

THE GLOBAL FINANCIAL CRISIS AND THE INTEGRATION OF ISLAMIC STOCK MARKETS IN DEVELOPED AND DEVELOPING COUNTRIES

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ABSTRACT

This study aims to determine the impact of the 2007 global financial crisis on the integration of the Islamic stock markets. Seven Islamic stock markets are selected based on the countries' level of development and geographical factors. The period of analysis is divided into the pre-crisis period (9 January 2005 to 22 July 2007) and the crisis period (29 July 2007 to 10 January 2010). The methodology of this study relies on the Auto-Regressive Distributed Lag approach and the multi-variate Vector Error Correction Mechanism. The 2007–2008 global financial crisis caused changes in the integration level of the Islamic stock market. Both the level of development and geographical factors are found to have a significant influence on the integration of the Islamic stock markets during the crisis and non-crisis periods. The findings have important bearings on the formulation of financial policies, in which co-integrated Islamic stock markets suggest that there is a need for policy coordination among these markets to mitigate the impacts of financial fluctuations. Financial reforms, including the reduction or removal of trade and investment barriers, will be essential if these countries are to exploit the advantages of financial interdependence.

Keywords: Islamic stock markets, integration, financial crisis, diversification benefits

INTRODUCTION

The increased presence of the Islamic banking and finance industry in the global financial scenario has resulted in it no longer being seen as peripheral to its conventional counterpart. Currently, the Islamic financial system plays a complementary role that has high potential to be developed as a viable alternative to the conventional financial system. Many countries have taken measures to provide an environment that can accommodate and nurture the development of the industry. In countries such as Malaysia, Japan, and the UK, tax preferential measures and banking and financial law amendments have been undertaken to enable financial transactions to be conducted as required by Islamic law. With the current developments in the global financial scenario, further efforts have been

undertaken to strengthen the foundations the Islamic banking industry to face the new global financial challenges. Malaysia, for example, has implemented a financial safety-net framework for the Islamic banking industry composed of a lender of last resort and deposit insurance system. This is part of the country's continuous efforts to ensure healthy growth and to move the industry toward greater heights. In Germany, the Federal Financial Supervisory Authority has been supportive of the development of the Islamic banking industry by making it easier for interested financial institutions to obtain licenses dealing with Islamic banking products, which are compatible with the country's financial rules.

The strong growth momentum and escalating interest in Islamic finance call for greater research efforts in this area with the objective of obtaining deeper understanding of this nascent field. There is also a pressing need for investigations of Islamic equity markets in the aftermath of the global financial crisis, particularly by investors and policymakers. An area that is highly pertinent but lacks research is the integration and efficiency of the Islamic equity markets. Compared to the extensive literature on the integration and efficiency of the conventional equity market, the Islamic equity market integration and its related issues have remained largely unexplored. Existing studies have focused mainly on conventional stock markets, with pioneering studies examining the integration of the developed stock markets (see, for example, Grubel, 1968; Levy & Sarnat, 1970; Taylor & Tonk, 1989; Campbell & Hamao, 1992; on major developed countries). In the 1990s, there was increasing interest in developing countries' stock markets (see, for example, Chan, Gup, & Pan, 1992; Hung & Cheung, 1995). However, although studies on the Islamic stock market integration are increasing, they remain rather limited. Consequently, this study hopes to contribute to the literature by providing recent empirical evidence on the topic of stock market integration in the case of the Islamic stock markets.

By undertaking a thorough empirical investigation on the integration of selected Islamic stock markets from various regions in the period before and during the 2007 global financial crisis, this study intends to achieve the following objectives:

1. To analyse the potential diversification benefits in the Islamic stock markets in both developed and developing countries;
2. To assess the impact of the 2007 global financial crisis on the nature of integration among the selected Islamic stock markets; and
3. To determine if the level of economic development and geographical factors play important roles in influencing the nature of integration among the selected Islamic stock markets.

This study hopes to contribute to the existing literature in several ways. A novel area of the study is that it covers the Islamic stock markets in a wider geographical area, which is currently lacking in the literature. Most existing studies on the integration of the Islamic stock markets have focused on the Gulf and Middle East and North African (MENA) regions. In contrast, this study covers the Asian, MENA, US, and UK Islamic stock markets. This study also aims to test the importance of geographical proximity to financial integration, which may have important implications but has not been explored in the area of financial integration.

Second, as in the case of the conventional stock markets, information about the nature of integration among the Islamic stock markets is of interest to equity market participants. Clear understanding of the nature of integration among the stock markets is one of the key determinants of success for investors, fund managers, and other market players who seek to diversify their investments and make capital budgeting decisions in these markets. In the context of capital budgeting, there is a clear impact of financial integration on the accessibility of capital to individual firms. In particular, greater coordination through financial integration would ensure stability and promote capital flows between countries, thereby improving access to capital by the individual firms. Greater access to capital facilitates decisions on capital budgeting, such as investments in fixed assets by firms. This study contributes by providing input to assist financial analysts in making such investment decisions.

Lastly, the study provides important inputs for policymakers in designing measures to safeguard the health and stability of the Islamic capital markets. Amid the on-going efforts to strengthen the financial infrastructure of the Islamic banking and finance industry, information about the integration of the Islamic financial markets and the impact of the financial crisis on the Islamic stock markets is needed.

LITERATURE REVIEW

Integration of Islamic Stock Markets

Several studies have analysed the nature of integration in the Islamic stock markets within a particular economic grouping, particularly in the case of stock markets in the Middle East and Gulf area. For example, Darrat, Elkhail and Hakim (2000) analyse the major stock markets in the Middle East and North African countries (MENA), namely Egypt, Morocco, and Jordan, and find that these markets are integrated among themselves but not with the major world stock markets. Marshdeh and Shrestha (2010) include more stock markets in the

MENA region, namely Egypt, Jordan, Morocco, and Turkey, as well as three developed stock markets, namely the US, UK, and Germany. The study applies the ARDL approach on monthly data covering the period from December 1994 to June 2004 and documents similar findings as those of Darrat et al. (2000), finding integration among the regional stock markets but segmentation from the developed stock markets.

There are also many empirical analyses on stock market integration in the Gulf countries. Hassan (2003) investigates the long-run relationship of share prices among the Kuwait, Bahrain, and Oman stock markets and finds that there are potential diversification benefits for investors in this region. Based on the multivariate co-integration analysis, the study finds the existence of a long-run relationship between the Kuwait and Bahrain stock markets, whereas the stock market of Oman is exogenous. The study indicates that investors in the Gulf region could benefit by diversifying in these markets, and greater efficiency can be achieved by liberalising the market, at least for GCC nationals. More liberalised stock markets in the GCC countries would support the objective of establishing a single stock market under the proposed Arab Monetary Union.

Shachmurove (2001) studies the dynamic co-movements among the stock indices of the emerging Middle East markets, namely Egypt, Israel, Jordan, Lebanon, Morocco, Oman and Turkey. The study includes the US as the major world stock market and employs the VAR and Bayesian VAR models to understand the dynamic co-movements between these markets on daily data over the period of 22 October 1996 to 30 September 1999. The results show that the dynamic linkages among the stock markets are relatively small, indicating the potential benefits of portfolio diversification in these stock markets. The study implies that the economies could benefit by further liberalising their stock markets and making their stock markets more accessible to international investors. This possibility calls for the adaptation of legal and regulatory frameworks, including higher transparency, internal control rules, and banning insiders' trading to protect the interests of international investors. Additionally, privatisation and the establishment of full currency convertibility would help to increase the attractiveness of these markets to international investors.

The study by Ceylan and Dogan (2004) focuses on the stock markets of selected OIC countries with the objective of determining the impact of the 11 September 2001 event on the Islamic stock markets. By focusing on daily stock market data over two sub-periods, namely the pre- and post- 11 September 2001 period, the results suggest that these stock markets became more integrated following the September 11 incident. The study suggests further exploration in terms of standardisation issues, surveillance matters, impediments to fund

transfers, and the settlement of traded instruments to shed light on the links among these stock markets.

Very few studies focus on the Islamic stock markets and cover a wider geographical area beyond the MENA and Gulf regions. The study by Abd. Majid, Meera and Omar (2008), includes Islamic stock markets from more countries and covers a wider geographical area compared to the study of Ceylan and Dogan (2004). Focusing on eight Islamic stock markets that can be categorised according to region, the stock markets included are Turkey, Egypt, Oman and Kuwait (representing the MENA region) and Malaysia, Indonesia, Bangladesh and Pakistan (representing the Asian region). Daily stock market data for the period from 1 January 2002 to 31 May 2006 were analysed based on the methods of co-integration and vector auto-regression. In addition to the integration of the developing stock markets, the study also assesses the degree of integration between these markets and the world's three largest stock markets, namely the US, the UK and Japan. Greater integration is found among stock markets located in the Asian region, whereas stock markets in the MENA region are found to be segmented. The Islamic stock markets in the Asian region are found to be more responsive to shocks in the Japanese market, whereas those in the MENA region are more responsive to shocks in the UK market. Based on the findings, the importance of geographical proximity is highlighted as the determining factor in integration with the developed stock markets.

Stock Market Integration and Financial Crisis

Although most studies suggest increasing integration among the global stock markets due to reduced transaction costs in the financial sector, it is important to note that the nature of integration among the stock markets is sensitive to global financial events, particularly during the "down market" or financial crisis. The study by Bekaert and Harvey (1995) emphasises that the nature of stock market integration is time variant. Focusing on twelve emerging stock markets, the study shows that a number of the stock markets are segmented in one part of the sample and become integrated in another sample period. A plausible reason for this observation could be regulatory changes, such as the lifting of capital market restrictions to foreign investors.

Several studies assess the changes in the nature of stock market integration due to financial crises in an attempt to find evidence of the international transmission of financial shocks through the stock markets (see, for example, King, Sentana, & Wadhvani, 1994; Longin & Solnik, 1995; Karolyi & Stulz, 1996; Solnik, Boucelle, & Le Fur, 1996; Ramchand & Susmel, 1998; Chesnay & Jondeau, 2001; Ang & Bekaert, 2002). A review of these studies reveals the time-varying aspect of stock market integration and indicates that the

nature of stock market integration changes due to financial crises. Essentially, stock markets tend to move in unison during a down market but exhibit low integration during normal times.

The 1997 Asian financial crisis has fuelled interest in the Asian stock markets, particularly in the impact of the financial crisis on stock market integration. Generally, the crisis was found to have a significant impact on the nature of integration among the Asian stock markets. The study by Click and Plummer (2005) finds that the major ASEAN stock markets have become increasingly integrated in the post-crisis period compared to the pre-crisis period. It is proposed that the increased stock market integration is facilitated by ongoing efforts to expedite financial market integration and efficiency in the region after the crisis. Similarly, Abd Majid et al. (2008) examine market integration among five founding ASEAN members, Indonesia, Malaysia, the Philippines, Thailand and Singapore, and their inter-linkages with two established equity markets, the US and Japan, for the period before and after the financial crisis. The study documents consistent evidence of greater integration among the ASEAN stock markets and the two major markets, particularly in the aftermath of the 1997 financial crisis.

In addition to increasing integration during the financial crisis, the crisis also affected the direction of causality between stock markets. The study by Cheung, Cheung and Ng (2007) on the integration of the Asian and US markets shows that although the US market has a significant effect on the Asian markets in three sub-periods, there is evidence of reverse causality during the crisis period. In particular, the Asian markets are found to be significant in affecting the US market during the crisis period but not in the pre- and post-crisis periods. Ibrahim (2000) assesses the integration of the ASEAN equity markets together with the US and Japan prior to the 1997 Asian financial crisis and after the crisis, when capital controls were imposed. The findings show that there were significant short-run dynamic interactions among ASEAN regional markets throughout a variety of sample periods.

In addition to studying the impact of the crisis on the integration of the stock markets, several studies show the dominance effect of the established stock market on smaller markets' changes due to the crisis. The study by Dunis and Shannon (2005), which examines the integration of the emerging markets in South East Asia (Indonesia, the Philippines and Malaysia) and Central Asia (Korea, Taiwan, China and India) with the established markets (the US, the UK and Japan), finds that all seven emerging markets exhibit greater integration with Japan's stock market than with the other two established markets. The influence of the US stock market on emerging economies has seemed to diminish in recent years. Consistent with the findings of Dunis and Shannon (2005), the study by

Mohd Yusof and Abd. Majid (2006) finds that between the US and Japanese stock markets, the latter seems to have significantly led Malaysia's stock market after the 1997 Asian financial crisis.

Implications of Stock Market Integration

The nature of integration among stock markets has several important implications for effective market strategizing and policy making pertaining to the equity markets. First, the integration of the stock markets indicates the efficiency of the financial markets. According to the efficient market hypothesis, an efficient financial market is characterised by its ability to adjust rapidly to new information (Fama, Fisher, Jensen, & Roll, 1969). The prices of assets in an efficient financial market are fully reflective of all available information and, as such, are consistent with the economic fundamentals (Beechey, Gruen, & Vickery, 2000). In the context of market integration, theoretically, assets in completely integrated markets have similar expected returns due to the same risk exposure (Bekaert & Harvey, 1995). Complete integration among stock markets indicates efficiency, but it also suggests that these markets offer no diversification benefits because the markets' performance tends to be similar. In a risk-return framework, an investor can increase return, reduce risk, or both by having an investment mix in stock markets with returns that are uncorrelated. Thus, the degree of stock market integration suggests the potential portfolio diversification benefits that can be gained by investors.

Hooy and Lim (2013) extend the definition of market integration beyond stock price co-movements to include the impact of financial reforms on market efficiency. Their recent study on 49 developed and emerging markets provides robust empirical evidence supporting the significant and positive association between market integration and informational efficiency. However, their study found that a significant positive relationship is only documented for the emerging stock markets. This finding seems to imply that the financial deepening policies pursued by emerging market economies, such as opening up their markets to foreign investors and removing implicit investment barriers, are in line with promoting information efficiency in the stock market.

Theoretically, it has been well established that diversification enables investors to expand their portfolio frontiers. In this regard, knowledge about stock market integration is one of the key success factors for investors, fund managers, and other market players who seek to diversify their investments and make capital budgeting decisions in the international stock markets. Investors could benefit from information about stock market integration to establish investment strategies based on the potential benefits that can be gained by diversifying in different stock markets. The seminal work of Grubel (1968)

analyses the stock markets in ten developed countries and shows that a domestic investor (in the New York Stock Exchange) can increase annual returns by as much as 68% while keeping his risk constant by diversifying internationally. The benefits of diversifying in the international stock markets are further emphasised by Levy and Sarnat (1970), who highlight how knowledge about stock market integration helps investors benefit by diversifying in the emerging markets.

Second, because information about stock market integration implies capital market efficiency, understanding the extent of the integration is highly relevant in the context of countries aiming for macroeconomic harmonisation. In countries aiming for economic integration, investors are able to allocate capital in highly productive markets without incurring high transaction costs. The outcomes of integrated stock markets produced by financial sector integration are improved liquidity and increased economic activity among the member countries. As such, each member country aims for an efficient capital market in an effort to attract investors into the market. In the context of economic integration, the stock markets become increasingly integrated due to efforts to increase financial market integration through measures such as abolishing capital restrictions, lowering transaction costs, and improving the transmission of information, which are commonly part of the effort towards macroeconomic integration. For instance, ASEAN's objective to establish the ASEAN Investment Area (AIA) by 2010 required effort to increase the efficiency of the financial sector in the region and resulted in further integration of the member countries' stock markets (Click & Plummer, 2005).

Third, because stock market integration largely implies financial sector integration, information about stock market integration is particularly relevant for policymakers in designing policies to safeguard the stability of the financial sector and the economy in general. Careful policy safety nets can be designed in the context of regional grouping to avoid the vulnerability of the economy to international financial shocks. The degree of stock market integration signals the extent of financial sector integration, which reflects the vulnerability of countries to experiencing "financial contagion" (Ibrahim, 2000; Tai, 2004). Because two stock markets may be highly integrated due to strong economic ties, such as trade and investment, as well as due to macroeconomic policy harmonisation, adverse development in a financial system could well be transmitted to another in a systemic shock. One example of financial contagion was the experience of the developing Asian countries during the financial crisis in 1997–1998. Therefore, the need to clearly understand the nature of stock market integration is crucial for policymakers to remain vigilant and undertake pre-emptive measures to prevent systemic shocks.

METHODOLOGY

Data Description

In analysing the nature of integration among the Islamic stock markets, seven Islamic stock indices are chosen for inclusion in the analysis. The measure of stock market integration in this study is defined solely based on the index or stock price co-movements rather than the wider degree of integration, as defined by Hooy and Lim (2013), which includes the effects of the degree of foreign investibility. The Islamic stock markets and their respective indices are as follows: for Indonesia (INA), Jakarta Islamic Stock Index (JAKIS); for Kuwait (KWT), Dow Jones Islamic Index of Kuwait (DJIMKW); for Malaysia (MY), Dow Jones Islamic Index of Malaysia (DJIMY); for Turkey (TKY), Dow Jones Islamic Index of Turkey (DJIMTR); for Japan (JAP), Dow Jones Islamic Index of Japan (DJIJ); for the UK, Dow Jones Islamic Index of UK (DJIUK); and for the US, Dow Jones Islamic Index of America (IMUS).

The selection of these stock markets is based on several factors. First, the stock markets cover a wide geographical area, which contributes to the novelty of this study. In particular, the stock markets selected represent major Islamic stock markets across the globe, with Indonesia, Malaysia and Japan representing the Asian region, Kuwait and Turkey representing the MENA region, the UK representing Europe, and the US representing the American region. In addition, this study covers a greater number of Islamic stock markets compared to earlier studies on the Islamic stock markets (see, for example, Ergun & Mohd Nor, 2009; Hassan, 2003). The stock markets from the countries selected in this study can also be categorised according to the countries' level of development. In particular, Indonesia, Malaysia, Kuwait and Turkey are Islamic stock markets from the developing countries, whereas Japan, the UK, and the US are from the developed countries. The developing stock markets can further be categorised based on proximity to major financial centres: the stock markets of Indonesia and Malaysia are closer to the Japanese market, whereas Kuwait and Turkey are closer to the UK market. These categorisations allow a determination of the levels of development, and geographical factors have a significant influence on the responses of these stock markets to the global financial shocks.

Data on weekly closing stock indices of the seven Islamic stock markets are gathered from the *Bloomberg Database* covering the period from 9 January 2005 to 10 January 2010. The selection of the beginning of the sample period is strictly due to data availability for all seven stock indices, whereas the ending period includes the latest available data at the time of the data collection to enable the inclusion of the most recent economic and financial development in the analysis. Because the study intends to analyse the impact of the financial crisis on

the integration of the stock markets, the period of analysis is divided into two sample periods: the pre-crisis period (from 9 January 2005 to 22 July 2007) and during the crisis period (from 29 July 2007 to 10 January 2010). The date for the crisis period is based on the US sub-prime mortgage crisis, which began on 26 July 2007, as stated by existing studies on the 2007 global financial crisis (see, for example, Dungey, Renee, Gonzalez-Hermosillo, & Martin, 2008). All of these indices are denominated in local currency units, from which the Islamic stock returns for these markets are calculated.

Methods of Investigation

ARDL bound testing approach

To examine the long-run relationship among the markets, this study employs the ARDL bound testing approach to cointegration, which involves estimating the conditional error correction version of the ARDL model (Pesaran, Shin, & Smith, 2001). The choice of the ARDL approach in this study is based on the consideration that cointegration analysis is unbiased and efficient. This analysis can be applied to a small sample size (Pesaran et al., 2001); therefore, conducting bounds testing is appropriate for the present study. Second, this analysis estimates the short- and long-run components of the model simultaneously, removing problems associated with omitted variables and autocorrelation. Lastly, it can distinguish between dependent and independent variables (Narayan, 2004).

In this study, we estimate the following baseline model:

$$MY_t = \alpha_0 + \alpha_1 INA_t + \alpha_2 TKY_t + \alpha_3 KWT_t + \alpha_4 US_t + \alpha_5 UK_t + \alpha_6 JAP_t + \epsilon_t \quad (1)$$

where MY , INA , TKY , KWT , US , UK , and JAP refer to the Islamic stock markets of Malaysia, Indonesia, Turkey, Kuwait, the US, the UK and Japan, respectively, and ϵ_t is the error term for the model.

The error correction version of the ARDL framework pertaining to Equation (1) can be reproduced as follows:

$$\begin{aligned} \Delta MY_t = & \delta_0 + \sum_{i=1}^p \epsilon_i \Delta MY_{t-i} + \sum_{i=0}^p \phi_i \Delta INA_{t-i} + \sum_{i=0}^p \varphi_i \Delta TKY_{t-i} + \sum_{i=0}^p \gamma_i \Delta KWT_{t-i} + \sum_{i=0}^p \mu_i \Delta US_{t-i} + \sum_{i=0}^p \nu_i \Delta UK_{t-i} + \sum_{i=0}^p \pi_i \Delta JAP_{t-i} \\ & + \lambda_1 MY_{t-1} + \lambda_2 INA_{t-1} + \lambda_3 TKY_{t-1} + \lambda_4 KWT_{t-1} + \lambda_5 US_{t-1} + \lambda_6 UK_{t-1} + \lambda_7 JAP_{t-1} + u_{1t} \end{aligned} \quad (2)$$

Generalised Method of Moments (GMM)

This study investigates the short- and long-run relationships among seven selected Islamic stock market worldwide. The study estimates Equation (3) using GMM estimation, where the error correction terms are incorporated in the models. Based on Hung and Cheung’s (1995) study on a five-variable Johansen-Juselius cointegration test, the VECM representation can be reformulated in a simple matrix form as follows:

$$\begin{bmatrix} \Delta MY \\ \Delta INA \\ \Delta TKY \\ \Delta KWT \\ \Delta US \\ \Delta UK \\ \Delta JAP \end{bmatrix} = \begin{bmatrix} \delta_0 \\ \delta_1 \\ \delta_2 \\ \delta_3 \\ \delta_4 \\ \delta_5 \\ \delta_6 \end{bmatrix} + \sum_{i=1}^k \Gamma_i \begin{bmatrix} \Delta MY \\ \Delta INA \\ \Delta TKY \\ \Delta KWT \\ \Delta US \\ \Delta UK \\ \Delta US \end{bmatrix}_{t-k} + \Pi \begin{bmatrix} MY \\ INA \\ TKY \\ KWT \\ US \\ UK \\ JAP \end{bmatrix}_{t-1} + \begin{bmatrix} v_0 \\ v_1 \\ v_2 \\ v_3 \\ v_4 \\ v_5 \\ v_6 \end{bmatrix} \quad (3)$$

Because Equation (3) considers the possibility of the past level of parameters to have an effect on current changes in other parameters, the lagged values must be incorporated in the models. In this study, the Akaike Information Criterion (AIC) is used to determine the lag length incorporation in all tests.

RESULTS AND DISCUSSION

Descriptive Analysis

The descriptive analysis helps to provide a preliminary description of the nature and volatility of the stock indices. At the same time, it enables a comparison of the basic performance indicators of the stock indices, allowing an observation of how they fare against each other. Table 1 provides summary statistics on the stock returns (i.e., stock prices in first difference) for the selected Islamic stock markets included in this study. In the pre-crisis period, the Islamic stock market in Indonesia was the most active and profitable, showing the highest average daily returns of 0.7%. This is followed by Kuwait at 0.5%, Turkey and Malaysia at 0.4% each, the UK at 0.3%, and the US and Japan at 0.2% each. Obviously, the most profitable Islamic stock markets have been in the developing countries, whereas those in the developed countries have been rather slow. In terms of volatility of return (as reflected by the standard deviation), Turkey recorded the

highest volatility at 3.4%, recording the highest maximum return of 8.1% and the largest decline of 10.7%. The next most volatile market was Indonesia at 3.1%, followed by Kuwait, the UK, Japan, Malaysia, and the US. In general, the market seems to be more volatile in the relatively “thin” markets in the developing countries. It can also be observed that the more volatile market has higher average returns, particularly in the case of Indonesia. Clearly, this finding supports the conventional wisdom in finance that “the higher the risk, the higher the return”.

Table 1
Descriptive statistics of Islamic stock indices

	DJIMY	JAKIS	DJIMTR	DJIMKW	IMUS	DJIUK	DJIJ
<i>Pre-Crisis Period</i>							
Mean	0.0041	0.0067	0.0041	0.0045	0.0025	0.0035	0.0023
Median	0.0039	0.0096	0.0045	0.0057	0.0030	0.0058	0.0016
Max.	0.0531	0.0801	0.0814	0.0848	0.0402	0.0593	0.0647
Min.	-0.0812	-0.0939	-0.1068	-0.0809	-0.0478	-0.0658	-0.0837
Std. Dev.	0.0166	0.0312	0.0339	0.0293	0.0156	0.0209	0.0208
<i>During Crisis Period</i>							
Mean	-0.0002	0.0022	0.0013	-0.0045	-0.0005	-0.0006	-0.0020
Median	0.0027	0.0068	0.0043	0.0016	0.0001	0.0003	-0.0009
Max.	0.0761	0.1306	0.1639	0.1830	0.1072	0.1791	0.0616
Min.	-0.1015	-0.2213	-0.1540	-0.1783	-0.1762	-0.2141	-0.1622
Std. Dev.	0.0335	0.0537	0.0419	0.0435	0.0353	0.0486	0.0319

An analysis of the basic indicators during the crisis period shows that the Islamic stock markets were not spared in the global financial crisis. Similar to the conventional stock markets, all Islamic stock markets were adversely affected by the global financial crisis. This effect is clearly reflected by the lower and even negative average returns for all of the stock markets under review. It can also be observed that the Islamic stock markets in the developing countries performed better than those in the developed countries in the crisis period. Despite the lower return compared to the pre-crisis period, the Indonesian stock market remained the most profitable compared to the rest of the Islamic stock markets, with an average positive return, albeit lower, of 0.22%, followed by Turkey at 0.1%. The rest of the markets recorded an average decline, with Kuwait recording the largest decline at -0.4%, followed by Japan at -0.2%, the UK at -0.06%, the US at -0.05%, and Malaysia at -0.02%. As expected, the volatility (standard deviation) for all of

the Islamic stock markets was also higher during the crisis period. Similar to the pre-crisis period, the higher return in Indonesia comes with higher risk; the Indonesian stock market recorded the highest standard deviation at 5.4%, followed by the UK at 4.9%, Kuwait at 4.4%, Turkey at 4.2%, the US at 3.5%, Malaysia at 3.4% and Japan at 3.2%.

ARDL Analysis

As shown in Table 2, in the pre-crisis period, the results of the ARDL test show no evidence of any long-run equilibrium relationship among the Islamic stock markets. This is indicated by the insignificant joint F-statistics from the estimation of the stock markets during the period. In the context of portfolio diversification benefits, the result suggests that in a non-crisis period, there are potential gains by diversifying investment portfolios in these Islamic stock markets. In contrast, in the crisis period, the results of the ARDL estimations show the existence of a long-run equilibrium relationship among the Islamic stock markets. The joint F-statistics are significant at the 90% upper bound at lag length 3, suggesting that the Islamic stock markets have a common equilibrium point in the long run (refer to the third column of Table 2). This result, which is contradictory to the behaviour of the stock markets in the pre-crisis period, suggests that there is no potential diversification benefit in the Islamic stock market during the crisis period.

This study shows that the global financial crisis had a significant impact on the integration of the Islamic stock markets. It has been consistently reported throughout the study that the stock markets were increasingly integrated during the crisis period compared to the non-crisis period. In fact, the findings of this study provide further support to the existing literature, indicating that stock markets tend to exhibit increasing integration during a crisis period (see, for example, Chesnay & Jondeau, 2001; Ang & Bekaert, 2002). During a period of financial crisis, stock markets tend to react in unison to the major epicentre of the crisis, reacting similarly to any potential risks due to the crisis (Yoshida, 2010). For example, due to the US sub-prime crisis, the stock markets showed similar performance as the investors in these markets pre-empted the possibility of an impending US stock market crash in September 2008. There were also concerns of higher risks in investing in other stock markets because the US is a global economic powerhouse. In addition to providing further empirical support for this view, a novel aspect of this study is that the increasing integration occurs in all types of stock markets; the Islamic stock markets are “no exception to the rule”.

Table 2
ARDL F-statistics for testing existence of co-integration

Lag	<i>Pre-crisis period</i>	<i>During-crisis period</i>
1	2.337	1.973
2	2.104	1.957
3	1.602	3.463*
4	1.250	2.782
5	1.217	2.044
6	0.730	2.936

Note: * denotes that F-statistics falls above the 90% upper bound.

At this juncture, it is important to note that the existence of cointegration among the markets does not rule out the possibility of arbitrage profits through diversifying portfolios across these markets in the short term, which may last for quite a while (Dwyer & Wallace, 1992). Thus, because of varying degrees of business and financial risks of different securities and various security cash flows co-varying less than perfectly across the markets (and even within the same country), the diversification benefits in these markets in the long term may be reduced but are not likely to be fully eliminated in practice.

Multivariate Analysis using GMM

Table 3 provides the results based on the multivariate VECM analysis for the Islamic stock markets focusing on the period during the crisis. As shown by the table, all of the error correction terms (ECTs) are significant for the reviewed Islamic stock markets. The significant ECTs imply that these markets are interrelated in the long run. The structural similarity of the Islamic stock markets due to the observation of the requirement of *shari'ah* explains the integration of these stock markets over the long run.

The short-run causality, as indicated by the F-statistics, shows that the Islamic stock markets in Malaysia, Indonesia, the US, and the UK have been sensitive to changes in the other stock markets. In particular, the Malaysian stock market is significantly influenced by the Indonesia, Kuwait, US and UK markets, whereas the impact of the Japanese stock market is somewhat weak. Because the Turkish stock market has no significant influence on the Malaysian stock market, potential portfolio diversification benefits exist for investing in Malaysian and Turkish stock markets. The Indonesian market is significantly affected by the Islamic stock markets in Malaysia, Turkey, and Japan, but not the US, UK, and

Kuwait. Similar analysis can be applied indicating that potential diversification benefits exist in the Indonesian, UK, US, and Kuwait stock markets. The US market is significantly affected by all Islamic stock markets except Japan, indicating potential diversification benefits between Islamic stock markets in the US and Japan.

Table 3
Results of multivariate VECM analysis for during crisis period

Dependent Variables	Independent Variables							ECT _{t-1}
	$\Delta DJIMY$	$\Delta JAKIS$	$\Delta DJIMTR$	$\Delta DJIMKW$	$\Delta IMUS$	$\Delta DJIUK$	$\Delta DJIJ$	
$\Delta DJIMY$	–	18.601*** [0.000]	1.646 [0.169]	3.735*** [0.007]	4.972*** [0.001]	5.017*** [0.001]	2.194* [0.075]	–0.162*** (–4.386)
$\Delta JAKIS$	20.989*** [0.000]	–	3.035** [0.021]	2.305* [0.064]	0.304 [0.876]	1.162 [0.332]	2.941** [0.024]	–0.203*** (–4.005)
$\Delta DJIMTR$	1.950 [0.108]	2.234* [0.071]	–	3.055** [0.020]	1.207 [0.313]	2.426* [0.053]	1.955 [0.108]	–0.328*** (–4.585)
$\Delta DJIKW$	1.399 [0.241]	1.719 [0.152]	3.349** [0.013]	–	0.544 [0.704]	0.847 [0.499]	2.508** [0.047]	–0.069*** (–2.663)
$\Delta IMUS$	2.463** [0.050]	4.651*** [0.002]	6.312*** [0.000]	6.255*** [0.000]	–	51.753*** [0.000]	6.795* [0.075]	–0.494*** (–5.385)
$\Delta DJIUK$	6.211*** [0.000]	3.015** [0.022]	3.722*** [0.007]	3.082** [0.020]	26.76*** [0.000]	–	3.761*** [0.007]	–0.602*** (–6.811)
$\Delta DJIJ$	2.137* [0.082]	8.511*** [0.000]	1.999 [0.101]	2.314* [0.063]	1.485 [0.212]	3.440** [0.011]	–	–0.208*** [v3.638]

Notes: ***, ** and * represent significance at the 1%, 5% and 10% levels, respectively. The diagnostic tests of adjusted R2, Durbin-Watson statistics and J-statistics have been conducted, but are not reported in this table in order to conserve space.

CONCLUSIONS

Summary of Major Findings

Motivated by increasing interest in the Islamic stock markets in the aftermath of the global financial crisis, this study analyses the impact of the global financial crisis on the integration of selected Islamic stock markets. The study focuses on seven Islamic stock markets selected from various regions and adopts a time series analysis of the ARDL and VECM. In an effort to determine the impact of the global financial crisis on the nature of integration among the Islamic stock markets, the period of analysis is divided into the pre-crisis and crisis periods.

The results based on the descriptive analysis suggest that the Islamic stock markets are not fully sheltered from the global financial crisis. However, in terms of magnitude, it is observed that the impact of the crisis on the Islamic stock markets is not as severe as it is on the conventional stock markets. Similar to the conventional counterparts, all of the Islamic stock markets included in the study recorded lower average returns and higher volatility in the crisis period compared to the pre-crisis period. In both periods, the Islamic stock markets in the developing countries provided higher average returns than those in the developed countries. Nevertheless, the conventional wisdom of “high risks, high returns” is also applicable to the Islamic stock markets, where markets with higher returns are more volatile, particularly in the relatively “thin” market of the developing countries.

The results from the ARDL test show no evidence of a long-run equilibrium relationship among the Islamic stock markets in the pre-crisis period, but they suggest otherwise in the crisis period. Thus, there are potential diversification benefits among the Islamic stock markets in the non-crisis period, and these diversification benefits diminish during the crisis period. Further investigations based on the VECM analysis on the integration of the Islamic stock markets during the crisis suggest that all of the Islamic stock markets are interrelated in the long run, which can be explained by the structural similarity produced by the requirement to observe Islamic laws.

Implications of Study

Since this study shows that the Islamic stock markets are as vulnerable as other markets to the global financial shocks, it is important for industry players to remain vigilant about the impact of the crisis on their investments in Islamic stock markets. At the same time, policymakers need to take pre-emptive steps to minimise the impact of the crisis and ensure the stability of the Islamic stock markets. The findings of this study indicate that the general belief that the Islamic

financial markets are sheltered from the adverse impact financial shocks due to their interest-free nature is flawed. In view of this finding, it is important for market participants to undertake continuous prudent risk management practices and to devise suitable hedging mechanisms so that pre-emptive measures can be taken to safeguard the stability of the Islamic financial markets in times of economic and financial uncertainty. In addition to devising its own risk management techniques to address financial shocks, perhaps the Islamic capital market could learn from the best risk management practices of the conventional capital market to address market risks.

The general findings that the Islamic stock markets show no evidence of a long-run equilibrium relationship in the pre-crisis period but suggest otherwise in the crisis period are supportive of the time-varying aspect of stock market integration, as suggested by Bekaert and Harvey (1995). In addition to providing further empirical support to this view, a novel aspect of this study is that the increasing integration occurs in all types of stock markets, and the Islamic stock markets are “no exception to the rule”. The behaviour of the Islamic stock markets, which show increased integration during the crisis period, is consistent with the conventional stock markets. This finding may be of practical importance to industry players in a way that provides some indication regarding the behaviour of the Islamic stock market during a crisis. The similar behaviour of the Islamic stock market during a crisis period is also important to policymakers to allow them to take pre-emptive measures to avoid a wide-scale decline in the Islamic stock market during a global financial crisis.

In terms of portfolio diversification benefits for investors, the study highlights the relevance of both the level of economic development and geographical factors in influencing the integration of the Islamic stock markets. The study clearly documents that in a non-crisis period, investors can gain from portfolio diversification by considering both developed and developing countries' Islamic stock markets in their investment portfolios. In a crisis period, geographical factors are shown to be relevant diversification criteria, particularly during the crisis period. We conclude that investors who are interested in diversifying their portfolios can still gain benefits if they diversify and consider Islamic stock markets across economic groupings, such as in developed and developing countries, as well as markets in different regions depending on the market condition. This information has important practical implications for market strategising and capital budgeting by investors.

Lastly, our evidence of the extent of interdependencies among these markets also has important implications for the macro-stabilisation policies in each Islamic stock market and for the financial policies of multinational corporations (MNCs). For MNCs, a clear understanding of the nature of

integration among the Islamic equity markets has important implications for the accessibility of capital to MNCs, which may rely on funds in these Islamic stock markets. In particular, greater financial integration ensures stability and promotes capital flows between the countries, thereby improving accessibility to capital by the MNCs.

The extent of the effectiveness of the macro-economic policies of each stock market in addressing stock market imbalances will crucially depend on the extent of financial integration of each market with the other markets. Similarly, the extent of integration of each Islamic stock market has important bearings on financial policy formulation. Co-integrated Islamic stock markets suggest that there is a need for policy coordination among these markets to mitigate the impact of financial fluctuations. In this regard, we concur with the argument proposed by Hooy and Lim (2013) regarding the importance of financial deepening and reform policies that would promote information efficiency in the stock market. Greater policy reform, including the reduction or removal of trade and investment barriers to improve corporate governance and transparency, will be essential if these countries are to exploit the advantages of financial interdependence.

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