (2003). Stock market integration and financial crisis: the case of Asia, *Applied Financial Economics*, Vol. 13, pp. 477-486.

Yu, I-W., Fung, L. and Tam, C-S. (2007). Assessing bond market integration in Asia, Working Paper 10/2007, Hong Kong Monetary Authority. HK, 21 June.

Yusof, R.M. and Majid, M.S.A. (2006). Who moves the Malaysian stock market – the US or Japan? Empirical evidence from the pre-, during, and post-1997 Asian financial crisis, *Gadjah Mada International Journal of Business*, Vol. 8, pp. 367-406.