IS INDONESIA MORE FINANCIALLY LINKED TO THE WORLD SINCE THE ASIAN FINANCIAL CRISES?

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Abstract

The 1997-98 Asian financial crises brought significant changes to the Indonesian economy. The contagion originated in Thailand and spread throughout the region, indicating interdependencies of the Indonesian economy with the world's economies but especially with those in the region. The crisis was channelled through the financial sector, which is assumed to be the most open sector in the economy. As a result, reform began and changes took place in many sectors and in the policies that guided them. How the financial integration changed over 15 years of reform is the main interest of this study. Specifically, this study analyses the changing financial integration in stock markets following the Asian crises. Therefore, the period of the study is in five parts, based on the origins of the US subprime and European crises. Using a quantitative approach, this study employs multivariate EGARCH-M(1,1) models. These models allow us to examine different effects of positive and negative news on financial risk in stock prices. Daily stock data are used from the Jakarta Stock Exchange (JKSE), the Singapore Exchange (STI), the Kuala Lumpur Stock Exchange (KLSE), the Shanghai Composite Index (SSE), Nikkei 225 (NIKK) (Japan), the Korea Stock Exchange (KOSPI), the Bombay Stock Exchange (SENSEX), the German stock exchange (DAX), the London FTSE, and Standard and Poor's US (SP). The result of this study provides the figures showing the development of Indonesian financial-market linkage to other countries and will help the government to be aware of crises that are initiated by external factors, and to be able to manage future crises.

Keywords: Asian crisis, reform, financial integration, GARCH-model

JEL code: C18, F36, G32

I. INTRODUCTION

In the global economy, there is no economic entity that is entirely independent and self-sufficient that can be in isolation and without interaction with other countries in meeting its economic and domestic requirements. Interaction between countries enables efficiencies to lower production costs; interaction that is channelled through trade and investment. On the other hand, interdependence between countries leads to higher vulnerability to crises originating in another country. Likewise, as a small economy, Indonesia is dependent on the world's economy and has experienced at least three financial crises in the past fifteen years; the Asian crisis of 1997–1998, the US subprime crisis in 2008 and the recent Europe financial crisis.

The linkage between economies is commonly known as integration, which covers several aspects; integration in real sectors as indicated from trade, and integration in financial sectors, known as international financial integration (IFI). The Asian and subprime crises are evidence of IFI, which subsequently induced crises in other countries. Originating from the depreciation of the baht, which immediately affected stock markets in the Asian region, this event had spillover effects throughout the region. Unlike other ASEAN countries, the currency crisis in Indonesia was accompanied by social and political crises; it was a multidimensional crisis, which meant that Indonesia had a longer and deeper crisis compared to others in the region.

Integration in the global economy was triggered by the oil crisis during the Gulf War and led to changes in direction for the global economy. Oil-exporting countries like Indonesia changed their international trade paradigms from import substitution to export orientation and, as a consequence of the crisis, there was a requirement to be more deeply involved in the global economy and to reap more benefits from trade and investment. The liberalisation stage in Indonesia began with the issuance of Paket Oktober 1980 (Pakto), which opened the Indonesian economy to international trade and was an invitation to foreign investors, especially those with an interest in manufacturing sectors. Along with globalisation in trade and investment, financial market grew quickly.

In fact, the Indonesian stock market is very much dependent on global news, which is shown by the high dependence of its financial market on others of the world. As a small economy, Indonesia regulates its financial market relatively moderately and has tended to move to more open markets with comparatively higher rate of returns to attract more foreign investors. Along with a higher proportion of foreign ownership in equity, Indonesia is more vulnerable to any news or shocks from the major investors' countries. In this context, Indonesia experiences high volatility stemming from the major countries, especially channelled through trade (demand) and capital flow. Volatility is an indicator of relative risk in stock prices, which reflects relations between risk and return. Commonly, equity prices increase with higher volatility because sharp increases in equity prices lead to higher returns for investors. This is commonly known as the positive relation between risk and return.

Financial integration in Indonesia since the early 1990s has been marked by a rapidly growing proportion of foreign transaction on the Indonesian stock exchange. Foreign transactions continued to increase from 33 per cent (1995) to a peak of 92 per cent in 2002. The Asian crisis did not influence foreign transaction in 1998 following a 7 per cent growth between 1998 and 1999. In 2011, foreign transactions achieved 65 per cent of trading in 2011 (Stock exchange statistics, 2012). Foreign ownership is dominant in equity compared with government and corporate bonds. Between 2009 and 2012, average foreign ownership was over 62 per cent but for corporate and equity bonds it is less than 5 per cent and 2 per cent, respectively.

Along with these higher rates of foreign transactions in the domestic financial market, there has been debate about the benefits and the costs of these transactions. On the one hand, capital inflow contributes more liquidity and lowers the cost of capital (Bekaert and Harvey, 2000); yet, on the other hand, foreign capital mobility causes extreme volatility for developing countries.

Because Indonesia has experienced three financial crises, this illustrates how much it has been exposed to the world's financial markets and their development. This paper focuses on the development and changes in Indonesia's exposure to the international financial markets since the Asian financial crisis of 1997–98. Specifically, this article explores changes in spillover effects from several major countries, which are assumed to have influenced the stock markets over the period 1995 to 2013. To achieve this objective, the multivariate EGARCH-M(1,1) model will be employed. The model enables us to examine asymmetric news returns spillovers to Indonesia from other countries.

II. LITERATURE REVIEW

Developing countries need capital to induce their development. Encouraging foreign investors by providing higher rates of return is one of the most attractive ways of doing this. Many countries encourage capital inflow by relaxing regulations and restrictions on capital outflows, deregulating domestic financial markets, liberalising foreign direct investment and improving their economic environment and prospects through the introduction of market-oriented reforms. Developing countries, especially emerging countries such as those of Asia, Latin America and Eastern Europe were the highest recipients of foreign capital as they relaxed regulation of the operation of domestic financial markets and moved away from regimes of financial repression.

According to Agenor (2003), the degree of integration of financial markets around the world increased significantly during the late 1980s and the 1990s. A key factor underlying this process has been the increased globalisation of investments seeking higher rates of return and opportunities to diversify risk internationally. The opportunity to invest in emerging markets enabled investors from major countries to diversify their investment baskets to achieve maximum returns. For the recipient countries, foreign capital inflow allows them more liquidity to accelerate growth with smooth increases in consumption and to avoid adverse effects. At the same time, however, it has been recognised that the risk of volatility is that it can lead to reversals in capital flows in the context of a highly open capital account and these can have a significant cost. From that perspective, a key issue has been to identify the policy prerequisites that may allow countries to exploit the gains, but minimise the risks associated with financial openness.

According to some theories, international financial integration (IFI) facilitates risk sharing and thereby improves production specialisation, capital allocation, and economic growth (Obstfeld, 1994). Apart from the benefits, IFI has its cost, especially when the financial infrastructure has not matured to a more open financial system, and might only bring about instability. Instability at the macro level induces capital outflow and lowers investors' confidence. Thus, some theories predict that international financial integration will promote growth only in countries with sound institutions and good policies.

Studies of stock-market spillover effects in ASEAN countries were preceded by the examination of stock market integration. The spillover effects tend to increase as markets become integrated; the interdependence among markets is established and this is a concern of investors who need to be able to forecast the volatility of the markets across the region.

The study of integration in ASEAN has been a concern of economists. This concern or interest was initiated by the Asian financial liberalisation in the 1990s, but has become more significant since the end of the crisis period. Ng (2002) says that the reasons for the rapid growth of ASEAN markets are to do with the growing liberalisation of the economies, the restructuring of the private sector, the gradual opening of the stock markets to foreign investors, strong economic growth, and privatisation of state enterprises. Ng (2002) analyses the links between the South-East Asian stock markets following the opening up of the stock markets in the 1990s. Employing cointegration and time-varying parameter models to examine the ASEAN-4 stock markets, (that is, those of Indonesia, the Philippines, Singapore and Thailand) from December 1987 to November 1997, Ng defines the linkage as the co-movement between stock markets across countries. Co-movement within the region has increases since the liberalisation and the opening up of the financial markets. The result shows that the stock markets of the ASEAN-4 countries became more closely linked and may show greater co-movement in the returns. Furthermore, the stock market returns of Indonesia, the Philippines and Thailand are more closely linked with those of Singapore.

The linkage between countries has advanced since the crisis. ASEAN countries have recently tended to decrease their dependency on loans from banking and switch to bonds and stocks as sources of capital, especially from outside the region. Click and Plummer (2005) examine the degree of correlation of the ASEAN-5 countries (Indonesia, Malaysia, Singapore, the Philippines and Thailand) as a way to assess the feasibility of policy initiatives to improve ASEAN market integration and the implications for portfolio investors. Specifically, their paper considers whether the stock markets of ASEAN-5 are integrated or otherwise segmented by applying cointegration techniques to extract long-run relations (Click and Plummer, 2005). The result shows that the ASEAN-5 stock markets are integrated to some degree and are not segmented completely by national borders. From the perspective of policy makers, initiatives to increase integration is feasible and desirable. From the perspective of portfolio investors, the benefits of diversifying international portfolios within the countries will decline but not be eliminated.

Both studies strengthen the premise that stock markets in ASEAN countries are more integrated with world stock markets and bring more capital into the countries from abroad. Theoretically, an integrated market is more efficient compared to a segmented market (Click and Plummer, 2005). Even though, from the perspective of investors, more integrated markets mean fewer benefits from portfolio diversification across countries because there is no differential to allocate the capital, yet an integrated market allows investors to allocate their capital within the region where it is the most productive. With more capital flows between countries, additional trading in individual securities will improve the liquidity of the stock markets. This in turn would decrease the cost of capital for the firms that seek it and for investors who would have lower transaction costs. Therefore, there is a more efficient allocation of capital within the region (Click and Plummer, 2005; Ng, 2002).

However, analysis of cointegration tests is not sufficient to show whether the markets are integrated. This is because cointegration assumes the time-invariance of the cointegrating relation (Ng, 2002). In fact, financial data are characterised by time-varying data. Therefore, the application of conventional

time series and econometric models, such as linear regression, work only when the variance is constant (Chong et al., 1999) and their application would produce biased results. Models of unconditional volatilities are proposed for time variation in second or higher-order moments, such as financial data. The ARCH model was first proposed by Engle (1982) to examine this kind of data. Since then, the extensions of the model have varied and been used by researchers, especially for forecasting stock market volatility. The GARCH model of Bollerslev (1986) is the ARCH extension that has been adopted for a vast number of studies. A linear ARCH (*q*) model requires a long lag of *q* but the GARCH model has a more flexible lag structure that needs a small lag of GARCH(1,1), which is sufficient to model variance changing over long sample periods (Chong et al., 1999).

Gokcan (2000) investigates the stock-market volatility of seven emerging countries by comparing linear and non-linear GARCH model. He finds that, for emerging stock markets, the GARCH(1,1) model performs better than an EGARCH model. Chong et al. (1999) study the performance of the GARCH model and its modifications for the daily returns of the KLSE, including a composite index, and some important sectors; tin index, plantation index, properties index and finance index from 1 January 1989 to 31 December 1990. They find that the EGARCH model, though is not the best model in the goodness-of-fit statistics, performs best in describing the stock market indexes.

Meanwhile, a study by Lestari (2010) shows that the Indonesian stock market is more integrated with the Asia's major industrial countries, such as Japan, Singapore and China, compared to the USA. It is predicted that news from the USA and European countries will go indirectly to Asian industrialised countries. Evidence for this is that Indonesia was not very much affected during the US subprime crisis. Moreover, the study also showed that foreign ownership in Indonesia's equity markets led to positive effects by reducing the stock market volatilities; this known as the calming effects.

III. RESEARCH METHOD

Financial data have some common characteristics: distribution of stock returns is significantly non-normal; the kurtosis of stock returns time series is larger than kurtosis of the normal distribution in which it is leptokurtic; the distribution of stock returns is skewed, either to the right (positive skewness) or to the left (negative skewness); and the variance of stock markets returns is not constant over time or the volatility is clustering. Volatility clustering is regarded by some analysts as the persistence of stock market volatility: financial analysts call this uncertainty or risk (Chong et al., 1999).

Cotter and Stevenson (2008) suggest that the use of daily data provides a deeper analysis of volatility transmissions and the use of such data overcomes problems caused by monthly structural breaks. Daily stock market returns can be calculated as the difference of natural logarithmic of the price index, as follows:

$$r_{i,t} = \log(P_{i,t} / P_{i,t-1}) \qquad (1)$$

where $r_{i,t}$ is the actual return of stock market index for country i at time t, while $P_{i,t}$ and $P_{i,t-1}$ are the closing prices of stock of country i at days t and $t-1$, respectively.

Meanwhile the volatilities of the stock market returns are calculated as follows:

$$Vol_{r,i,t} = [r_{i,t} - E(r_{i,t})]^2 \qquad (2)$$

where $Vol_{r,i,t}$ is the volatility of returns in country i at day t, and $r_{i,t}$ denotes the actual return in country i at day t. $E(r_{i,t})$ represents the expected price at time t.

In this paper, we use the daily stock price index (closing price) of ten countries: the Jakarta composite index (JKSE) (Indonesia), the Kuala Lumpur composite index (KLSE) (Malaysia), the Korean composite index (KOSPI), the Singapore exchange (SGX), the Shanghai composite index (SSE) (China), the Bombay stock exchange (SENSEX) (India), and the Nikkei 225 (NIKK) (Japan). The US stock market is represented by the Standard and Poor index (SP) and the European countries are represented by the FTSE (London) and the DAX (Germany).

Because the purpose of this paper is to model the returns and their associated volatilities for the stock markets, Table 1 summarises the descriptive statistics for the return series. The lowest average return was experienced by Nikkei 225, where the stock markets tend to be corrected. The Jakarta stock exchange provided the highest yields in their returns. The other stock markets are similar in their stock market returns, that is, between 0.1 and 0.4. Even though the JKSE has the highest average return, yet the KLSE might provide the highest returns compared to others.

Table 1. Description statistics

	RDAX	RFTSE	RJKSE	RKLSE	RKOSPI	RNIKK	RSENSEX	RSGX	RSP	RSSE
Mean	0.02	0.01	0.05	0.01	0.02	(0.01)	0.04	0.01	0.01	0.02
Maximum	10.80	9.38	13.13	20.82	11.28	13.23	15.99	12.87	10.96	9.40
Minimum	(7.43)	(9.26)	(12.73)	(24.15)	(12.80)	(12.11)	(11.81)	(9.22)	(9.47)	(9.26)
Std. Dev.	1.60	1.26	1.68	1.55	1.94	1.53	1.63	1.38	1.30	1.57
Skewness	(0.03)	(0.12)	(0.19)	0.43	(0.20)	(0.31)	(0.09)	(0.03)	(0.20)	(0.11)
Kurtosis	6.69	8.34	10.69	61.01	7.50	9.27	8.96	10.47	10.41	7.64
Jarque-Bera	2,322.7	4,881.7	10,103.9	573,978.1	3,486.6	6,775.6	6,068.1	9,508.4	9,398.1	3,685.2
Observations	4093	4093	4093	4093	4093	4093	4093	4093	4093	4093

Source: Author's calculation

Models that are commonly used to analyse these kinds of data are ARCH and GARCH models. These are able to examine time-varying data that are characterised by heteroscedastic variance. The GARCH model improves the ARCH model by effectively removing the excess kurtosis in return series. However, similar to ARCH models, GARCH models also have weaknesses; the GARCH models cannot cope with seriously skewed distributions, therefore forecasting with a linear GARCH would be biased for a skewed time

series. (Chong et al., 1999; Gokcan, 2000). Non-linear GARCH such as the quadratic GARCH (QGARCH) model of Engle and Ng (1993) and Sentana (1995), the model of Glosten, Jogannathan and Rankle (1992), and the EGARCH model of Nelson (1991) are able to cope with the problem (in Chong et al., 1999).

Another weakness of the ARCH model and its extension, the GARCH model, is that they do not take into account the different effect of positive and negative shocks on the conditional volatility (or risk). Volatility is likely to decline with price increases but tends to increase when price falls; this behaviour is known as the leverage effect. In asset price movements, bad news seems to have a greater effect on volatility than do positive shocks of a similar magnitude (McAleer, 2005); therefore, the EGARCH model of Nelson (1991) and Engle and Ng (1993) is applied because it is able deal with good news (positive return shocks) and bad news (negative return shocks) that have a different effect on volatility. The model is able to capture asymmetric effects that focus on the effect of conditional variance of the conditional return.

The other model is also estimated, that is, the GARCH-M model of Engle et al. (1987) and Fang et al. (2008). The model allows the returns to be partly determined by their associated risks. This model was developed based on the premiss that higher risk can bring about higher returns. Therefore, the model is useful to guide investors in diversifying assets between real estate and other assets based on the degree of risk.

The data used to investigate return spillover effects are the stock price indexes for ten countries: the Jakarta composite index (JSX) (Indonesia), the Kuala Lumpur Stock Exchange (KLSE) (Malaysia), the Korea Composite Stock Price Index (KOSPI), the Singapore Exchange (SGX), the Shanghai Stock Exchange (SSE) (China), and the Nikkei 225 (NIKK) (Japan). Moreover, because we hypothesise that the spillovers originated from the collapse of major countries affected by the crises, therefore the three countries most affected are used as the sample. The countries are Germany (DAX), the UK (London FTSE) and the USA (SP) to represent the US subprime mortgage crisis.

By combining the EGARCH and GARCH-M models, the model used for the study is the EGARCH(1,1)-M model, which takes into account the effects of conditional variance and asymmetry along with the trade-off between risk and return. The effects of the subprime crisis on Asian markets are shown by five models according to the period of the crisis. The first model represents the whole period between the Asian crisis and the recent past or 4 July 1997 to 13 March 2013. Model 2 represents the period of the Asian crisis from 7 July 1997 to 20 November 2002. Model 3 indicates a stable period before the US crisis, from 21 November 2002 to 16 January 2008 and model 4 is the period of the US crisis, 17 January 2008 to 15 January 2009. The last model (model 5) is for the European crisis of 16 January 2009 to 12 March 2013.

Mean estimation is represented as follow:

$$r_{i,t} = \alpha + \vartheta_1 r_{DJ,t} + \sum_{j=2}^{n} \vartheta_j r_{j,t} + \varepsilon_t, \varepsilon_t \sim N(0, \sigma_t^2) \quad (1)$$

With the conditional variance:

$$\sigma_t^2 = \omega + \alpha\varepsilon_{t-1}^2 + \beta\sigma_{t-1}^2 \quad (2)$$

And the variance equation model:

$$Log(\sigma_t^2) = \omega + \beta \log(\sigma_{t-1}^2) + \alpha\left|\frac{\varepsilon_{t-1}}{\sqrt{\sigma_{t-1}^2}}\right| + \gamma\frac{\varepsilon_{t-1}}{\sqrt{\sigma_{t-1}^2}} \quad (3)$$

$r_{i,t}$ is the return for JSX at the period of t, which is influenced by constant (α), and $\sum_{j=2}^{n} \vartheta_j r_{j,t}$ is the return from the other countries' stock markets, namely, HSI, KLSE, SSE, NIKK, KOSPI, SENSEX, DAX, FTSE and SP. Meanwhile ε_t is the residual and consists of a conditional variable (the unsystematic hetero-risk) σ_t^2, which is assumed to be normally distributed. Residuals resulted from the mean equation; the conditional variance model is formed as in equation 2. α, ϑ are the parameters of the mean equation and α, β, γ are the parameters of the variance equation.

Different effects from positive and negative news are shown in equation 3. If $\gamma = 0$ then shocks from positive news of the returns will have greater magnitude than negative news of the returns. Therefore, when $\gamma \neq 0$ it shows asymmetric effects. If $\gamma < 0$ therefore negative news of the returns reduces volatilities instead, showing leverage effects or tendencies to create clustering (volatility persistence). Meanwhile when $\gamma > 0$ therefore positive news from the returns will increase volatilities. Usually, the coefficient of γ is negative and indicates that positive shock returns leads to lower volatilities compared to negative shock returns.

IV. RESULTS AND DISCUSSION

Table 2 presents the correlation coefficients among the stock markets under study. During the period of study from the Asian crisis to the recent past, it is surprising to see that the Indonesian stock market does not correlate highly with any other market, including those of the major countries. In fact, the highest correlation is between the London and German stock markets, indicating that European stock markets are well connected as a single market. Indonesia is relatively well attached to Asian industrial countries such as Japan, Korea, India and Malaysia. This figure also applies to other Asian countries such as Malaysia and Korea. The Korean stock market correlates highly with Japan's. Interestingly, almost all the Asian countries have negative relations with the US stock market but not with those from Europe. This indicates that Asian capital markets are substitutes for the US markets.

Table 2. Correlation matrix

	RDAX	RFTSE	RJKSE	RKLSE	RKOSPI	RNIKK	RSENSEX	RSGX	RSP	RSSE
RDAX	1.00									
RFTSE	0.79	1.00								

RJKSE	0.19	0.22	1.00							
RKLSE	0.12	0.16	0.29	1.00						
RKOSPI	0.25	0.27	0.31	0.24	1.00					
RNIKK	0.26	0.30	0.30	0.22	0.44	1.00				
RSENSEX	0.26	0.29	0.30	0.16	0.30	0.27	1.00			
RSGX	0.16	0.15	0.22	0.23	0.24	0.18	0.13	1.00		
RSP	0.03	0.01	(0.02)	(0.04)	0.01	(0.02)	(0.02)	(0.00)	1.00	
RSSE	0.07	0.07	0.13	0.11	0.13	0.17	0.15	0.03	(0.02)	1.00

Table 3. Estimation Results of EGARCH-M(1,1)

Parameter	Model 1	Model 2	Model 3	Model 4	Model 5
	JSX				
α	0.04	-0.04	0.03	-0.21	0.08
ϑ	0.01	0.01	0.05	0.05	0.00
$\mathbf{B_{SGX}}$	0.04	0.23	0.05	0.07	-0.03
$\boldsymbol{\beta_{KLSE}}$	0.18	0.18	0.39	0.36	0.07
$\boldsymbol{\beta_{SSE}}$	0.06	-0.02	0.03	-0.01	0.09
$\boldsymbol{\beta_{NIKK}}$	0.13	0.01	0.09	0.12	0.21
$\boldsymbol{\beta_{KOSPI}}$	0.13	0.03	0.18	0.17	0.18
$\boldsymbol{\beta_{SENSEX}}$	0.17	0.06	0.17	0.14	0.19
$\boldsymbol{\beta_{DAX}}$	-0.01	0.04	-0.08	-0.33	0.03
$\boldsymbol{\beta_{FTSE}}$	0.10	-0.05	0.14	0.40	0.06
$\boldsymbol{\beta_{SP}}$	-0.01	-0.05	-0.06	0.04	0.02
ϖ	-0.16	-0.10	-0.22	0.13	-0.35
δ	0.23	0.20	0.28	0.23	0.20
ζ	-0.05	-0.03	-0.10	-0.31	0.01
γ	0.98	0.97	0.78	0.68	-0.86

Entries in bold indicate significance at 5% level.

The estimation of the EGARCH(1,1)-M models for each equation in section three is in Table 3. As explained in the previous section, the models are distinguished according to the stage of the crisis for the Asian crisis, the US subprime crisis and the European crisis. The purpose of this distinction is to see the development of financial links from Indonesian stock markets to those countries affecting the crisis.

Model 1 represent the whole period of the past fifteen years of Indonesia's experience of three crises. Model 2 represents the period of direct effects of the Asian crisis. Model 3 is the period of post-Asian crisis and before the US crisis. This is the period of economic recovery and a stable macroeconomic situation. Model 4 assumes that the subprime crisis affected the Asian stock markets and affected directly to Indonesia stock market. Finally, Model 5 represents the period of the European crisis. Based on those models, we will examine how the spillover effects from other countries affect the Indonesian stock market.

Overall, the result shows interdependence among markets in a range of magnitude. Moreover, the effect of risk on return represented by ϑ is not

significant, indicating that the trade-off between risk and return is not evident for all the markets.

Table 3 provides the β values of the mean equation. In model 1, it is shown that during the past 15 years, the Indonesian stock market has been affected by Asian markets, such as Singapore, Malaysia, China, Japan, Korea and India. The British stock market is the only affecting developed countries. India and Malaysia are the most affecting countries. This figure indicates that any news that affects those countries (India and Malaysia) first will have a spillover effects for Indonesia. The effect of an increase in India and Malaysia's returns leads to an increase in the Indonesia stock returns by 0.18 and 0.18 points, respectively.

Furthermore, the ϑ value is insignificant, meaning that the effect of unsystematic risk σ_t^2, on the US stock returns is not evident. Moreover, the value of ζ in the variance equation is significantly negative, indicating the leverage effect on variance. As well, the asymmetric effect suggests that the negative news brings about larger volatility than positive news.

Financial linkage between Indonesia and other countries during the Asian crisis is represented in model 2. During this time, Singapore brought about the highest spillover effect, followed by Malaysia. This strengthens the contention that the Asian crisis originated from the depreciation of Asian currencies triggered by the fall of the baht. However, most the Asian stock markets indicate the presence of asymmetric risk, meaning that the effects of bad news are larger compared to positive news of the same magnitude, as indicated by the significance of ζ values. They also indicate the presence of the leverage effect on the conditional variance, suggesting the existence of volatility clustering.

During the period of the post-Asian crisis, the Indonesian stock market rebounded to its highest level after the crisis, peaking at 4,850 in early 2013. However, in model 3 we modelled the period before the subprime crisis of 2008. It is shown that before the subprime crisis, Indonesia experienced a strong macroeconomic stability with more influence from other countries. Indonesia's financial market was linked to all the Asian countries except China. Moreover, developed countries like Germany, Britain and the USA also had an influence on the stock market. The linkage between Indonesia and the Asian markets shows a positive relation, with the largest influence from Malaysia. Meanwhile influence from developed countries showed negative relations except from Britain. This indicates that before the subprime crisis, when the US financial markets started to collapse, Indonesia was benefiting from capital inflows.

During the US crisis, Indonesia's financial market was affected by Britain only, as the substitute markets of the developing countries, according to investors. This explains why Indonesia was not affected very much by the US crisis and it might indicate that investors used the Asian stock market to diversify their portfolio to compensate for their losses in the subprime market. Furthermore, the asymmetric effect applies for Indonesia, Malaysia, Korea and China, indicating that bad news has a greater effect than positive news.

Model 5 shows indirect effect of the European crisis. Similar to model 4, model 5 explicitly confirms that there is no financial linkage from European countries to Indonesia. Moreover, model 5 is unable to confirm the existence

of the leverage effects for all the Asian stock markets. The values of ζ are negatively significant, indicating there is no presence of the leverage effects and asymmetric effects in which negative news has a greater effect than positive news.

The interdependence among countries' stock markets represents a more integrated financial market in Asia. The result in this paper is in line with the previous study such as Wang (2007), which suggests that the Asian countries are becoming closely linked. Market integration is becoming more significant and intense. Eventually this integrated market will requires efficiencies in the region's stock markets along with initiatives to switch the sources of capital from banking to bonds and stocks.

V. SUMMARY

Using the Jakarta stock exchange market returns and the returns of nine countries from Asia, the USA and Europe, we examine the development of financial linkage from those countries to Indonesia in the various crisis periods. The goal is to understand the development of the influences from those countries and their persistent effects. The paper attempts to analyse the spillover effects on the Jakarta composite index (JCI) of three crises; the Asian crisis, the US subprime crisis, and the European crisis,. An EGARCH-M(1,1) model is employed to examine the direction of the spillover effects and the presence of the trade-offs between the risk and return for each of the Asian stock market returns. We also test the significance of the asymmetric effects between positive and negative news. The results show that during the period of crisis, Indonesia is consistently affected by the Asian countries and with limited spillover effects from developed countries. The subprime crisis did not hit Indonesia's stock markets to the same extent as the European crisis. However, the effect is significant for Asian stock markets because the regional interdependence is stronger than its interdependence with the US stock market. The result also indicates that market integration occurs within Asian stock markets. Moreover, the trade-off between the risk and return is not evident except for developed countries and for Singapore. Meanwhile the asymmetric effects are evident for all the Asian countries' stock markets. In addition, we find evidence of the leverage effects in all the stock markets, which means negative news leads to higher volatility relative to the positive news.

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