

Who Co-moves the Islamic Stock Market of Indonesia - the US, UK or Japan?

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Abstract. *This paper explores the dominance of world Islamic stock markets of Japan, the UK, and the US over the Islamic stock market of Indonesia. The Granger causalities based on Vector Error Correction Model (VECM) framework are adopted to empirically identify the co-movements among these Islamic stock markets. The study found that the Islamic stock markets of Indonesia, the UK, Japan, and the US are moving towards a greater level of integration. The Japanese Islamic stock market dominantly co-moved the Indonesian Islamic stock, as compared to the UK and the US Islamic stock markets both in the bivariate and multivariate frameworks. This further implies that any developments in the Japanese financial market have to be given more consideration by the Indonesian authority in designing policy to stabilize and promote its Islamic stock market.*

Keywords: *Islamic stock market, co-movements, integration, diversification benefits, multivariate causality.*

Abstrak. *Artikel ini bertujuan untuk mengidentifikasi dominasi pasar saham syariah Jepang, Inggris, dan Amerika Serikat terhadap pasar saham syariah Indonesia. Penelitian ini dengan menggunakan metode kausalitas bivariat dan multivariat berbasis Vector Error Correction Model (VECM). Penelitian mendapatkan bukti bahwa pasar saham syariah Indonesia, Jepang, Inggris dan Amerika Serikat bergerak menuju tingkat integrasi yang lebih tinggi. Pasar saham syariah Jepang secara dominan menggerakkan pasar saham syariah Indonesia, dibandingkan dengan pasar saham syariah Inggris dan Amerika Serikat baik berdasarkan analisis bivariat maupun analisis multivariat. Ini lebih jauh menyiratkan bahwa setiap perkembangan di pasar keuangan Jepang harus mendapat pertimbangan lebih besar oleh otoritas Indonesia dalam merancang kebijakan untuk menstabilkan dan sekaligus mempromosikan pasar saham syariahnya.*

Kata kunci: *pasar saham syariah, gerakan bersama, integrasi, manfaat diversifikasi, kausalitas multivariat.*

How to Cite:

Majid, M. S. A. (2018). Who Co-moves the Islamic Stock Market of Indonesia - the US, UK or Japan? *Al-Iqtishad: Jurnal Ilmu Ekonomi Syariah (Journal of Islamic Economics)*. Vol. 10 (2): 267 – 284. doi: <http://dx.doi.org/10.15408/aiq.v10i2.7288>

Introduction

Recently, the empirical studies on the global stock market integration have been widely researched in the finance literature. The research interest on this issue has been proliferating after 1987 stock market crisis as this issue provides importance implication for investors to minimize the risk by diversifying their investments, and for policy-makers to design prudent macroeconomic strategies in promoting the stock market. The studies on the integration of stock market have further intensified after the 1997 Asian financial and the 2008 global financial crises (Janakiramanan and Asjeet, 1998).

The term global market integration characterizes a wide area of research in financial macroeconomics that covers various diverse aspects of the interdependencies across the national stock markets. The integration of market has been viewed by earlier studies both from the asset pricing and statistical perspectives. The former perspective defines the markets' integration if they follow "the law of one price" (Klemeier and Harald, 2000), while the later perspective delineates the integrated markets if their prices are correlated. Thus, the commonly established definition of integration of markets shows that if the two or more markets have identical stocks, thus they must be identically priced (Naranjo and Aris, 1997) due to their similarity in risk characteristics irrespective of their trading location (Akdogan, 1991; and Cheng, 2000). Since the prices in integrated stock markets move together in the long run (Cheng, 2000). Therefore, investing in those markets provide no diversification benefits for global investors. This study explores the co-movements between the Islamic stock markets of Indonesia with those of the UK, US, and Japan from the perspective of statistics.

There have been many studies investigated co-movements of the conventional stock markets in the developed countries. For example, Majid et al. (2008), Majid (2009), and Majid et al. (2009) investigated the interdependencies and co-movements of the ASEAN stock markets with those of the developed. The result confirmed that the world stock markets move towards a greater level of integration. The ASEAN and world markets ever become more integrated after the episodes of economic crises in 1987, 1997, and 2008 (Cha and Oh, 2000; Jang and Sul; 2002; and Majid and Kassim, 2009). These findings demonstrate that the benefits' diversification of investing in stocks across the global market tended to diminish as the markets become more liberalized in their financial markets.

Comparing to the enormous empirical studies on the interrelationships among the conventional stock markets both in the advanced and emerging stock markets, the similar studies on the global Islamic stock markets, particularly in Indonesia has been relatively limited. Yusof and Majid (2006) found bidirectional

causality between the stock markets of Japan and Indonesia and a unidirectional causality from the stock markets of the US to the Indonesian stocks. The inter-linkages among the stock markets of Indonesia with those of Australia, the UK, Singapore, the Philippines, Japan, the US, Hong Kong, and Malaysia, were also documented by Adityara (2012).

Among the studies focused on the integration of Islamic stock markets is conducted by Majid and Kassim (2010), and documented that the Islamic stock markets tended to become more interlinked. Thus, implying the decline of diversification benefits when investing in the Islamic stocks globally. Moreover, other existing empirical studies on the Islamic stock market in Indonesia only examined their determinants (Majid, 2016a, 2016b; Beik and Fatmawati, 2014; Ali, 2014; Baroroh, 2013; and Azwar et al., 2011). These studies found that money supply, inflation, interest, exchange rate, the conventional stock market, economic growth affect the Islamic stock market (Baroroh, 2013; Beik and Fatmawati, 2014; Majid, 2016b). Azwar et al. (2011) found that debt ratio, profitability, and interest rate affected the Islamic stock markets. These findings implied that to strengthen the Islamic stock market, the design of firm strategy should be coordinated with the national monetary policy and global capital markets policies.

Unlike few earlier studies that focused on the Islamic stock market of Indonesia, this study contributing the following to existing Islamic stock market literature. *Firstly*, unlike the study by Majid and Kassim (2010) on the global Islamic stock markets in a broader perspective, this study specifically focused on the Indonesian Islamic market per se. *Secondly*, to get a clearer and specific empirical picture on the dominant role of the world leading Islamic stock markets over the Indonesian Islamic stock market, this study only focuses on the importance of the US, the UK, and Japanese Islamic stock markets that represent the major continents in the world. This study excludes the macroeconomic determinants from the analysis like the studies by Beik and Fatmawati (2014) and Baroroh (2013). *Thirdly*, this study presents the latest trends in the world Islamic stock markets' co-movements on the Islamic stock market of Indonesia using latest data of daily Islamic stock indices from 1999 to 2016. *Finally*, unlike the study by Azwar et al. (2011) who utilized a simple multiple regression analysis, this study used standardized Granger causalities, both bivariate and multivariate to provide a comprehensive empirical evidence on the inter-linkages between the Islamic stock market of Indonesia and the largest world Islamic stock markets. Focusing only on the Granger bivariate or multivariate analysis could miss essential information due to the possibility of investigating non-cointegrated markets at the bivariate level, but they are jointly cointegrated (Yusof and Majid, 2006).

Considering these novelties of our study, this study explores the dominance of the Islamic stocks of UK, the US, and Japan over the Islamic stock market of Indonesia and their co-movements both in the bivariate and multivariate framework. The findings of this study are hoped to shed some lights for investors when diversifying their investments in the Islamic stock markets across the globe. As for the policy-makers, the findings of this study are hoped to provide an important reference when designing policy to stabilize and promote the Islamic stock markets nationally and globally.

Literature Review

There have been many studies investigated co-movements of the conventional stock markets in the developed countries. For example, Majid et al. (2008), Majid (2009), and Majid et al. (2009) investigated the interdependencies and co-movements of the ASEAN stock markets with those of the developed markets using the Generalized Method of Moment (GMM) frameworks. These studies confirmed that the world stock markets move towards a greater level of integration. During the 2008 global financial crisis, Majid and Kassim (2009) documented that the ASEAN and world markets ever become more integrated. Similarly, Cha and Oh (2000) and Jang and Sul (2002) found that the integration among the Asian emerging markets investigated to increase after the stock market crash in 1987 and the Asian financial crisis in July 1997. The financial sector of the economy is found to be the worst sectoral economy of Malaysia impacted by the 2008 global economic crisis (Kassim et al., 2011). The stock markets among the major trading partners are found to be more intensified both in Malaysia (Abdul Karim and Majid, 2009) and Indonesia (Abdul Karim et al., 2009). These findings imply that the benefits' diversification of investing in stocks across the global market tended to diminish as the markets become more liberalized both in term of financial and trading activities worldwide.

Comparing to the enormous empirical studies on the interrelationships among the conventional stock markets both in the advanced and emerging stock markets, the similar studies on the global Islamic stock markets, particularly in Indonesia, have been relatively limited. Yusof and Majid (2006) explored the dominant role of the US and Japanese stock markets over the stock market of Indonesia using the Variance Decomposition and impulse response analyses and found the bidirectional causality between the stock market of Japan and Indonesia and a unidirectional from the stock markets of the US to the Indonesian stocks. Adityara (2012) explored the influences of global conventional stock markets on the Indonesian stock market using the Granger Causality and documented the interlinks among the stock markets of Indonesia with those of Australia, the UK, Singapore, the Philippines, Japan, the US, Hong Kong, and Malaysia over the period 2004- 2010.

Among the studies focused on the integration of Islamic stock markets is conducted by Majid and Kassim (2010) using the Autoregressive Distributed Lag (ARDL) framework during the 1999-2006 period, and documented that the Islamic stock markets tended to become more interlinked, thus implying the decline of diversification benefits when investing in the Islamic stocks globally. Moreover, other existing empirical studies on the Islamic stock market in Indonesia only measured the performance (Tulasmı and Trihariyanto, 2016) and its determinants (Majid, 2016a, 2016b; Beik and Fatmawati, 2014; Ali, 2014. Baroroh, 2013; Azwar et al., 2011).

In a more detailed, Tulasmı and Trihariyanto (2016) compared performances between the returns of the Islamic stocks of Malaysia and Indonesia using the methods of Sharpe, Treynor, and Jensen. The investors who invest their monies in the Indonesian Islamic stocks could gain showing higher returns the documented that returns of Islamic stocks of Indonesia were higher than those of Malaysia. Meanwhile, Majid (2016b) explored the macroeconomic determinants of the Islamic stock of Indonesia. This research found that money supply, interest, exchange rate, and economic growth affected the market. Baroroh (2013) examined the long-run co-movements between the Islamic stock market and macroeconomic determinants. The study recorded that the discount rate, exchange rate, and inflation Granger caused the Islamic stock returns of Indonesia.

In the similar vein, Beik and Fatmawati (2014) assessed the impact of worldwide Islamic stock market and macroeconomic determinants on the Indonesian Islamic stocks using the Vector Error Correction Model (VECM) over the 2007-2012 periods. They found that the Islamic stock market of Indonesia is positively influenced by the Islamic stock markets of Europe, Malaysia, and level of economic activity, and negatively impacted by the Islamic stock markets of Japan, the US, money supply, and interest rate. Additionally, by using a multiple regression analysis, Azwar et al., (2011) explored the effects of financial ratios and macroeconomic variables on the Indonesian Islamic stock returns. Debt, profitability, and interest rate are found to affect the Islamic stock returns, while the price to earnings ratio, exchange rate, and inflation are documented to have no significant effect on Islamic stock returns. These findings implied that to strengthen the Islamic stock market, the design of national monetary policy should be coordinated with the global capital markets policies.

The above-reviewed studies show that none of the studies has empirically the dominance of the world largest Islamic stock markets over the Islamic stock market of Indonesia, thus this study intends to fill this gap of literature and empirical findings. As the market is moving towards a more liberalized and thus greater level of integration worldwide, this study is indeed timely to be conducted, as it provides

latest empirical evidence on the importance of leading world Islamic stock markets on the national Islamic capital market of Indonesia.

Method

Daily closing indices of four Islamic stocks of Indonesia, the US, the UK, and Japan spanning the period from the beginning of 1999 to end of 2016 are analysed in the study. These stock indices are denominated in domestic currency units, gathered from the Bloomberg Database. The following indices are utilized to measure the stock returns of each stock: (i) Jakarta Islamic Index for Indonesia; (ii) Dow Jones Islamic Index of America for the US; (iii) Dow Jones Islamic Index of Japan for Japan; and (iv) Dow Jones Islamic Index of the United Kingdom of Great Britain for the UK.

Two arising common problems in exploring the inter-linkages among the global stock markets are resolved in this study. *Firstly*, the missing observations due to different holidays' across the national stock markets are resolved by using the Occam's razor method, where the missing data are simply to be filled in by data from previous day (Jeon and Vonfurstenberg, 1990; Hirayama and Tsutsui, 1998; and Majid and Kassim, 2009). *Secondly*, the differences in the trading hour across the global stock markets are overcome by adjusting today's indices of Indonesia, the UK, and Japan with the US index of the previous day.

In analysing the dominance of the Islamic stocks of UK, the US, and Japan over the Islamic stock market of Indonesia and their co-movements, several steps of empirical analysis are conducted. *Firstly*, the tests of stationary for each stock index are performed using both Augmented Dickey-Fuller (ADF) (Dickey and Fuller, 1979; 1981) and Phillips and Perron (PP) tests (Perron, 1988; Phillips and Perron, 1988). *Secondly*, the test of cointegration between the Islamic stock markets of Indonesia and the UK, Japan, and the US is done using the Johansen and Juselius (1990) technique. *Thirdly*, the bivariate causalities between the Islamic stock markets of Indonesia and the UK, Japan, and the US are examined using the Granger causality test. *Finally*, to investigate the short- and long-run causalities among these Islamic stock markets within the multivariate framework, the Vector Error Correction Model (VECM) is performed.

Due to the non-stationary of the bulk of macroeconomic variables (Serletis, 1993), including stock indices, thus to avoid from the spurious regression, the time series' empirical study should perform the unit root test to ensure the stationarity of variables. If the non-stationary variables were analysed in the regression analysis, their findings would be void (Thomas, 1997). Taking this into account, thus this

study utilizes the tests of ADF (Dickey and Fuller, 1979; 1981) and PP (Perron, 1988; Phillips and Perron, 1988). To conduct the tests of stationarity, the rejection of null hypothesis ($H_0: \delta = 0$) implies the stationarity of Islamic stock indices. Meanwhile, the non-rejection of the alternative hypothesis ($H_1: \delta \neq 0$) signifies the non-stationarity of Islamic stock indices.

With the intention to discover the cointegration between the Islamic stock markets of Indonesia and the UK, Japan, and the US, the study uses the Johansen and Juselius (1990) technique within the Vector Autoregressive (VAR) framework. The presence of a cointegration among these markets is assessed using the tests of statistics of Johansen and Juselius (1990). Furthermore, this study measures the number of cointegrating vectors using the statistics of Osterwald-Lenum (1992).

After validating the presence of cointegration, to discover the direction of bivariate causalities between the Islamic stock markets of Indonesia and the UK, Japan, and the US, the following model is estimated:

$$\Delta D_t = \varphi + \delta_p \Delta IID_{t-p} + \lambda_q \Delta IJP_{t-q} + \gamma_r \Delta IUK_{t-r} + \beta_v \Delta IUS_{t-v} + \varepsilon_{1t} \quad (1)$$

In testing the bivariate causality, the values of F-statistic for δ , λ , γ , and β are referred. The null hypothesis of the estimated coefficient is equal to zero is tested. If the null hypotheses ($\delta_1 = \dots = \delta_p = 0$; $\lambda_1 = \dots = \lambda_q = 0$; $\gamma_1 = \dots = \gamma_r = 0$; and $\beta_1 = \dots = \beta_v = 0$) are not rejected, implying the non-Granger causality the Islamic stock market of Indonesia on the Islamic stocks of Japan, the UK, and the US, and vice versa. The findings from this test provide various path of interaction patterns between the Islamic stock market of Indonesia and the UK, Japan, and the US, namely: (i) a unidirectional Granger causality from one to another Islamic stock markets, or otherwise; (ii) a bi-directional Granger causality between the Islamic stock markets; and (iii) non-Granger causality between the Islamic stock markets.

In the final step, after identifying the existence of co-integration between the Islamic stock markets of Indonesia and the UK, Japan, and the US, to estimate the multivariate causal co-movements between the Islamic stock markets, the following Vector Error Correction Model (VECM) that is presented in the form of the matrix. For this purpose, the Akaike (1974) Information Criterion (AIC) is used to determine the number of lags to be included in our estimated models.

$$\begin{bmatrix} \Delta ID \\ \Delta JP \\ \Delta UK \\ \Delta US \end{bmatrix} = \begin{bmatrix} \delta_0 \\ \delta_1 \\ \delta_2 \\ \delta_3 \end{bmatrix} + \sum_{i=1}^k \Gamma_i \begin{bmatrix} \Delta ID \\ \Delta JP \\ \Delta UK \\ \Delta US \end{bmatrix}_{t-k} + \Pi \begin{bmatrix} ID \\ JP \\ UK \\ US \end{bmatrix}_{t-1} + \begin{bmatrix} \varepsilon_{t0} \\ \varepsilon_{t1} \\ \varepsilon_{t2} \\ \varepsilon_{t3} \end{bmatrix}$$

To test for multivariate causality, the value of F statistic based on the Wald test on the null hypothesis of the summation of the estimated lagged coefficient of independent variables are equal to zero. The non-rejection of null hypothesis shows that the independent variables do not move the dependent variable. Moreover, when the estimated value of Π is discovered to be significant using the t statistic, it implies that the Islamic stock markets share a long-term equilibrium. Finally, the findings show the channels of causality among the Islamic stock markets. Firstly, the significant value of Error Correction Term (ECT) denotes the presence of long-run equilibrium in the markets and the presence of short-run disequilibrium would be corrected and adjusted moving towards long-run equilibrium. Secondly, patterns of causal directions of interaction among the Islamic stock markets could be also identified as in the bivariate causality framework, as discussed earlier.

Result and Discussion

This section presents and discusses findings of the study in the following sequences. It begins with illustrating the descriptive statistics and followed by the presenting the findings from tests of stationarity, cointegration, bivariate Granger and multivariate causalities based on the VECM framework.

Table 1. Descriptive Statistics of The Islamic Stock Returns

Islamic Stocks	IID	UIK	IJP	IUS
Mean	0.134	0.023	0.022	0.037
Maximum	5.419	2.687	3.412	2.467
Minimum	-6.626	-2.978	-4.401	-3.613
Std. Dev.	1.108	0.637	1.899	0.578
Skewness	-1.061	-0.477	-0.383	-0.065
Kurtosis	10.819	6.501	5.253	8.443

Table 1 described the summary of statistics of the Islamic stock markets of Indonesia (ID), Japan (JP), The United Kingdom of Great Britain (UK), and the United States of America (US). It showed that, during the entire period of study, the Islamic stock markets documented positive daily returns, where the Islamic stock market of Indonesia provided the highest stock returns of 13.4%, followed by the Islamic stock markets of the US (3.7%), Japan (2.3%), and the UK (2.2%). Out

of four investigated Islamic stock markets, surprisingly the Islamic stock markets of Indonesia recorded the lower level of risks than those of Japan and the US. At this juncture, these findings implied that investing in the Islamic stock market of Indonesia provided more returns, comparing to its owned risk level as well as the risks level in the Japanese and the US Islamic stock markets.

Moreover, as observed from Table 1, compared to the descriptive statistics of other markets. The Indonesian Islamic stock market is documented to be somewhat similar to other markets since its average daily returns and risks are comparable to the world leading Islamic stock markets. This provides an initial indication that the Islamic stock market of Indonesia is moving towards similar direction with other advanced Islamic stock markets as these markets tended to become more integrated. These findings confirmed the earlier findings by Majid and Kassim (2010), who documented an increased integrated level among the Islamic stock markets. As discussed earlier, to provide robust and reliable empirical findings for time series' regression analysis, all data (Islamic stock indices) to be analyzed have to be stationary (Gujarati, 2009). The Augmented Dickey-Fuller (ADF) and Phillips-Peron (PP) tests with constant and trend models are estimated, for this purpose, where their findings are reported in Table 2.

Table 2. Result of Stationary Tests

Islamic Stocks	Level		First-Difference	
	ADF	PP	ADF	PP
IID	-1.432	-1.506	-17.098***	-21.147***
IJP	-1.292	-1.271	-10.341***	-25.840***
IUK	-1.617	-2.412	-12.053***	-27.927***
IUS	-1.500	-1.558	-11.051***	-27.765***

Notes: *** indicates the 1% level of significance.

As illustrated in Table 2, the study recorded that all the Islamic stock indices of Indonesia, the UK, Japan, and the US were having the unit root at level. The study could not reject the null-hypothesis of the presence of unit root at the 1% significance level. Thus, the study further tested the stationarity of Islamic stock indices at the first differences using the similar ADF and PP tests. The study discovered that, all the stock indices became stationary after taking first differencing. These findings are in harmony with many previous studies on

the stock markets, where the stock indices were stationary at the first difference (Beik and Fatmawati, 2014; Baroroh (2013); and Majid and Kassim, 2010). These findings implied that all Islamic stock indices were integrated of order one, I (1). Documenting this, the study could then proceed to analyse the existence of co-integration or long-run equilibrium among the Islamic stock markets.

Having documented the similar order of Islamic indices' integration, the study continued testing the co-integration or long-run equilibrium among the Islamic stock markets of Indonesia, the UK, Japan, and the US. Table 3 reported the results of co-integration tests. As observed from Table 3, the Islamic stock markets recorded to co-integrated at the 5% level of significance, both based on the tests of Trace statistics and Maximum eigenvalue statistics. These findings implied that there was a long-run equilibrium existed among the Islamic stock markets.

Table 3. Findings of The Cointegration Among The Islamic Stock Markets

Null Hypothesis	Trace Statistic	Max-Eigen Statistic
$r \leq 0$	92.811**	69.013**
$r \leq 1$	53.121	26.987
$r \leq 2$	23.508	15.011
$r \leq 3$	10.432	10.113

Notes: ** and r indicate the 5% level of significance and cointegrating vectors' number, respectively. As the study used daily data, the optimal lag-length incorporated in the study was 30. The lag-length criteria of the AIC used in this study suggested that the lag-length = 2.

As delineated previously, the finding of co-integration among the Islamic stock markets showed that the markets have shared the co-movements moving towards a long-run equilibrium. This empirical evidence is in line with the study by Yusof and Majid (2006) for the conventional stock markets of Indonesia, Malaysia, Japan, and the US; conventional stock markets of the OIC members (Majid et al., 2007); and for the global Islamic stock markets (Majid and Kassim, 2010). These findings further implied that, in the long-run perspective, the investors who diversified their investment across the global Islamic stock markets tended to diminish.

Moreover, Yang and Siregar (2001) noticed that the documentation of cointegrated Islamic stock markets did not entirely rule out the probability of benefitting arbitraging profits in the short-term. In the long run, the benefits of

diversification among the integrated Islamic stock markets could be lowered, but in reality, the investors could still gain diversifying benefits. The benefits of investment diversification among the Islamic stock market would not diminish completely due to their differences in financial risks (Ibrahim, 2003), scales of business, cash flows, and trade bilateral dependencies (Pretorius, 2002; Abdul Karim and Majid, 2010), economies’ external capital controls (Sheng and Tu, 2000), and financial deregulation (Chowdhury, 1994).

The bivariate Granger causality test is performed to discover the path or pattern of causality between the Islamic stock market of Indonesia and the UK, Japanese, and the US Islamic stock markets, where their findings are reported in Table 4. As illustrated in Table 4, the study found a unidirectional running from the Islamic stock markets of the UK and the US to the Indonesian Islamic stock market at least at the 5% level of significance. These findings suggested that changes in the Islamic stock market of the UK and the US Granger caused movements of the Islamic stock market of Indonesia.

Table 4. Findings of The Bivariate Granger Causality

Causality direction	Estimated coefficient		Conclusion
IID ↔ IJP	2.909*** 2.451***	(0.002) (0.004)	Bidirectional
IID ← IUK	1.138 1.907**	(0.187) (0.043)	Unidirectional
IID ← IUS	0.791 1.809**	(0.471) (0.049)	Unidirectional

Notes: *** and ** show the significant levels at the 1% and 5%, respectively. Figures in the bracket (.) represent the probability of the t-test.

Additionally, as observed from Table 4, the stock markets of Indonesia and Japan Granger caused each other (bidirectional causality) at the 1% level of significance. This indicated the Islamic stock market of Indonesia is more interdependence from the Islamic stock market of Japan, as compared to the Islamic stock markets of the UK and the US. Our findings implied that for economically and geographically close Islamic stock markets, such as Indonesia and Japan, are highly interconnected. This finding supported the previous empirical evidence by Janakiramanan and Asjeet (1998) who found that economically and geographically close stock markets demonstrated elevated interdependence.

Finally, the study estimated the VECM to identify the multivariate causalities between the Islamic stock markets of Indonesia and the Japanese, the UK, and the US. Table 5 reported the findings from the VECM. As observed from Table 5, the study discovered both channels of Granger causality of the short-run by way of joint F-tests of lagged differences and the long run by way of significant t-statistics of error correction terms (ECTs). All estimated ECTs are found to be significant at least at the 10% significance level with the estimated values spanning from -0.001 to -0.008, signifying the last day of disequilibrium in the Islamic stock markets were cleared in the long-run term by the speed of adjustment from 0.01% to 0.08% on the following day. These results further meant that when there was a deviation from co-integrating relations in the markets, these were largely due to the movements from the other Islamic stock markets that amend to clear the disequilibrium, findings similar to Majid and Kassim (2010) for the global Islamic stock markets and the conventional stock markets of Indonesia, the US, and Japan (Yusof and Majid, 2006).

Table 5. Findings from multivariate causality based on the VECM

Islamic stock	F-Stat				t-Stat
	ΔIID	ΔIJP	ΔIUK	ΔIUS	ECT_{t-1}
ΔID	-	0.139*** [0.005]	0.145 [0.954]	2.350** [0.042]	-0.008*** (0.001)
ΔJP	0.312** [0.034]	-	1.217** [0.042]	1.200** [0.035]	-0.016*** (0.006)
ΔUK	0.147 [0.342]	1.196* [0.057]	-	0.219*** [0.003]	-0.006* (0.079)
ΔUS	1.067 [0.592]	2.644* [0.079]	5.111*** [0.004]	-	-0.003** (0.001)

Note: ***, **, and * show significance at the levels of 1%, 5%, and 10%. The number in brackets (.) and squared brackets [.] are the *p*-value of the t-statistics and F-statistics, respectively.

At this juncture, it is important to bear in mind that the findings of long-run co-movements among the Islamic stock market of Indonesia and the UK, Japanese, and the US Islamic stock markets only represented their long-run interdependencies as well as implied causality, but it did not show the pattern of causational directions among the Islamic stock markets. As such, to discover the multivariate causalities

among these markets, Table 5 also reported empirical findings for the multivariate causalities based on the Wald test using F-statistics.

As for multivariate causalities among the Islamic stock markets, the Indonesian Islamic stock market is affected by the Islamic stock market of Japan. Meanwhile, the Islamic stock market of Indonesia, in short-run, only influenced the changes in the Islamic stock market of Japan, but it was independence from the UK and the US stock markets. On the other hand, the world leading Islamic stock markets of Japan, the UK, and the US, these markets are found to bidirectional Granger caused within the multivariate perspective. These findings further confirmed our earlier findings from bivariate causality that the Islamic Japanese stock market played a more dominant role over the changes in the Indonesia Islamic stock market. The closed ties between Indonesia and Japan both regionally and economically and geographically (Janakiramanan and Asjeet, 1998) are simply the cause of Japan's dominance over the Indonesian stock market.

Last but not least, our empirical evidence of the degree of interrelationships or co-movements among the Islamic stock markets provides imperative inferences for the macro-harmonization policies of the Islamic stock markets. As the markets were integrated, the stock market of a country might not be totally protected from foreign shocks, showing the importance of interdependent policies regulating the capital markets worldwide. Policy harmonization in juxtaposition with the diminution or elimination of trade and investment blockades should further is enhanced if Indonesia intends to grasp opportunity from a greater integration among the Islamic stock market interdependence (Majid et al., 2008; Kotorri and Korbi, 2009; and de Bruyn et al., 2013).

Conclusion

This study explores which world-leading Islamic markets, Japan, the UK or the US, actually, leads the Islamic stock market of Indonesia over the period 2000 to 2016 within both bivariate and multivariate Granger causalities perspectives. The study discovered that the Islamic stock market of Indonesia, Japan, and the US have moved together towards a greater level of integration. As for their interdependencies, the Islamic stock market of Japan was found to have a more dominant role over the changes in the Indonesian Islamic stock as compared to the US Islamic stock market, both in the bivariate and multivariate frameworks.

These findings implied that the opportunities of gaining investment diversification benefits among the Islamic stock markets tend to diminish as the markets become more integrated. This further implies that any development in

the Japanese economy has to be given more consideration by the Indonesian authority as this stock market has dominant influences on the Indonesian Islamic stock market than those of the UK and the US markets. Greater macroeconomic harmonization policies among the Islamic stock markets should be further enhanced if these countries intend to seize benefits from a greater integration among them.

To further add to present existing empirical studies on interdependencies among the Islamic stock markets, upcoming empirical research on this topic may possibly cover wider areas of Islamic stock markets and probe underlying determinants of co-movements among Islamic stock markets. Forthcoming studies also suggested exploring both linear and non-linear equilibrium relationships using more sophisticated empirical tests.

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