INTEGRATION OF EUROPEAN UNION, NAFTA AND ASIA STOCK MARKETS

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Abstract - This study examines the integration of European Union, NAFTA and Asia stock markets. These countries include, England, France, German, USA, Canada, Mexico, Indonesia, Malaysia, Singapore, Philippines, Thailand, Hongkong, China, Japan and South of Korea period starting from January 2008 to December 2016. Unit root, Co-integration test, Vector Autoregressive (VAR) and Granger Causality Test are employed. The results showed that Stock markets of European Union, NAFTA and Asia countries are integrated with other stock markets. Furthermore, United states have a significant impact with other stock market.

Keywords - Stock prices, financial integration, Johansen cointegration, VAR.

I. INTRODUCTION

Globalizations in capital markets and reduction of restrictions on international cross listings have led to greater flows of capital between economies, easier ownership and trading in securities from around the world. With increased market integration, the current world financial markets have become more closely correlated and interdependent over time. Understanding the information linkages and correlations between markets are important for policy makers and fund managers in their financial decisions in relation to investment and risk management (Yang, 2014).

Financial integration is the process by which a country's financial markets become more closely integrated with those inother countries or regions. Economic theory and empirical findings suggest that financial integration and financial marketsdevelopment are likely to remove barriers to exchange, to allocate capital more efficiently and, therefore, contribute toeconomic growth (Majid, et. al, 2008).Financial literature has presented a strong emphasis on the interaction among international financial markets. However, empirical results are mixed and conflicting on the extent of financial market integration.Some empirical studies have found that stock markets are integrated. Osterwald (1992) examines stock market integration ofUS, Japan, England, Germany, and Canada over the period of 1974–1990. The results show the presence of a single cointe-grating vector indicating low levels of integration. Espitia and Santamaria (1994) conclude that a high level of correlationexists between daily return time series for all the European markets. Moreover, Bertero and Mayer (1990) examine the linkageamong between the United States and Japan. Their empirical results show that both markets are integrated with a spillover effect from the United States to the Japanese markets.On the other hand, other studies have found that stock markets are segmented. Roca (1999) finds no significant relation-ship between Australia and its major trading partners by applying cointegration analyses on weekly stock price indices datacovering the period 1974 to 1995. Karim and Gee (2006) examines stock market integration between the developed markets of theUS, Canada and UK and the emerging markets of India, Malaysia and Singapore. The empirical results show that only thepairs Malaysia-Singapore and the US-Canada stock markets exhibit long-run relationships.Several studies have examined stock market integration in other regions. Richards (1995) find that Asian and Latin American emerging markets are partially integrated with the world market and that thelevel of integration is time-varying. Masih and Masih (1997) use multivariate cointegration and find that all the Asian NewlyIndustrializing Countries (NIC) of Hong Kong, Singapore, South Korea and Taiwan share long-run cointegration relationshipwith markets in Japan, the U.S., Japan, U.K., and Germany. Masih and Masih (1999) apply vector error-correction as well as level VAR models and find results similar to their aforementioned study.

II. LITERATURE REVIEW

Although the research topic of whether international stock markets are integrated or relationship between stock markets with exchange rate and crude oil has been hotly discussed and analyzed, both in academia and in the financial service industry, it still represents a moot point that is perhaps surprisingly not yet fully resolve. The Vector Autoregressive (VAR) model was used in several studies to investigate integration stock markets. The VAR analysis in the study by Mevlud Islami and Paul J. J.

Welfens (2013) conducted a generalized VAR analysis to confirm the findings integration the stock markets in Eastern European countries seems to be rather week except for the Hungarian stock market. This means that only the Hungarian stock market is integrated. Leila C Kabigting (2013) studied financial integration of the stock markets of the ASEAN 5 +3 countries found that there is the presence of integration and co-integration with Philippine with the following countries: Indonesia, Singapore, and Thailand. They also pointed out that any news in any of these stock markets may increase volatilities not only in the country but also in the region.

Turgut Tursoy and Faisal (2017) investigates financial market integration among U.S. stock market and Turkish stock market using monthly data for the period of 1989 to 2015. Using Cointegration analysis, Granger causality test, error correction term. The findings of the study suggested that Turkish stock market which is the local market is strongly integrated with the US stock market.

Ajaya Kumar Panda and Swagatika Nanda (2017) examines short term dynamism and long term equilibrium relationship between the stock markets of South and Central America. Johansen and Juselius multivariate cointegration test, Granger causality test based vector error correction model (VECM) approach, and variance decomposition analysis were used to investigate the dynamic linkages between markets. This study identifies long run co-movements between the stock markets. Chile, Peru and Venezuela are the most dynamically interlinked.

III. RESEARCH METHODOLOGY

A stationary time series is significant to a regression analysis based on the time series, because useful information or characteristics are difficult to identify in a non stationary time series. Therefore, a non stationary time series would lead to a spurious regression. However, most economic time series are non stationary in practice. Hence, time series should be made stationary after differencing. Useful information or characteristics can still be identified in the time series after differencing. A time series is said to be stationary if its mean and variance are constant and, the covariance depend on upon the distance of two time periods. The unit root test is used to test stationarity of variables and the order of integration. The Augmented Dicky-Fuller unit root test (ADF) (Dicky and Fuller, 1979) and the Phillips-Perron unit root test (PP) (Phillips and Perron, 1988) are often used to test stationarity.

In this study, the Johansen and Juselius (1990) Trace and Maximum Eigenvalue tests are employed to test the long-run relationships among the stocks. If two or more variables are found to be co-integrated, it implies that there is a long-run equilibrium relationship between them, and even though the variables themselves may be non-stationary, they will nevertheless move closely together over time.

The unrestricted vector autoregressive (VAR) approach used in this study was developed by Sims (1980). The VAR was developed to account for problems with intervention and transfer function analysis. This model provides a multivariate framework where changes in a particular variable are related to changes in its own lags and to changes in other variables. The VAR treats all variables as jointly endogeneous and imposes no a priori restrictions on the structural relationships, if any, between variables being analyzed. Because the VAR expresses the dependent variables in terms of only predetermined lagged variables, the VAR model is a reduced form model. Another argument that arises in the context of an unrestricted VAR is whether this model should be used where the variables in the VAR are co-integrated. There is a body of literature that supports the use of a vector error correction model (VECM), or co-integrating VAR if variables are integrated, I(1). Because the co-integrating vectors bind the long run behavior of the variables, the VECM is expected to produce results in the impulse response analysis and variance decomposition that more accurately reflect the relationship between the variables than the standard unrestricted VAR. Augmented Dickey-Fuller are used to investigate the degree of integration of the variables used in the empirical analysis. If a I(1) process does exist, the second step involves estimation of the VAR model with first differences, otherwise VAR is estimated in levels.
In next step Granger Causality test was applied. According to Granger (1969), a variable X is said to 'Granger cause' Y if past values of X help in the prediction of Y after controlling for past values of Y, or equivalently if coefficients on the lagged values of X are statistically significant. The null hypothesis of no direction of causality was tested against the alternative that there exists a direction of causality amongst the variables. The conclusion was arrived based on the fact that their F-statistics were statistically significant at 5% as indicated by their p-values.

IV. DATA

The data used in this study from DataStream stock market index data for European Union, NAFTA and ASIA. The observation period ranges from January 2008 to June 2016. I choose to work with daily data to alleviate problems associated with non-synchronous trading resulting from the fact that not all markets are

open during the same hours of the day. The missing data arising from holidays and special events are assumed to be the average of the recorded previous price and the next price. The specific markets as a mentioned below.

European Union	
UK	Financial Times Stock Exchange 100 Index (FTSE 100)
France	Cotation Assistée en Continu 40 (CAC 40)
Germany	Deutscher Aktienindex 30 (DAX 30)
NAFTA	
United States	Dow Jones Industrial Average (DJIA)
Canada	Toronto Stock Exchange (TSX)
Mexico	Índice de Precios y Cotizaciones (MXX)
ASIA	
Indonesia	Indonesia Composite Index (IHSG)
Malaysia	Kuala Lumpur Stock Exchange (KLSE)
Singapura	Straits Times Index (STI)
Philippines	Philippines Stock Exchange (PSEi)
Thailand	Stock Exchange of Thailand (SET)
Hongkong	Hong Kong Stock Exchange (HKEX)
China	Shanghai Stock Exchange (SSE)
Japan	Tokyo Stock Exchange (N225)
South of Korea	Korea Stock Exchange Index (KOSPI)

V. RESULTS

Before proceeding with the main results, we determine the order of integration of all variables using the Augmented Dickey Fuller (ADF) and Phillips–Perron (PP) unit root tests. As mentioned in the previous section, Pesaran et al.'s (2001) bounds testing approach is based on the assumption that the variables are I(0) or I(1). If the order of integration of any ofthe variables is larger than one, then the critical bounds suggested by Pesaran et al. (2001) are not valid.

Table 1: Stasionary Test

Variables	Stationary Test					
	ADF *t-statistics*			*Phillips-Perron*		
	Level	1st Differences		Level	1st Differences	
European Union						
FTSE 100	-1.867935	-49.45443	Stationary	-1.682366	-49.72050	Stationary
CAC 40	-2.854157	-50.49304	Stationary	-2.855229	-50.71538	Stationary
DAX 30	-0.628942	-48.02202	Stationary	-0.579971	-48.04217	Stationary
NAFTA						
DJIA	-0.045041	-52.57899	Stationary	-2.037159	-52.87937	Stationary
TSX	-1.750959	-48.83758	Stationary	-1.647896	-48.93456	Stationary
MXX	-1.362529	-45.07769	Stationary	-1.089956	-45.23966	Stationary
ASIA						
IHSG	-0.710721	-30.28550	Stationary	-0.686189	-45.40150	Stationary
KLSE	-0.959036	-44.09329	Stationary	-0.862388	-44.17923	Stationary
STI	-2.040542	-46.73634	Stationary	-2.176815	-46.82457	Stationary
PSEi	-0.731725	-44.70207	Stationary	-0.673803	-44.55781	Stationary
SET	-0.618123	-47.03616	Stationary	-0.618123	-47.03616	Stationary
HKEX	-2.143684	-49.89802	Stationary	-2.079265	-49.93956	Stationary
SSE	-2.019015	-46.29789	Stationary	-2.037201	-46.45496	Stationary
N225	-0.842534	-51.27531	Stationary	-0.790155	-51.27449	Stationary
KOSPI	-1.935545	-47.86831	Stationary	-1.946168	-47.88752	Stationary
Test critical values:	*5% critical value -2.862570*					

Table 1 presents the results of the unit root tests. The results of ADF and PP unit root tests indicate that all stock indices are non-stationary atlevels. However, unit roots in the first difference of stock indices are rejected at the 1% level of significance. It is, therefore,worth concluding that all stock indices are I(1) and the bounds testing approach could be proceeded.One of the important aspect of VAR model is to select the optimal lagged term.

Table 2: Optimum Lag-Length

Lag	LR	FPE	AIC	SC	HQ
0	NA	1.15e+75	215.4020	215.4389	215.4155
1	132121.6	2.99e+50	158.7921	159.3823	159.0071
2	2145.608	**1.38e+50***	158.0558	**159.1992***	**158.4723***
3	518.3759	1.43e+50	**158.0222***	159.7188	158.6402
4	398.9472	1.41e+50	158.0394	160.2893	158.8590
5	298.7184	1.50e+50	158.0998	160.9029	159.1208
6	251.1688	1.62e+50	158.1803	161.5367	159.4029
7	320.7180	1.70e+50	158.2290	162.1387	159.6531

LR: sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion.

Table 2 shows the summary results of VAR lag order selection criterion. The first left hand column shows the model for which the lag length has been selected using The LR, FPE, AIC, SC and HQ criterion.
The numbers are the smallest value in each of criteria. Based on the results, the study chose two lag to be appropriate. The Johansen co-integration test represents each variable as a function of all the lagged endogenous variables in the system. It uses two ratio tests, a trace test and a maximum Eigenvalue test, to examine the number of co-integration relationships. Both tests could be used to determine the number of co-integrating vectors present, although they do not always indicate the same number of co-integrating vectors.

Table 3: Johansen Cointegration Test

Hypothesized No. Of CE(s)	Trace Statistic	5% Critical Value	Prob**
R = 0	345.7753	334.9837	0.0178
R = 1	281.3575	285.1425	0.0708
R = 2	221.8542	239.2354	0.2289
Hypothesized No. Of CE(s)	**Max-Eigen Statistic**	**5% Critical Value**	**Prob****
R = 0	64.41781	76.57843	0.3891
R = 1	59.50329	70.53513	0.3516
R = 2	52.04486	64.50472	0.4442

Note * Trace test indicates 1 cointegrating eqn(s) at the 0.05 level and Max-eigenvalue test indicates no cointegrating eqn(s) at the 0.05 level.

Table 3 reports the results of the Johansen co-integration test. Trace test and maximum Eigenvalue indicates that at least one co-integrating equations exist at the 0.05 level. Therefore, there exists co-integration between stock market. Co-integration between variables Implies existence of long-run causality for at least one direction

The results of the Granger causality test of the total time periods are summarized and it indicates whether there exists significant Granger Causality and if it exists, then in which direction such causality exists among the various stock markets. The table elucidates that significant causality are found between stock markets.
The Granger causality test results showed there exists a bidirectional causality between European Union, NAFTA and Asia Stock market for example all NAFTA stock markets affect almost all of Asia stock market including Indonesia, Malaysia, Singapore, Thailand, Hongkong, China and Japan.
Furthermore, the results also showed that there exist a

uni-directional causality between one to another region such as United Kingdom stock market with the United States, Canada, Singapore and Japan or Hongkong stock markets with French, American and Sinngapura stock markets. Based on the Granger Causality result, we can conclude that United states have a significant impact with other stock market.

CONCLUSION

In general, the empirical results reveal that the long-run cointegrating relationship among these markets were strengthened during the period. There also exists significant influence among stock markets. If stock markets share a common trend, it implies that markets move together and any one market will be representative of the behavior of that group of markets. It means that short-term gains from international diversification would be limited because markets are constrained by common shocks manifesting temporary effects.

According to the results of this study I would like to give the recommendation. The international investors should not invest at the same time. Because, stock markets are positively correlated with each other. They should choose one of them for investment.

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