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COINTEGRATION AND INTERDEPENDENCY OF GOVERNMENT BOND YIELD: EVIDENCE FROM ASEAN-4, INDIA, AND CHINA WITH GLOBAL GOVERNMENT BONDS YIELD

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ABSTRACT

The purpose of the study is to explore cointegration and interdependency of 10 years government bond yield of ASEAN-4 countries (Indonesia, Malaysia, Philippines, and Thailand), India, and China with global government bond yield of USA, Germany, and Japan. The research applied estimating model of Vector Autoregression (VAR) and Granger Causality/Block Xxogeneity Wald Test to observe two-way relationship between variables and employ weekly data of 10 years government bond current yield of each country from January 2007 until December 2022. After discovering that all exogenous variable (USA, Germany, and Japan) is independent through Granger Causality/Block Xxogeneity test, the long-run relationship is assessed with Johansen test. The outcome showed that there are no cointegration (long-run relationship) between 10 years government bond yield for ASEAN-4 countries, India, and China with global government bond yield of USA, Germany, and Japan. Short-run relationship estimated with VAR model and the result obtained that all government bond yields for ASEAN-4, India and China are mostly predicted by their own past lags. Furthermore, unlike other country in the research, Philippines and China are seen to be independent from global government bonds (USA, Germany, and Japan). The finding on this study enriched research that focused on observing relationship between countries, especially the smaller number of research that focused on long term government bond for ASEAN countries and developed countries. In addition, the research unlocked insights for investor on their investment strategy as well as for regulator in determining yield coupon as part of strategic policy by leveraging visibility of 10 years government bonds interdependency of developing and developed countries.

Keywords: Cointegration, Interdependency, Government Bond, Yield, VAR

INTRODUCTION

Globalization in financial system have unlocked unlimited opportunities for global investor to invest in multiple financial assets across the world. Whereas government across the world, especially emerging market countries also taking benefit to finance their budget deficit that required capital injection from developed countries such as USA, Germany, and Japan. One of the most familiar and popular instruments used is government bonds, with certain yield value. The process between these countries will create integration between their financial systems. This integration in financial system unconsciously created multiple risk, such as exchange rate risk, interest rate risk, etc. This is drive by the alteration in macro and monetary policy of capital donor countries that will transmit to borrowing countries, and co-movement that happened generate unstable domestic economic condition due to massive capital outflow to more stable and profitable market.

Economic crisis had been major catalyst on the growing demand of domestic obligation market. This is viewed as a strategy to reduce dependency on foreign debt that are vulnerable to uncertainty of exchange rate and maturity (Piesse, Israsena and Thirtke, 2007). During pandemic Covid-19, ASEAN-4 countries issued significant volume of government bond to finance fiscal spending (Yiu, Tsang, and Nguyen, 2020). Specific for Indonesia, total government debt amounted to IDR 7.700 trillion by the end of 2022 with domestic government bond scored the highest proportion of 88,53%, or equal to IDR 6.846 trillion. Jaramilo & Weber (2012) argued that emerging countries government must be careful in maintaining fiscal balance, especially in positive economy era where the environment can change rapidly and impacting government bond yield. While Gadanecz, Miyajima and Shu (2014) argued that emerging market government bond yield with long term tenure can be influence among others by expectation of domestic exchange rate to foreign rate and other domestic factors such as inflation, GDP growth, fiscal balance, and CDS spread. Miyajima, Mohanty, and Chan (2015) highlighted US treasury yield as dominant factor in determining local currency government bond yields of emerging market.

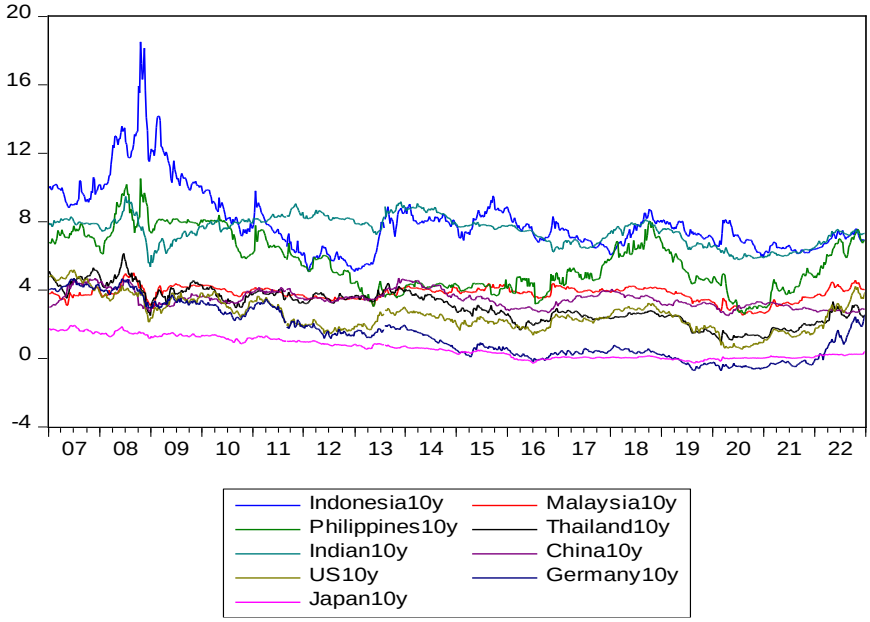

Figure 1: Trend of 10Y government bonds yield of ASEAN-4, China, India, USA, Germany, and Japan

Source: Statista Research Department, 2023

Figure 1 above illustrated that 10Y government bonds for each country fluctuated during the research period with uptrend on 2007-2009, which is the global financial crisis. Based on weekly yield data, 10Y government bond yield for Indonesia, Philippines and India has more fluctuation compared to Thailand and China. While Japan and Germany tend to be more stable. This fluctuation informed that there are possibility of relationship or integration in financial market between countries. Is the high and flow of 10Y government bond yield in a single country will cause cointegration or independent to other countries, especially developed countries.

Ang & Piazzesi (2003) pioneering the research on yield curve. Diebold, Ruebysch & Arouba (2006) and Cherif & Kamoun (2007) argued that macro-economic factor influence yield movement in different level of signification for different yield term. Gadanecz, et al. (2014) found considerable influence of raising exchange rate volatility that led to investor demand for higher yield compensation in holding local currency sovereign bond of twenty emerging market economies (EME) countries. However, dissenting finding stated by Yu Hsing (2015) that argued normal effective exchange rate negatively influences bond yield. In Indonesia, Ihda Muktiyanto and Muhammad Aulia (2019) concluded that fluctuation in 10Y UST yield, interest rate, exchange rate (IDR to USD), and CDS5y have significant influence on 10Y government bond yield (SBN domestik), whereas change in 10Y UST yield is variable with the highest coefficient that influence SBN domestik. Mohanasundaram & Karthikeyan (2015), In their research concluded that there are no cointegration (long-run relationship) between India and South Africa stock market with US stock market, where the short-run relationship is analyzed with Vector Autoregression (VAR). Furthermore, the analysis showed that US and South Africa stock market is influenced by their own past lag, whilst India stock market are predicted by its own and South Africa, both on the past lag. Sadhwani (2015) assessed short-run relationship with Vector Autoregression (VAR) model and found out that there are no cointegration (long-run relationship) of India exchange rate with foreign exchange rate of EUR, GBP, USD, and YEN. Sachdeva, Bhullar Singh, Gupta Kumar (2021) argued that there are cointegration (long-run relationship) between Indian stock market with US stock market by applying estimating model of Vector Autoregression (VAR).

This research expanded and enriched the previous research by testing cointegration and interdependency not only for India, but for developing and developed countries from different continent by adding ASEAN-4 country (Indonesia, Malaysia, Philippines, and Thailand), China and USA (America), Germany (Europe) and Japan (Asia). Moreover, the variable assessed is focus on fixed income instrument (10Y government bond) as reference of alternated low risk investment instead of high-risk investment (stock market) and foreign exchange market. The method of research used are model Vector Autoregression (VAR) and Granger Causality/Block Xxogeneity Wald Test. The outcome of the study will be helpful especially for researcher, investor, and government in dealing with government bond market.

LITERATURE REVIEW

Integration in capital market is important to be understood, especially if there is economic, trade and investment relationship between countries. Eiteman et.al (2010) argued that market integration is a condition where stock price between capital markets have closely correlated relationship. Another definition of market integration displayed by Click and Plummer (2005) that explained from investor point of view with high asset portfolio, where market integration showed that two different market have same movement and correlated. Capital market integration at specific time will reduce the opportunities of portfolio diversification. Co-movement of market will lead to contagion and eventually lead to higher level of correlation, thus reduce the opportunities to perform diversification (Hyde, Bredin and Nguyen, 2010). This reduction triggered by high correlation, which will transmit faster influence to integrated countries when shock in capital market happened. Empirical study of Caporale, Gil-Alana and You (2021), argued that financial integration can be divided into two section which is regional integration and global integration.

Panda & Nanda (2016) in their research applied analysis method of cointegration test, variance decomposition test, dan granger causality to assesses dynamic linkages of capital market in USA. Chen et.al (2020) conducted cointegration test to check dynamic linkages of bitcoin market during pandemic Covid-19 by applying Vector

Autoregression (VAR) model. Vo and Tran (2020) in their research used cointegration test to understand volatility that happened on US capital market will be significantly responded by ASEAN capital market. Paucar (2020) in his research conducted cointegration test to estimate influence of US market to Colombian stock market, by using Vector Autoregression (VAR) model to estimate short-run relationship. Dhingra & Patel (2021), that analyze financial linkages and interdependences of BRICS country by using 10Y government bond yield as variable, found that based on Johansen cointegration analysis there are long-run relationship between BRICS in contrary to insignificant short-run relationship. Koskita and Laopodis (2019) explained that dynamic linkages on time series data divided into two parts of short-run and long-run dynamic linkages that are obtained from cointegration test. These dynamic linkages obtained by building Vector Autoregression (VAR) or Vector Error Correction Model (VECM) and Engle's (2002) dynamic condition correlation generalized autoregressive conditional heteroskedasticity (DCC-GARCH) specification.

Click and Plummer (2005), Chandra (2015), Ersabathari & Mauharam (2017) argued that ASEAN capital market is cointegrated and have cointegration relationship before and after crisis. The same empirical finding obtained in a study by Sum (2017) that performed research on stock market performance in ASEAN countries against uncertainty of US economic policy. In that research, based on Granger Causality test, it is found that change in US economy policy have two-way relationship with stock market return in Singapore and Malaysia, but not for Indonesia, Philippines, and Thailand. However, analysis on monthly data showed that uncertainty of US economy policy has negative influence on stock market return of the five ASEAN country.

Previous researcher had applied different model to analyze relationship of stock market between countries as impact of integration in economic and financial system. This relationship is strongly drive by how independent one country financial system relative to other countries. The common estimating model applied is Vector Autoregression (VAR) or Vector Error Correction Model (VECM) and Granger Causality model that identify causality among variables within the model. Engle-Granger (1983) in the literature review state that non-stationary variables within the model will have higher probability on long-rung relationship. Therefore, for further analysis, cointegration test are necessary to identify relationship between variables within the model.

Vector Autoregression (VAR) or Vector Error Correction Model (VECM) is widely used by researcher because its capability to estimate and as analysis tool that capture phenomena on macro-economic variable and how that phenomenon transmits to other variable through cointegration and granger causality. Several research that estimate and identify relationship between macro-economic variables and financial linkage, especially during economic shock from different region by utilizing Vector Autoregression (VAR) or Vector Error Correction Model (VECM) are Dhingra V.S, & Patel P. (2021), Bouri, et al (2021), Sandoval Paucar G. (2020), Vo & Tran (2020), Geurello & Tronzano (2020), Fakuda & Tanaka (2020), Eleftheria Koskita & Nikiforos T. Laopodis (2019), Chi-Chuan Lee & Chien-Chiang Lee (2019).

METHODOLOGY

This research performed in Indonesia with primary objective to examined 10Y government bond yield of ASEAN-4 countries, India, and China with global government bond yield of USA, Germany, and Japan. The current yield data of countries under study taken from January 2007 to December 2022. By testing relationship between variables, this research then continues to check on causality and cointegration. Unit root applied ADF test. Cointegration test applied with Johansen Cointegration test, while causality test using Granger Causality/Block Xxogeneity Wald Test. VAR model built by considering minimalization of theoretical approach to capture economic phenomenon correctly. While Vector Error Correction Model (VECM) are use in non-structural VAR model when time series data is non-stationer in difference level and cointegrated. However, in this research model applied are Vector Autoregression (VAR). E-views statistical application are used to perform the analysis.

Research Gap

From recent research as explained above, in general most of the research are concentrated on cointegration analysis on stock market of a country relevant to USA or other country. However, recent research on cointegration analysis between government bond yield of developing countries and government bond yield of developed country of USA, Germany, and Japan is not available to the researcher knowledge. Another interesting aspect of this research is, external variable influence that being assessed is not only for US government bond but also Japan's government bond as representative of ASIA's developed country and Germany as representative of European developed country. This fettle will certainly provide valuable information for investor of government bond to gain understanding of relationship between variables both short-run and long-run of government bond yield for each country.

Sample and Data Collection

This research utilized secondary data, which is 10Y government bond yield of each country within the research obtained from www.worldgovernmentbonds.com. To ensure data validity, researcher compared 10Y government bond yield data from other platform www.id.investing.com and conclude that output from both sources is equally the same. In other words, secondary data used are valid. Data consist of 832 observations, which is weekly data from period of January 2007 until December 2022. 10Y government bond yield used is yield on market closing price (current yield).

Research Tools and Techniques

Unit Root Test

Stationary test performed to all data variable used in this research. Stationary test performed with Augment Dickey Fuller (ADF) method on confidence level of 5% (α=5%). Built hypothesis for stationary test is:

H0 = data contain unit root (non-stationer)

H1 = data do not contain unit root (stationer)

Linear Correlation

In this research, correlation test performed to obtain information on significant level of relationship between two variables within research period. Correlation value will be equal to zero (0) if two variables are not correlated. Maximum value of correlation test is one (1), which means two variables perfectly have positive correlation and have same direction of movement.

Granger Causality Test

Granger Causality test performed to understand causality relationship between two endogen variables within VAR model. Availability of causality is assessed with F-test or observed from its probability value. Finding in causality test will provide information whether change in variable A cause by change on variable B, vice versa. And whether variable A and variable B influence each other. This information will support better estimation result.

Cointegration Test

Alternative cointegration test applied in this research is cointegration test developed by Johansen. The Johansen test utilized to determine cointegration between variables. Cointegration between variables cause relationship or long-run equilibrium between variables. However, it will cause disequilibrium in short run. With this difference, then adjustment is imperative. Optional model that can provide adjustment through correction of disequilibrium is VECM model, while if there is no cointegration implied, VAR model can be utilized to estimate short-run relationship.

Vector Autoregression (VAR) Model

Vector Autoregression (VAR) model utilized by considering minimalization of theory approach, with objective to capture the economic phenomena clearly. With that understanding, VAR model are considered as non-structural or non-theoretic model. VAR models have capability to analyze dependency relationship between variables within the model. In VAR models, all variables within the model (Endogen and Exogen) are assumed to have relationship. And required lag of each variable required to detect dependency relationship of variables within the VAR model.

DISCUSSION

Normality tests performed to all country's government bond yield data. Table 2 below visualized information of statistical descriptive of variables within the models, which calculated based on each government bond yield on closing price.

Table 2: Descriptive Statistic of Government Bond Yield for ASEAN-4, India, China, USA, Germany, and Japan

	INA	MAS	FIL	THA	IND	CHN	USA	GER	JPN
Mean	8.022.341	3.798.970	5.606.730	3.047.018	7.484.388	3.478.179	2.545.886	1.437.127	0.595875
Median	7.596.000	3.875.500	5.240.500	3.000.000	7.650.000	3.450.000	2.441.500	1.161.000	0.426000
Maximum	1.851.700	5.006.000	1.051.500	6.140.000	9.469.000	4.710.000	5.187.000	4.655.000	1.937.000
Minimum	5.085.000	2.522.000	2.580.000	0.960000	5.349.000	2.510.000	0.533000	-0.713000	-0.280000
Std. Dev.	1.938.338	0.417990	1.638.020	1.008.213	0.828013	0.498852	0.955760	1.520.464	0.593602
Skewness	1.699.578	-0.653681	0.371506	0.085119	-0.309025	0.446151	0.386305	0.515556	0.463311
Kurtosis	7.166.939	3.738.342	2.219.123	2.416.094	2.306.500	2.519.414	2.898.300	2.027.545	1.833.950
Sum	6.674.588	3.160.743	4.664.799	2.535.119	6.227.011	2.893.845	2.118.177	1.195.690	4.957.680
Observations	832	832	832	832	832	832	832	832	832

Source: author's work.

From above table, it can be observed that JPN bond yield have lowest mean 0,596, while INA have the highest mean of 8,022 and followed by IND 7,484. In general, it can be concluded that average (mean) yield of ASEAN-4. India and China government bond during research period are higher compared to USA, German and Japan government bond yield.

Stationarity Check of Data

Before proceeding to further data stationary test, figure 2 below showed weekly time series data movement of 10Y government bond yield during period of Jan 2007 – December 2022. This informed that data are not stationer at level, thus required stationarity through differencing process (first differencing), according to Box-Jenkins method developed by George Box and Gwilym Jenkins in their writing of Time Series Analysis: Forecasting and Control (1970). After differencing process, Figure 3 indicated data plot that have reached stationarity on first difference.

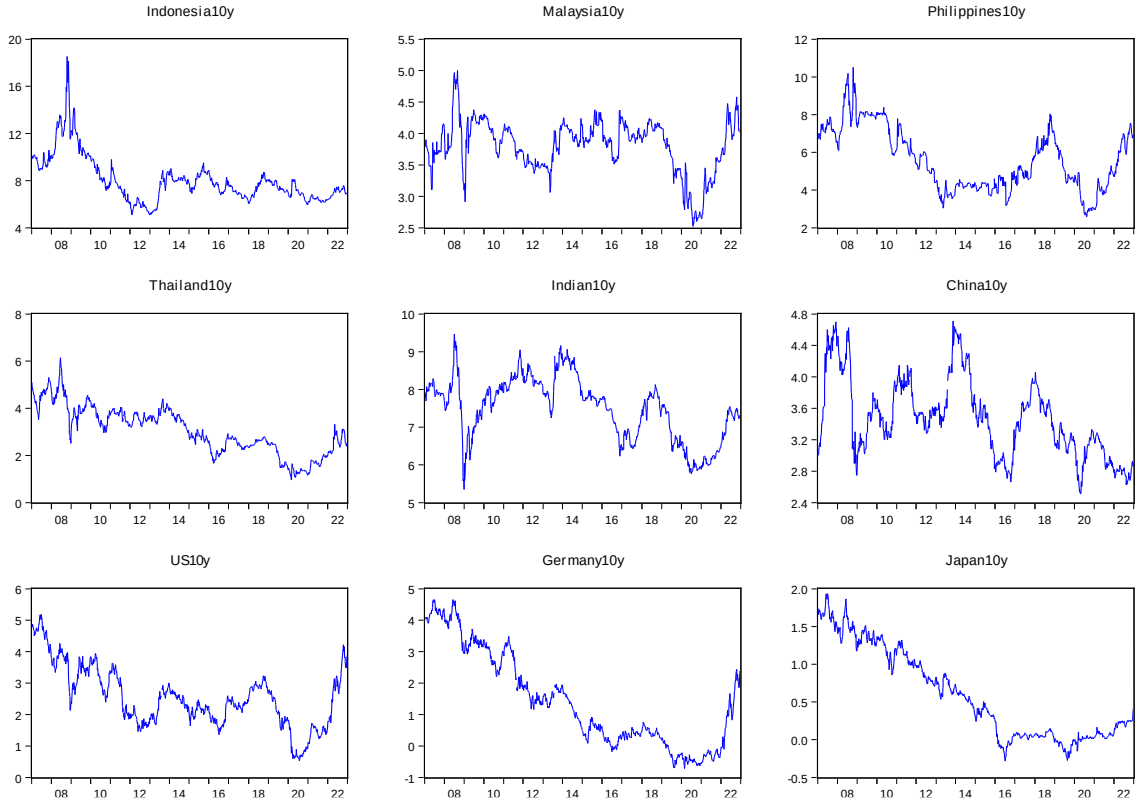

Figure 2: Data plot for 10Y Government Bond Yield for Indonesia, Malaysia, Philippines, Thailand, Indian, China, USA, Germany, and Japan (data level)

Source: Author's Work

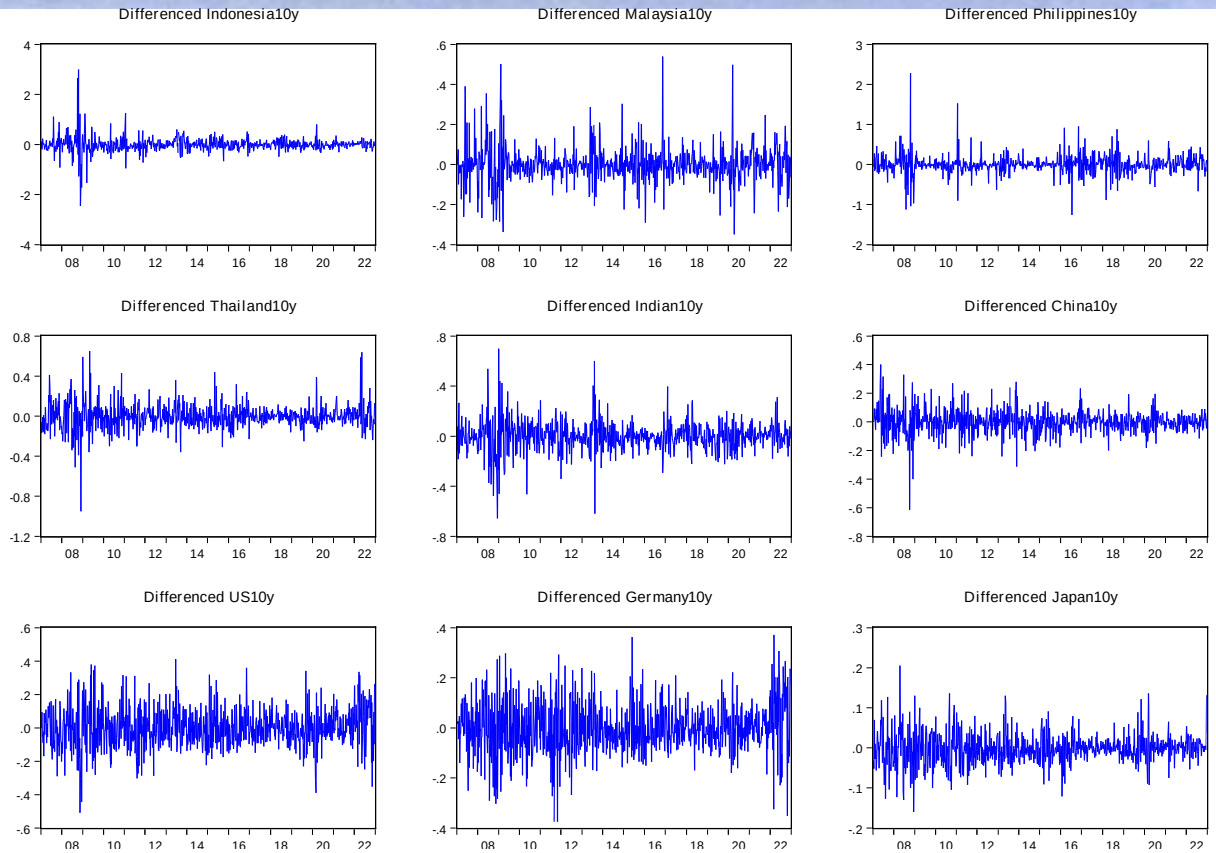

Figure 3: Data plot for 10Y Government Bond Yield for Indonesia, Malaysia, Philippines, Thailand, Indian, China, USA, Germany, and Japan (first difference)

Source: Author's Work

Table 3 is value of Augmented Dickey-Fuller (ADF) test after the time series data during research period are declared stationer for further analysis to be continue. It is essential to verify whether the data have unit root. Augmented Dickey-Fuller (1979) test are chosen because of the wide application and popularity of used in much research. The Augmented Dickey-Fuller (ADF) test controls for higher order correlation by adding lagged difference terms of the dependent variable to the right-hand side of the regression (Mohd. Aamir Khan et al, 2010). Based on ADF-Unit Root test value below, it can be concluded that that all-time series data for all variable within the research period are stationer on first differencing level. This can be seen based on T-value that are less than and significant probability (0,000) at α=1%.

Table 3: Augmented Dickey Fuller pada Unit Root Test

Variable	At Level		At First Difference		Result
	T Value	Probability	T Value	Probability	
INA	-2.316.968	1,158333333	-2.813.591	0.0000	I (1)
MAS	-3.412.616	0,075	-2.604.287	0.0000	I (1)
FII	-1.956.380	2,127777778	-3.271.807	0.0000	I (1)
THA	-2.330.308	1,129861111	-2.889.573	0.0000	I (1)
IND	-2.119.151	1,647222222	-2.844.855	0.0000	I (1)
CHN	-2.024.696	1,91875	-3.305.181	0.0000	I (1)
USA	-2.458.323	0,877083333	-1.842.789	0.0000	I (1)
GER	-1.582.236	3,411805556	-3.042.865	0.0000	I (1)
JPN	-1.911.108	2,272916667	-2.719.791	0.0000	I (1)

Source: Author's Work

Table 4 below indicating that all variables have positive correlation. Japan10Y have strong correlation with Germany10Y (0.9625), Thailand10Y - Germany10Y (0.9029), Thailand10Y - Japan10Y (0.8836). Indonesia10Y have strong correlation with Philippines10Y (0,6654), US10Y (0,6053), Germany10Y (0.6514) and Japan10Y (0.6083), while Indonesia10Y have lowest correlation with Indian10Y (0.1373) and with China10Y (0.2168). This positive correlation is important to predict another variable, which is evaluated with Granger causality test which is sensitive to the order of lag selection (Sadhwani, 2020)

Table 4: Correlation Matrix

	INA	MAS	FIL	THA	IND	CHN	USA	GER	JPN
INA	1								
MAS	0,4319	1							
FIL	0,6654	0,5317	1						
THA	0,5531	0,5307	0,6112	1					
IND	0,1373	0,5074	0,2601	0,7060	1				
CHN	0,2168	0,3166	0,2099	0,6770	0,6511	1			
USA	0,6053	0,6160	0,7817	0,7720	0,4650	0,4789	1		
GER	0,6514	0,4099	0,7543	0,9029	0,5056	0,5178	0,841	1	
JPN	0,6083	0,2697	0,6736	0,8836	0,4865	0,5085	0,723	0,9625	1

Source: Author's Work

Availability of strong and positive correlation between variables, especially Indonesia during research period drawn interesting attention for further analysis. Whether 10Y government bond analysis of a country in the past have prediction capability of change for that government bond yield in the future. To understand that phenomena, causality test between variables is necessary to be performed. Causality test result is required in selection of optimum lag that will be used to estimate relationship between variables within the VAR model. Definition of optimum lag length conducted based on define criteria. In this research optimum lag defined based on Akaike Information Criterion (AIC) as shown in table 5 below.

Table 5: Lag-Length Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-5408.729	NA	3.78e-06	13.05477	13.10597	13.07440
1	6409.931	23352.53	1.97e-18	-15.22875	-14.71679*	-15.03242*
2	6560.012	293.2913*	1.67e-18*	-15.39521*	-14.42248	-15.02218

Source: Author's Work

Based on above table, optimum lag criteria indicated by asterisk (*) sign on the output number. The optimum lag based on Akaike Information Criterion (AIC) is -15,39521 at lag 2. This is supported with lowest FPE value available on lag 2 and stability result test on optimum lag (lag 2). Modulus number on optimum lag stability test is below 1 (<1), which means VAR model is stable for further deep analysis.

Table 6 VAR Granger Causality/Block Xxogeneity Wald Tests

Dependent Variable: US10y

Null Hypothesis	F-Statistic	P-Value	Decision on Ho
GERMANY10Y does not Granger Cause US10Y	0.21537	0.8063	Not Rejected
JAPAN10Y does not Granger Cause US10Y	122095	0.2955	Not Rejected

Dependent Variable: Germany10y

Null Hypothesis	F-Statistic	P-Value	Decision on Ho
US10Y does not Granger Cause GERMANY10Y	0.01209	0.9880	Not Rejected
JAPAN10Y does not Granger Cause GERMANY10Y	154646	0.2136	Not Rejected

Dependent Variable: Japan10y

Null Hypothesis	F-Statistic	P-Value	Decision on Ho
US10Y does not Granger Cause JAPAN10Y	197508	0.1394	Not Rejected
GERMANY10Y does not Granger Cause JAPAN10Y	216863	0.1150	Not Rejected

Source: Author's Work

Granger causality test is applied to find out whether one time series helps in forecasting the other (Engle-Granger, 1983). In this study, the Granger causality study is undertaken to assess whether there is any potential predictability

power of one government bond's yield to the other. We use Granger causality/ Block Xxogeneity Wald Tests (which is applied on exogenous variable) under the VAR framework to capture the degree and direction of causality between the government bonds yield.

Granger Causality Test indicated that null hypothesis on US10Y, Germany10Y, and Japan10Y are rejected, in other works the three variables are independent and does not have prediction capability to other variables. This information obtained from correlation test and granger causality test will be used to understand whether movement of variable data have long-run relationship and equilibrium. This information will be obtained from the next cointegration test.

Table 7 Johansen Cointegration Test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 critical value	Prob.**
None *	0.042833	154.1699	159.5297	0.0942
At most 1	0.041346	117.9664	125.6154	0.1331
At most 2	0.029742	83.04631	95.75366	0.2701
At most 3	0.028807	58.07644	69.81889	0.2991
At most 4	0.016906	33.90341	47.85613	0.5071

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen statistic	0.05 critical value	Prob.**
None	0.042833	36.20351	52.36261	0.7291
At most 1	0.041346	34.92012	46.23142	0.4650
At most 2	0.029742	24.96987	40.07757	0.7694
At most 3	0.028807	24.17304	33.87687	0.4430
At most 4	0.016906	14.10113	27.58434	0.8156

* Rejection of null hypothesis at 0,05 level; ** Mackinnon, Haug & Michelis (1999) p-values

Source: Author's Work

Based on Johansen cointegration test above, trace statistics proved that there are one cointegration, and Max-Eigenvalue proved that there are no cointegration on 0,05 level. Based on that, it can be concluded that there is no long-term relationship between variables of 10Y government bond yield between countries within research period. Thus, the optimum model to estimate short-run relationship between variables of 10Y government bond yield between countries is Vector Autoregression (VAR) model.

This is based on Dickey, Jansen, & Fuller (1991), that revealed the absence of cointegration confers the non-existence of the long-run relationship among variables. Variables can move randomly with no linkage from each other.

Vector Autoregression (VAR) Estimates

Estimation result of VAR equation (not shown in the paper) showed that all variables are function of that variable itself in different lag. Such as Indonesia10Y (-1), Malaysia10Y (-1), Philippines10Y (-1), Philippines10Y (-2), Thailand10Y (-1), Thailand10Y (-2), Indian10Y (-1), China10Y (-1), China10Y (-2), US10Y (-1), Germany10Y (-1), dan Japan10y (-1).

Indonesia 10Y can be explained by Malaysia10Y (-1), Malaysia10Y (-2), US10Y (-1), US10Y (-2), Germany10Y (-1) and Germany10Y (-2). Malaysia10Y can be explained by Indonesia10Y (-2), Philippines10Y (-1), Philippines10Y (-2), Indian10Y (-1), Indian10Y (-2), US10Y (-1) dan US10Y (-2). Philippines10Y can be explained by Malaysia10Y (-1) and Malaysia10Y (-2). Thailand10Y can be explained by Indonesia10Y (-1), Indonesia10Y (-2), Malaysia10Y (-1), Malaysia10Y (-2), US10Y (-1), dan US10Y (-2). Indian10Y can be explained by US10Y (-1), US10Y (-2), Japan10Y (-1) dan Japan10Y (-2). China10Y can be explained by variables of Indonesia10Y (-1), Indonesia10Y (-2), Indian10Y (-1) dan Indian10Y (-2). US10Y can be explained by Philippines10Y (-1), Philippines10Y (-2) dan Indian10Y (-2). Germany10Y can be explained by Indian10Y (-1) dan Indian10y (-2). While Japan10Y is not influence by other variables despite high correlation to U10Y and Germany10Y.

The finding above indicating that in long-run relationship there are independency on government bond yield of ASEAN-4 country (Indonesia, Malaysia, Philippines, and Thailand), India, and China in the event of change or shock on the government bond yield of global government (USA, Germany, and Japan). Thus, in the long-run, investor have an opportunity of return to shift to international diversification. This finding is consistent with Gadanecz, et al. (2014) research that found considerable influence of exchange rate risk in the event of high volatility, which drive high demand of yield compensation from investor that hold local currency sovereign bond of 20 emerging market economies (EME) country.

CONCLUSION AND RECOMMENDATION

This research found out that all variables are non-stationary that required time series stationary by applying first order of difference. Strong positive correlation is found among Japan-Germany, Thailand-Germany, Thailand-Japan. While specific for Indonesia strong correlation are found with Philippines, US, Germany, and Japan. Granger causality/Block XXogeneity Wald Test showed that all exogenous variables (USA, Germany, and Japan) are found to be independent. No integration is found as the result of the Cointegration test. Thus, this indicates existence of short-run relationship that we estimate trough Vector Autoregression (VAR) model, where all variables are function of itself on different lag. On the other hand, all variables are found to be independent in the long run.

REFERENCES

Caporale, G.M., Gil-Alana, L.A., Kefei, Y. (2021). Global and regional financial integration in emerging Asia: Evidence from stock markets. *Journal of Economic Integration, Center of Economic Integration, Sejong University, Volume 36(2), pp. 185-202*. https://doi.org/10.11130/jei.2021.36.2.185

Gadanecz, B., Miyajima, K., Shu, C. (2018). Emerging market local currency sovereign bond yields: the role of exchange rate risk. *International Review of Economic and Finance, Volume 57, September 2018, pp. 371-401*. https://doi.org/10.1016/j.iref.2018.02.004

Hsing, Y. (2015). Short-Run Determinants of the IDR/USD Exchange Rate: A Simultaneous-Equation Model. *Global Economy Journal (GEJ), World Scientific Publishing Co. Pte. Ltd., vol. 15(3), pp. 311-318.* https://.doi.org/10.1515/GEJ-2014-0038

Miyajima, K., Mohanty, M., Chan, T. (2015). Emerging market local currency bonds: Diversification and stability. *Emerging Markets Review, 2015, vol. 22, issue C, pp. 126-139.* https://doi.org/10.1016/j.ememar.2014.09.006

Panda, A.K., Nanda, S. (2017). Market linkages and conditional correlation between the stock markets of South and Central America. *Journal of Financial Economic Policy, Emerald Group Publishing Limited, vol. 9(02), pp. 174-197.* https://doi.org/10.1108/JFEP-08-2016-0063

Sachdeva, T., Bhullar, P.S., Gupta, P.K. (2021). Cointegration of Indian stock market with global stock markets: An empirical analysis applying vector error correction model. *Journal of Indian Management, Vol. XVIII, Issue No. 3, pp. 5-15.*

Sadhwani, R. (2020). Cointegration analysis of selected currency pairs traded in Indian Foreign Exchange Market. *International Journal of Management, Volume 11, Issue 5, May 2020, pp. 476-485.* https://doi.org/10.34218/IJM.11.5.2020.045

Thangamuthu, M., Parthasarathy, K. (2015). Cointegration and stock market interdependence: Evidence from South Africa, India, and the USA. *South Journal of Economic and Management Science (SAJEMS).* https://doi.org/10.17159/2222-3436/2015/v18n4a3

Tsang, A., Yiu, M.S., Nguyen, H.T. (2021). Spillover across sovereign bond markets between the US and ASEAN-4 economies. *Journal of Asian Economics, Volume 76, October 2021, 101343.* https://doi.org/10.1016/j.asieco.2021.101343

Vo, X. V., & Tran, T. T. A. (2020). Modelling volatility spillovers from the US equity market to ASEAN stock markets. *Pacific-Basin Finance Journal, 59, 101246*. https://doi.org/10.1016/j.pacfin.2019.101246

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