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FINANCIAL INTEGRATION OF INDONESIA AND EU STOCK MARKETS

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Abstract: *The purpose of this paper is to empirically explore stock market integration among the emerging stock market of Indonesia and four selected European Union (EU) (UK, France, Germany and Italy). Time series techniques of cointegration were used approaches with vector autogression (VAR). Utilizing monthly data over the period spanning from January 2010 to December 2014 taken from authorized sources. The results indicate the Indonesian stock market is cointegrated with the stock markets of European Union (EU) and than cointegration each stock market of European Union (EU), but not entirely. The study only focuses on stock markets of the emerging stock market of Indonesia and the four founding members of EU, i.e. UK, France, Germany and Italy. The stock index futures markets provide opportunity for the potential benefits from international portfolio diversification and hedging strategies. The stock index futures significantly extended the variety of investment and risk management strategies available to investors. Using the stock markets of emerging markets and European Union (EU) to the best of the authors' knowledge, goes clearly beyond the existing literature on the subject matter.*

Keywords: *Market Integration, Stock markets, Vector Autogression (VAR).*

INTRODUCTION

Trade and financial liberalization since the late 20th century enhanced the process of globalization, with increased trade ties and economic synchronization, international stock market indices have become more integrated. A decision by a country's government to permit foreigners to buy stocks in that country's stock market is called stock market liberalization. The rational behind financial liberalization is to restore growth and stability by raising savings and improving economic efficiency. Following the collapse of the Bretton Woods system, the developed countries initiated the international financial liberalization process.

Integration of financial markets, the central locus of International finance, is one of the important phenomena of open market economic system. In an open market system, nations are free to move with their businesses and investments across the borders without minimum trade barriers in general and in a specific

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region in particular. The market integration has been defined by many studies either based on asset pricing or statistical perspectives (Yusof and Majid, 2006). In terms of asset pricing, Jorion and Schwartz (1986) defined integration as a situation where investors earn the same risk-adjusted expected return on similar financial instrument in different national markets. With integration, the world market index should be mean-variance efficient and, as a result, the only priced risk should be the systematic risk relative to the world market.

Bekaert *et al.*, (2002) show that after integration, equity markets can be larger, more liquid and more volatile, and that the cost of capital declines, credit ratings improve, real exchange rates appreciate and economic growth increases, Gupta and Guidi (2012) assert that increased financial integration among stock markets in the world motivates international investors to look for new investment opportunities in order to improve risk adjusted returns for their portfolios. However, other demonstrate that the more integrated markets are more vulnerable to the effects of a shock in another country.

In this study, the stock market integration between emerging and developed stock markets. 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 1990s has resulted in a rising interest in investing in these markets. We consider whether the Indonesia stock market is integrated with European Union (EU) (UK, France, Germany and Italy) stock markets because of the importance of these economies to Indonesia as trading partners and in terms of investment flows.

The foundation and the establishment of EMU in 1999 commence an era where both monetary and fiscal policies in the euro zone became more coordinated. Stock market prices represent the economic conditions in each country and thus stock markets in EMU should be more integrated as a result of more similar conditions across the countries (Ripley, 1973). Additionally, during recent years there has been a positive progress towards financial integration in the EU with the implementation of single market legislation.

The EU's stock markets are still governed by different legal systems and other major obstacles such as legal, regulatory, tax or technical obstacles to cross border activity within the EU result in some degree of segmentation.

There have been many studies investigated financial integration from different perspectives such as stock markets, bond markets and exchange rates, including regional trade arrangements and yen bloc. Early studies on stock markets integration can be found in Grubel (1968), Levy and Sarnat (1970) and Solnik (1974). They have documented evidence of low correlations among national stock returns. This result implies that investors can gain benefits from international

portfolio diversification. However, the international links have been increasing over the past decade, especially for the stocks traded actively in the major financial centres (Goldstein and Michael, 1993).

The empirical findings of previous studies particularly on the integration Asian stock markets are mixed. For examples, Chan *et al.,* (1992) and Ibrahim (2005) document no cointegration between US and several Asian emerging markets. Ibrahim (2005) notes that, in the long run, these markets need not be cointegrated as they may be driven by country-specific factors, which is, the fundamental factors may have dominated the market long-run trends. In recent study, Karim, Jais and Karim (2011) examine the effects of the 2007 US subprime crisis on the integration and co-movements of selected stock index futures markets using time series techniques of cointegration over the period from January 2001 to December 2009. In order to explore changes in the stock market integration and co-movement, we divide the period of analysis into two periods, namely the pre-crisis period (January 2001 to July 2007) and during crisis period (August 2007 to December 2009). We found no evidence of cointegration among the stock index futures markets. Accordingly, the US subprime crisis does not seem to affect the long-run co-movements among the stock index futures markets of Malaysia, Singapore, the USA, the UK and Japan.

However, Arshanapalli *et al.,* (1995), Masih and Masih (1999), and Majid *et al.*, (2008; 2009) and Karim and Majid (2009) found evidence of cointegration among Asian emerging markets and developed markets. Karim *et al.,* (2009) 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.

Karim and Majid (2010) found to be integrated between the Malaysian stock market and the stock markets of its major trading partners (the USA, Japan, Singapore, China and Thailand). The data employed in this study are weekly stock indices spanning from January 1992 to May 2008 is analysed using autoregressive distributed lag (ARDL) bound testing approach and vector autoregression (VAR) framework. Karim and Karim (2012) that study re-examines the integration among five selected ASEAN emerging stock markets (i.e., Malaysia, Thailand, Indonesia,

the Philippines and Singapore) based on ARDL bound testing approach proposed by Pesaran *et al.,* (2001). In our study found that the ASEAN stock markets are moving towards more integration among themselves, especially following the global financial crisis.

Thus, this study attempts to partially fill the gap in the literature and to provide recent empirical evidence on stock market integration among the emerging stock market of Indonesia and four selected European Union (EU), (i.e., UK, France, Germany and Italy). The findings of this study may have implications for investors and companies in the international community who internationally diversify their investments and make capital budgeting decisions in this market.

The rest of the paper is structured as follows. Section 2 describes the empirical frameworks, VAR provides the description of the data. Section 3 offers empirical results. Finally, Section 4 presents conclusion and policy implication.

EMPIRICAL FRAMEWORK AND DATA PRELIMINARIES

1. Cointegration Test

In the econometric literature, there are plentiful econometric techniques to examine cointegration relationship among variables. A recent study by Gonzalo (1994) provides empirical evidence to support the Johansen procedure's relatively superior performance over other methods for testing the order of cointegration rank. Thus, to test for cointegration among the stock index futures markets, the maximum likelihood approach of Johansen (1988) and Johansen and Juselius (1990), hence forth the JJ cointegration approach is adopted. The JJ cointegration is based on a vector autoregression (VAR) model that can be formulated as follows:

$$\Delta Y_t = \delta + \Gamma_i \Delta Y_{t-1} + \ldots + \Gamma_k \Delta Y_{t-k} + \prod Y_{t-k} + \varepsilon_t$$

Where $\mathbf{\Delta}$ first difference, $\mathbf{Y_t}$ is an n x 1 vector of variables and $\boldsymbol{\delta}$ is an n x 1 vector of constant, respectively. $\mathbf{\Gamma}$ is an n x n matrix (coefficients of the short-run dynamics), $\prod = \alpha\beta$ where α is an n x 1 column vector (the matrix of loadings) represents the speed of short-run adjustment to disequilibrium and β is an 1 x n cointegrating row vector (the matrix of cointegrating vectors) indicates the matrix of long-run coefficients such that Y_t converge in their long-run equilibrium. Finally, $\boldsymbol{\varepsilon_t}$ an n x 1 vector of white noise error term and $\mathbf{k}$ is the order of autoregression. Johansen proposed two statistics to test the rank of the long-run information $\mathbf{\prod}$, namely, maximum likelihood and trace. We note that, the results of JJ test tend to be sensitive to the lag length. Following Hall (1989) and Johansen (1992), we specify the lag length that renders the VAR residuals serially uncorrelated. In order to test for the number of cointegrating vectors, this study employs Johansen

and Juselius's (1990) and Osterwald-Lenum's (1992) statistics that are adjusted for the degree of freedom.

In addition, an important requirement for implementing the JJ cointegration test is that the variables are non-stationary integrated of the same order. Accordingly, prior to the JJ test, the standard Augmented Dickey-Fuller (ADF) unit root tests are conducted to determine the order of integration for each stock index futures price.

In order to assess short-run dynamic interactions among the share prices, we use VAR model of VDC and IRF. Traditionally, VAR model as suggested by Sims (1980) relies on a Choleski factorization to orthogonalize VAR innovations so that they are uncorrelated contemporaneously. VDC measures the percentage of a market's forecast error variance that occurs because of a shock from a market in the system. While an IRF traces the response of one market to a change in one of the market's innovations. This IRF enables us to characterize the dynamic integration among markets, and observe the speed of adjustment of markets in the system. Unfortunately, innovation accounting results based on the Choleski factorization are sensitive to the ordering of variables when the residual covariance matrix is non-diagonal (Yang *et al.,* 2003). Thus, in order to overcome these drawbacks, instead of using IRF, we employ generalized impulse response analysis as developed by Pesaran and Shin (1998), which is invariant to the ordering of the variables in the VAR model. This feature of the generalized impulse responses is particularly useful for studies on equity markets, which are generally characterized by quick price transmissions and adjustments (Ewing *et al.,* 2003). A convenient feature of the VAR representation is that it can be estimated by OLS, which yields consistent, asymptotically efficient estimates and allows us to examine whether more complex transmission mechanism are involved (Hutson *et al.,* 2008).

2. Data preliminaries

The available data used in this study consists of monthly closing stock index prices of Indonesia (JKSE) and four selected European Union (EU) (i.e., the UK (FTSE 100); France (CAC 40) Germany (GDAXI); and Italy (FTSEMIB). The sample period starts from January 1, 2010 to December, 2014. All indices have been obtained from yahoofinance.com and bloomberg database.

EMPIRICAL RESULT

In this analysis, the ADF Unit Root Test is used in order to check the stationarity (essentially the non-stationarity) of the stock indexes for each stock markets. Since the series of stock indexes contain a trend it is decided to include both a constant and a trend in the regression line described above, in order to perform the unit root tests. The results from the 5 ADF Unit Root Tests are summarized in Table 3.1.

Table 3.1
ADF Unit Root Test Results on Stock Indexes for Each Stock Market

Country	*Level*			
	ADF Test Statistic	*1% critical value*	*5% critical value*	*10% critical value*
Indonesia	-2.936426	-4.121303	-3.487845	-3.172314
UK	-3.020856	-4.121303	-3.487845	-3.172314
France	-1.900883	-4.121303	-3.487845	-3.172314
Germany	-2.381824	-4.121303	-3.487845	-3.172314
Italy	-1.788209	-4.121303	-3.487845	-3.172314
	1st difference			
	ADF Test Statistic	*1% critical value*	*5% critical value*	*10% critical value*
Indonesia	-7.339105	-4.124265	-3.489228	-3.173114
UK	-9.400013	-4.124265	-3.489228	-3.173114
France	-7.428087	-4.124265	-3.489228	-3.173114
Germany	-7.764968	-4.124265	-3.489228	-3.173114
Italy	-7.375661	-4.124265	-3.489228	-3.173114

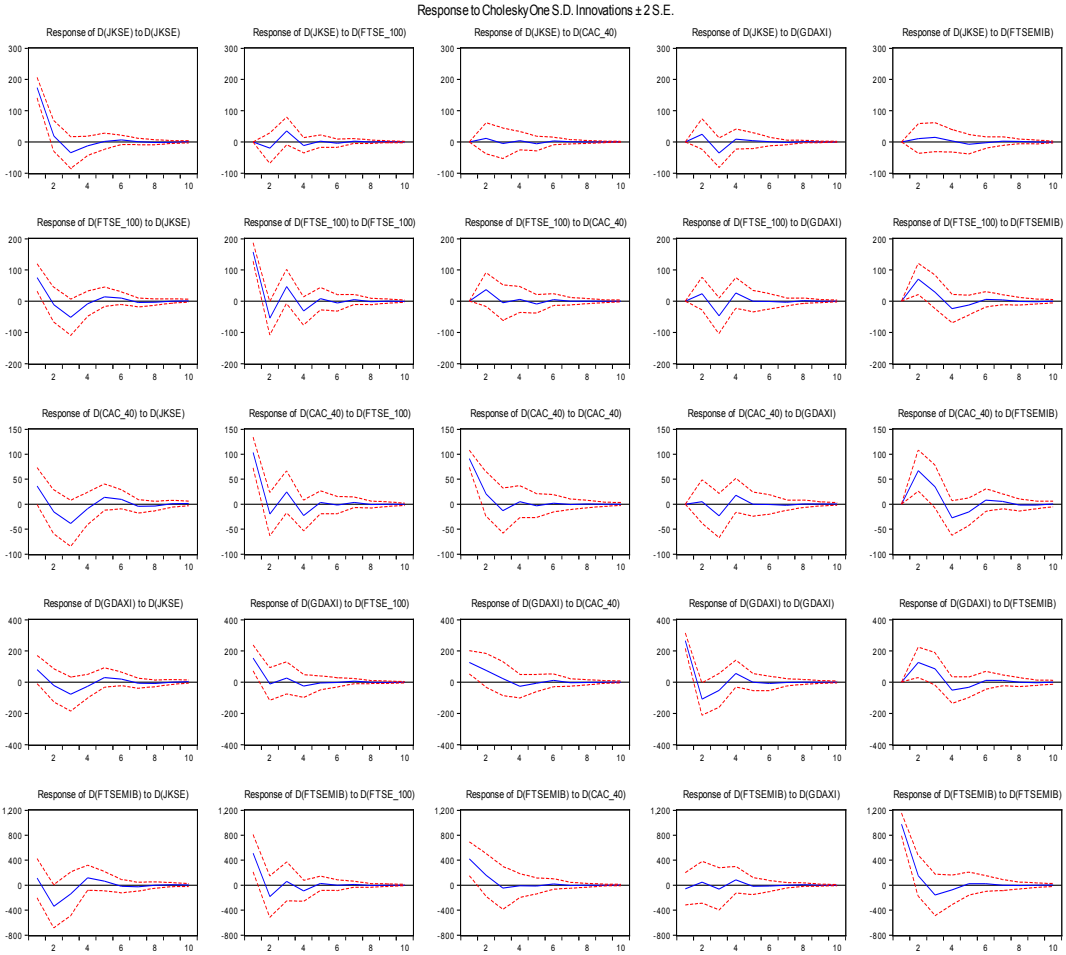
Notes: Variables represent aggregate national stock market price indices for Indonesia (JKSE), UK (FTSE 100), France (CAC 40), Germany (GDAXI) and Italy (FTSEMIB).

Results in Table 3.1 tend to indicate that while all variables contain a deterministic trend, we cannot reject the presence of a unit root for any of the variables. Therefore, overall, null hypothesis in the ADF test data is not stationary. Table 3.1 shows that the ADF test statistics for < critical value of 1, 5, 10 per cent or at the 'level' form but stationary after 'first-differencing' (Δ) the ADF test statistics for > critical value of 1, 5, 10 per cent

We also employ generalized impulse response analysis as developed by Pesaran and Shin (1998), which is invariant to the ordering of the variables in the VAR model. The generalized IRF in order to assess short-run dynamic interaction

between the Indonesia stock market and four member of EU. Results in figure 3.1, impulse response graph showing the movement is getting closer to the point of balance (*covergence*) or back to the previous balance, this indicates that the response of a variable as a result of a shock the longer will disappear so that the shock does not leave a permanent effect on these variables.

Figure 1: Impulse Response Graph



In our study, Granger causality test is employed to test long-run relationship among emerging stok market of Indonesia and four selected European Union (EU) (i.e., the UK (FTSE 100); France (CAC 40) Germany (GDAXI); and Italy (FTSEMIB). The results can be explained Table 3.2.

Table 3.2
Granger-Causality Results on Stock Indexes for Each Stock Market

	F-Statistic	*Probability*
JKSE does not Granger Cause FTSEMIB	2.80196	0.0697***
FTSEMIB does not Granger Cause JKSE	0.54871	0.5809
GDAXI does not Granger Cause FTSEMIB	0.43084	0.6522
FTSEMIB does not Granger Cause GDAXI	4.59803	0.0144**
FTSE_100 does not Granger Cause FTSEMIB	2.57238	0.0859
FTSEMIB does not Granger Cause FTSE_100	4.55821	0.0149**
CAC_40 does not Granger Cause FTSEMIB	1.23186	0.3000
FTSEMIB does not Granger Cause CAC_40	4.36623	0.0176**
GDAXI does not Granger Cause JKSE	2.04899	0.1390
JKSE does not Granger Cause GDAXI	0.37603	0.6884
FTSE_100 does not Granger Cause JKSE	0.48828	0.6164
JKSE does not Granger Cause FTSE_100	0.39191	0.6777
CAC_40 does not Granger Cause JKSE	0.32065	0.7271
JKSE does not Granger Cause CAC_40	1.12105	0.3335
FTSE_100 does not Granger Cause GDAXI	0.10241	0.9028
GDAXI does not Granger Cause FTSE_100	3.23723	0.0472**
CAC_40 does not Granger Cause GDAXI	1.68708	0.1948
GDAXI does not Granger Cause CAC_40	1.02846	0.3646
CAC_40 does not Granger Cause FTSE_100	1.96276	0.1505
FTSE_100 does not Granger Cause CAC_40	1.52463	0.2271

Notes: Significance at *1, **5 and ***10 per cent levels

Based on the test results in table 3.2 the Engel and Granger co-integration test by using criteria prob. value < α (eg α = 5% and 10%), it appears there are four null hypothesis is rejected. This means indicate co-integration among Indonesia on the European Union (EU), there is evidence of co-integration among Indonesia on the Italy and each stock market of European Union (EU) between Italy with Germany, France and UK and between Germany and UK.

Researchers conducted cointegration test to determine whether there will be a balance in the long run, that there are similarities movement and stability of the relationship between the variables in this study or not. In this study, cointegration

test was conducted by using Johansen's Cointegration Test. The following table 3.3 are presented the test results by the method of Johansen's Cointegration Test.

Table 3.3
Johansen Cointegran Test (Trace Statistic)

Hypothesized No. of CE(s)	*Eigenvalue*	*Trace Statistic*	*0.05 Critical Value*	*Prob.***
None *	0.419688	81.82141	79.34145	0.0321
At most 1	0.295539	50.80257	55.24578	0.1164
At most 2	0.271968	30.83420	35.01090	0.1307
At most 3	0.135886	12.74178	18.39771	0.2575
At most 4*	0.074563	4.416901	3.841466	0.0356

*denotes rejection of the hypothesis at the 0.05 level

According to the table 3.3 above can be seen comparing the value of the trace statistic of the critical value at significance level of 1% and or 5%. These results indicate that the trace statistic greater appeal so that there is a critical value long-term relationships between variables in the model, so it can be concluded that there are two cointegration equations formed.

CONCLUSION AND POLICY IMPLICATIONS

This study examines the stock market integration and short-run dynamic interactions between emerging stock market of Indonesia and the stock markets of European Union (EU) (i.e. UK, France, Germany and Italy). We employ, vector autogression (VAR) framework and monthly data spanning from January 2010 to December 2014. From the empirical findings, we found co-integration between Indonesia on the Italy and co-integration each stock market of European Union (EU). From generalized IRF analyses, we observe substantial dynamic interactions between the stock markets of Indonesia and stock market of European Union (EU). Impulse response graph showing the movement is getting closer to the point of balance (*covergence*) or back to the previous balance, this indicates that the response of a variable as a result of a shock the longer will disappear so that the shock does not leave a permanent effect on these variables.

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 integration among the stock markets would give an idea the potential benefits from international portfolio diversification and hedging

strategies. The stock index futures significantly extended the variety of investment and risk management strategies available to investors and help managers to mitigate international risks and managing economic, transaction and translation of risks.

In future, to add the existing literature on market integration in the Asian and EU region, further empirical studies can explore factors leading for market integration such as contagion effect, economic integration and stock market characteristics. International investors have to comprehend the driving forces behind the market integration in order to grasp the potential risks and returns of diversification.

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