Pertanika J. Soc. Sci. & Hum. 26 (2): 961 - 984 (2018)

PERTANIKA JOURNALS

SOCIAL SCIENCES & HUMANITIES

Journal homepage: http://www.pertanika.upm.edu.my/

The Diversification Benefits within Islamic Investments: The Case of Malaysia-Based Islamic Equity Investors

Nazrul Hazizi Noordin[1] and Buerhan Saiti[1,2]*

[1]*Institute of Islamic Banking and Finance, International Islamic University Malaysia, 53100 IIUM, Kuala Lumpur, Malaysia*
[2]*Istanbul Sabahattin Zaim University, Halkalı, 34303 Istanbul, Turkey*

ABSTRACT

This article aims to assist Malaysia-based Islamic equity investors in identifying possible diversification benefits by diversifying their portfolio in the Southeast Asian market and the top 10 world's largest equity markets (China, Japan, Hong Kong, India, UK, US, Canada, France, Germany and Switzerland). The multivariate GARCH-dynamic conditional correlation is applied to estimate the time-varying linkages of the selected Asian and international Islamic stock index returns with the Malaysian Islamic stock index returns, covering approximately eight years daily starting from 29 June, 2007 to 30 June, 2016. At the regional level, the results indicate that Malaysia-based Islamic equity investors would benefit most if they include the Japanese Islamic stock indices in their portfolio. Meanwhile, at the international level, the results imply that the US Islamic stock indices provide the most diversification benefit for the Malaysia-based Islamic equity investors.

Keywords: Equity markets, Islamic stock indices, MGARCH, Islamic Finance,portfolio diversification benefit

INTRODUCTION

Investors and fund managers are often looking for choice in investment that can lower their unsystematic risks. This has usually been done through investment diversification in cross-border markets as well as into different classes of asset such as stock, bond, real estate, commodity and more recently, the emerging Islamic investments. This concept of investment diversification

ARTICLE INFO

Article history:
Received: 02 June 2017
Accepted: 03 January 2018

E-mail addresses:
hazizinoordin@gmail.com (Nazrul Hazizi Noordin)
borhanseti@gmail.com (Buerhan Saiti)
*Corresponding author

ISSN: 0128-7702

is derived based on normative rules of portfolio selection provided in the modern portfolio theory (MPT) of Markowitz (1952), Tobin (1958) and Grubel (1968). As further argued by Levy and Sarnat (1970), the extent to which risks are reduced through diversification can only be determined by the linkages among asset returns. In other words, the privilege of having lower risks due to investment diversification only can be realised if returns of assets are not perfectly correlated.

Asset correlation essentially serves as a statistical measure that indicates the interdependency between two or more assets. Determining asset correlations indeed becomes an important part of today's asset allocation process that helps investors to maximise their returns at the lowest possible risk level. The lower the correlation between assets, the greater the risk reduction is achieved in an investment portfolio. Theoretically, investment diversification benefits can be achieved as long as returns in the different markets are not perfectly correlated. Thus, investors are willing to diversify their assets abroad only if returns of other countries' stocks are less correlated with local ones (Masih & Masih, 1997). Furthermore, a traditional approach to diversification suggests that an investor should maintain a diverse mix of different asset types such as equities, fixed income and commodity that are assumed to be less correlated to help spread the risks across the assets.

Some previous studies found that international diversification of an investment portfolio may provide benefits to investors and fund managers by creating a well-diversified portfolio with the lowest possible risks (Agmon, 1972; Grubel, 1968; Levy & Sarnat, 1970; Ibrahim, 2006; Lessard, 1973;Solnik, 1974; Smith et al. 1993). Nevertheless, more recent findings have provided evidence showing that international capital markets have been increasingly integrated, increasing the correlations among asset returns (Baharumshah et al., 2003; Becker et al., 1990; Bertero & Mayer, 1990; Dwyer & Hafer, 1988; Von Furstenberg & Jeon, 1990). These co-movements and contagions in the market prices may unfortunately reduce the advantage of internationally diversified investment portfolios (Saiti et al., 2016; Xiao & Dhesi, 2000).

The world's markets have recently glimpsed an economic downturn, sparking a fear of another global financial crisis. Despite being one of the fastest growing emerging markets, Malaysia is not an exception from this global deteriorating economic condition. The Malaysian ringgit fell below RM4 per USD for the first time since the 1997 financial crisis. Furthermore, the Malaysian market's bellwether, FTSE Bursa Malaysia KL Composite Index (FBM KLCI), slipped to its lowest level as the oil price slump continued to impair investor's confidence. As the Malaysian financial markets seemed to be highly susceptible to the recent devaluation of the ringgit and the serious fluctuation of global commodity prices, the present study is motivated to assist the Malaysian-based Islamic

equity investors in identifying possible Islamic investment opportunities abroad for diversification purposes that could reduce their investment risks.

Islamic investment is growing rapidly as an alternative investment class for all investors, both Muslim and non-Muslim, for its foundation in ethical business practices, social responsibility and fiscal conservatism. Islamic investors are mandated to invest only in an Islamic manner as denoted by Imam and Kpodar (2013); in their study on the determination of Islamic bank expansion around the world, interest rates were found to have a negative impact on banking selection among Muslims while the quality of institutions was not found to be a significant determinant. However, other investors such as non-Muslims are taking advantage of Islamic investment for the benefits they derive, including greater stability of returns, transparency and diversification (Saiti et al., 2014).

The primary objective of this study was to examine the extent to which Malaysia-based Islamic equity investors benefit from diversifying their investment portfolio in the Southeast Asian market and the world's major stock exchange markets[1] (United States, United Kingdom, China, Japan, Hong Kong, Canada, France, Germany, India and Switzerland) by empirically estimating the time-varying volatility and correlation between their market returns. In this research, we identified the portfolio diversification benefits from Malaysia-based Islamic equity investors' perspective. By applying the Multivariate-GARCH approach, this study investigates the dynamic conditional correlations between the MSCI Malaysia Islamic index returns and the selected Islamic index returns to identify both regional and international diversification benefits for Malaysia-based Islamic equity investors.

A main practical implication of this study to the Malaysian investment environment is that it provides highly significant insight into possible cross-market spillover, thus calling for some urgent corrective actions by the market authorities including the enhancement of economic co-operation among countries. In addition, this study intends to contribute to a better understanding of the correlations and volatilities of Islamic stock returns. Given that Islamic financial assets have grown to be one of the most important segments in the global financial system, it is worthwhile to investigate whether Islamic equities are able to provide portfolio diversification benefits as far as Malaysia-based Islamic equity investors are concerned by examining the dynamic conditional volatilities and dynamic conditional correlations of the Islamic stock index returns. Islamic financial assets have grown to be one of the most important segments in the global financial system. The size of the Islamic financial market is estimated to be around USD1.87 billion, growing at a steady rate of 12 to

[1]The list of the world's major stock markets was extracted from the World Federation of Exchanges' monthly report dated November 2015, available online at http://www.world-exchanges.org

15% per annum (IFSB, 2015). The number of Islamic investment funds has increased tremendously to 1,181 with USD60.65 billion assets under management in 2014 from 756 Islamic funds with USD28.35 billion assets under management in 2008 (Zawya, 2015). Notwithstanding the global oil price slumps, it is projected that Islamic funds will expand by 5.05% per annum in the next five years to reach USD77 billion by 2019. Despite the rapid expansion of the Islamic capital markets, previous studies on the correlations of Islamic asset returns have been lacking and remained relatively unexplored compared to voluminous works on the interdependencies among conventional asset returns. Therefore, this study aimed to fill this gap in the literature by focussing on a number of Islamic stock index returns in the world's largest equities markets including the United States, the United Kingdom, China, Japan, Hong Kong, Canada, France, Germany, India and Switzerland and applying the recent econometric methodology, the Multivariate GARCH-DCC, covering approximately eight years daily data from 1 June, 2007 to 30 June, 2016. Furthermore, Malaysia is chosen as the base country due to the fact that it has been regarded as the key leader of the global Islamic capital market, which actively pursues rapid development of Islamic investment and banking products. The country comprises the largest portion of the total value of global Islamic funds with a market capitalisation of 24%, equivalent to USD27.2 billion as at June 2015. Lastly, we hope to assist Malaysian equity investors and fund managers, especially Islamic ones, in making investment decisions on where in the world to invest.

The rest of the paper is organised as follows: Section 2 provides the theoretical foundation and critical review of previous studies on Islamic investments. Section 3 explains the methodology and data used in this study. Section 4 discusses the empirical findings and presents the results of the analysis and together with the concluding remarks are presented in Section 5.

LITERATURE REVIEW

Concept of Portfolio Diversification

The concept of diversification can be traced even before it gained tremendous popularity after Markowitz's article was published in 1952. For instance, Daniel Bernoulli (1738) in his famous article on the St Petersburg Paradox in the *Commentaries of the Imperial Academy of Science of Saint Petersburg* mentioned that "…it is advisable to divide goods which are exposed to some small danger into several portions rather than to risk them all together." In fact, the act of minimizing risks through diversification was also revealed in the Holy Qur'an in Surah Yusuf verse 67, about the story of Prophet Jacob, who gave advice to his sons to enter the city of Egypt via different gates to attract less attention in order to reduce the risk of being caught by their enemies. In the international investment scene, diversification is indeed one of the most well-known investment techniques among investors for reducing investment risks by allocating investments

in various asset types, industries and cross-border markets. According to Markowitz (1959), international investors may gain diversification benefits only if the asset returns in cross-border markets are not perfectly correlated with those of the domestic market. Diversification benefits can be measured by assessing whether the risk-return trade-off of a domestic index portfolio can be enhanced by including either the country's regional equity indices or global equity indices (Driessen & Laeven, 2007).

Islamic Equity Investment

The nature of Islamic equity investment seems to be aligned with the objectives of portfolio diversification, which is to help *rabbul mal* or investors to minimise potential investment risks at a given returns level. This holds true as Islamic teachings prohibit any financial deal that has a high volume of ambiguity and excessive risks (*gharar*), or even worse, any game of chance (*maysir*) using highly speculative financial instruments such as short-selling or derivative products such as futures, warrants and options that provide extreme returns to only few parties at the loss of others (Iqbal & Mirakhor, 2007). Furthermore, interest-based leverage that would expose investors and financiers to a great amount of credit risks is also excluded from Islamic equity investment. However, this does not necessarily denote that bearing a certain level of investment risk is entirely prohibited in Islam as the Prophet Muhammad (peace be upon him), in one of his *hadith* urged that the returns on an asset must relate to the risks associated with holding ownership of the asset or *al-kharaj bi al-dhaman*. Moreover, a legal maxim applicable to Islamic commercial transactions, *al-ghurm bi al-ghunm*, or 'gain is justified with risk' is commonly used as a basis for assessing the permissibility of Islamic equity investments in the eyes of *Shariah*. In fact, neglecting the element of risk can potentially lead to interest-based transactions, which is clearly prohibited in Islam (Quran, 2:275-279). This can be related to the assumption made under the MPT that investors are risk-averse, whereby an investor who holds Islamic stocks which have higher beta (indicating high volatility) is more likely to receive higher returns than someone who holds lower-beta stocks as compensation for bearing additional risks. Thus, Islamic equity markets, given their closer linkage to real economic activities and unique characteristics, such as ethical and financial ratio screenings that filter out highly risky and leveraged firms as well as prohibited industries such as alcohol, tobacco, pork, pornography and conventional financial sectors, are argued to provide larger diversification benefits for international investors compared to their conventional counterparts (Iqbal et al., 2010; Saiti et al., 2014).

Nevertheless, some may view compliance to *Shariah* principles as an investment constraint for equity investors. This is because by implementing *Shariah* or ethical stock screening, it is highly likely that constituent assets for Islamic indices

would be concentrated only on a limited number of sectors such as technology, energy, consumption and service, leaving out other sectors that may provide potential diversification benefits to investors (Bauer, 2006). This seems to be counterproductive as one could argue that despite the fact that the Islamic index is claimed to be less risky as it excludes high leverage firms, due to its limited investment choices, fewer potential diversification opportunities and also heavy dependence on performance of small firms with highly volatile returns, the Islamic stock might turn out to be even riskier.

From an empirical perspective, Najeeb et al. (2015) investigated the time-varying correlation dynamics of Islamic equity indices in the case of Malaysian Islamic equity investors using a few econometric analyses such as the Multivariate GARCH-DCC and the Wavelet Correlation Test. The study found that Malaysian Islamic stock market investors would enjoy higher diversification benefits if they invested in developed markets instead of in emerging markets. In answering the question as to whether Malaysian Islamic equity investors should invest in Asia-Pacific, European or the Middle East and North African (MENA) Islamic markets, the results of the Multivariate GARCH-DCC analysis showed that the returns of the Malaysian Islamic index are least correlated with the MENA Islamic market returns compared to those of the Asia-Pacific and European Islamic market returns, suggesting possible regional diversification benefits. In addition, the study indicated that the correlations among the Islamic stock indices increase as the investor's holding period extends. Meanwhile, using the Multivariate GARCH-DCC analysis, Saiti et al. (2014) studied whether the inclusion of Islamic stock indices in a portfolio provides potential diversification benefits for US-based stock market investors. The study found that both conventional and Islamic market returns of Japan, Gulf Cooperation Council (GCC) ex-Saudi, Indonesia, Malaysia and Taiwan are less correlated with the US market returns compared with Korea, Hong Kong, China and Turkey. In general, the study also indicated that US-based investors could potentially gain less diversification benefits by including the Islamic stock indices rather than its conventional counterparts in their investment portfolio.

A more recent study by Rahim and Masih (2016), using daily time series closing price data, applied several econometric techniques such as the Multivariate GARCH-DCC, the Continuous Wavelet Transform (CWT) and the Maximal Overlapping Discrete Wavelet Transform (MODWT) tests to explore the interdependence between Malaysia's stock market and its major trading partners including Thailand, Singapore, China, Japan and the US. Their findings indicated that in a short stock holding period, the US Islamic stock index provides greater diversification benefits compared with other Islamic stock indices of Malaysia's Asian trading partners as far as Malaysian Islamic investors are concerned. Similar to the suggestion of Najeeb et al. (2015), the study also suggested that the diversification

benefits of a portfolio with a long investment horizon exceeding 32 to 64 days tend to be minimal. Providing evidence from the ASEAN markets, Saiti (2015) denoted significant linkages among the emerging Southeast Asian markets, namely Malaysia, the Philippines, Singapore, Thailand and Indonesia.

Moreover, in investigating the causal relationship between the Islamic stock markets and the conventional markets, Ajmi et al. (2014) found evidence of significant linear and non-linear causality between Islamic and conventional stocks that leads to the dismissal of the decoupling hypothesis of Islamic equities from interest-bearing securities, reducing the potential diversification benefits that may arise from diversifying in *Shariah*-based markets. Similarly, using the copula approach, Hammoudeh et al. (2014) also revealed a significant dependence between the Dow Jones Islamic market index and three major global conventional equity markets, namely, Asia, Europe and the United States and global factors (oil prices, stock market implied volatility [VIX]), the US' 10-year Treasury bond interest rate, and the 10-year European Monetary Union government bond index. Moreover, in India, Dharani and Natarajan (2011) concluded that the Nifty *Shariah* Index and the Nifty indices performed in similar manner in terms of their risk-adjusted returns. On the contrary, Akhtar et al. (2012), using a sample of nine Islamic and 37 non-Islamic countries, suggested that Islamic financial markets may provide substantial diversification benefits during financial crises, as they may decrease the portfolio's sensitivity to international financial contagion risks. In addition, Ashraf (2013), who studied the returns performance of 29 Islamic equity indices versus conventional indices, implied that managers of conventional funds can also benefit by holding a passively managed portfolio of investments that adhere to *Shariah* principles.

RESEARCH METHOD

Multivariate GARCH-Dynamic Conditional Correlation

This section explains the research methodology and the data used in the present study. We employed the multivariate GARCH-DCC model of Engle (2002) in order to estimate time-varying volatility and correlation of returns of the selected indices. This widely adopted econometric model is able to precisely indicate changes in volatility and correlation of the indices over time together with its directions (positive or negative) and magnitude (stronger or weaker). Hence, it assists investors in determining whether shocks to the volatilities of stock market returns are complementary or substitutable in terms of taking risks (Najeeb et al., 2015; Saiti et al., 2014).

A main advantage of adopting the DCC model instead of the typical constant correlation model or simple Multivariate GARCH technique lies in its accuracy in pinpointing changes in the correlation between asset returns, detailing when and how they occur (Engle & Sheppard, 2001;

Engle, 2002; Ku, 2008). Other advantages of using the Multivariate GARCH-DCC model include: (i) the ability to detect plausible contagion effects during the financial crises effectively (Billio & Caporin, 2005; Dajcman et al., 2012; Wang & Thi, 2007); (ii) it provides a convenient way to model the procedure of estimating dynamic conditional volatilities and dynamic conditional correlation concurrently (Lee, 2006); (ii) it simplifies the process of estimating dynamic correlation matrix (Engle & Sheppard, 2001); (iii) it is free from any bias against volatility as it takes into account the time-varying volatility in adjusting correlation coefficients continuously (Cho & Parhizgari, 2008); (iv) it also directly accounts for heteroskedasticity as it estimates the correlation coefficients of the standardised residuals (Chiang et al., 2007); (v) it has a certain extent of flexibility, like the Univariate GARCH model, but it is not as complex as the conventional Multivariate GARCH model. Therefore, it allows correlations between multiple asset returns to be estimated (Chiang et al., 2007; Lee et al., 2006); and (vi) lastly, it provides a forecast of the degree of correlation between research variables for the coming periods (Lebo & Box-Steffenmeier, 2008).

Despite this, there are a number of caveats about the DCC outlined by Caporin and McAleer (2013), among others, that include: (i) the DCC represents the dynamic conditional covariance of the standardised residuals instead of yielding dynamic conditional correlations; (ii) the DCC is stated rather than derived; (iii) the DCC has no moments; (iv) the DCC has no testable regularity conditions; (v) the DCC yields inconsistent two-step estimators; (vi) the DCC has no asymptotic properties; and (vii) although is useful for diagnostic checks, the DCC is not a model.

Engle's (2002) Multivariate GARCH-DCC model is a generalisation of Bollerslev's (1990) constant conditional correlation (CCC) estimator[2], which comprises two steps as follows:

(i) The estimation of the conditional variances of each individual equity index by using the following Univariate GARCH (*X,Y*) model, given *k* number of asset returns;

$$h_{it} = \omega_i + \sum_{x=1}^{X_i} \alpha_{ix}\, r^2{}_{it-x} + \sum_{y=1}^{Y_i} \beta_{iy} h_{it-y}\,, \text{for } i = 1,2,\ldots,\mathrm{k}$$

where, ω_i, α_{ix} and β_{iy} are non-negative and $\sum_{x=1}^{X_i} \alpha_{ix} + \sum_{y=1}^{Y_i} \beta_{iy} < 1$. h_{it} is the estimated conditional variance of the individual asset, α_{ix} is the short-run persistence of shocks

[2]The CCC model follows a univariate GARCH model which assumes that the conditional variances across returns are independent from each other. However, it does not accommodate asymmetric impacts of any positive and negative shocks to the returns

to returns X (the ARCH effects) and β_{iy} is the contribution of shocks to returns Y to long-run persistence (the GARCH effects).

(ii) The estimation of the time-varying conditional correlation between asset returns. The standardised residuals generated from the first step are used as inputs in the following DCC estimator:

$$H_t = D_t R_t D_t$$

where, H_t is the multivariate conditional covariance matrix, D_t is the diagonal matrix of conditional time varying standardised residuals (ε_t) that are obtained from the Univariate GARCH model with $\sqrt{h_{ii,t}}$ on the i^{th} diagonal, I = 1,2,….k and R_t is the time varying correlation matrix (off-diagonal elements).

Engle's DCC specifications can be further defined as follows:

$$D_t = diag\left(\sqrt{h_{11,t}}, \sqrt{h_{22,t}}, \ldots, \sqrt{h_{kk,t}}\right)$$

$$R_t \quad Q_t^{*-1} Q_t Q_t^{*-1}$$

where, the k x k symmetric positive definitive matrix $Q_t = (q_{ij,t})$ is extracted from:

$$Q_t = (1 - \phi - \gamma)\,\bar{Q} + \gamma\, Q_{t-1} + \phi\sigma_{i,t-1}\sigma_{j,t-1}$$

where, Q_t is the k x k time varying covariance matrix of standardised residual $\left(\sigma_{it} = \frac{\varepsilon_{it}}{\sqrt{h_{it}}}\right)$ and $\bar{Q}$ is the unconditional correlations of σ_i, t $\sigma_{j,t}$ and ϕ and γ are non-negative scalar parameters that satisfy ϕ+γ<1.

Thus, the conditional correlation of market X and Y at time t can be summarised as follows:

$$\rho_{ij,t} = \frac{(1 - \phi - \gamma)\bar{q}_{ij} + \phi\sigma_{i,t-1}\,\sigma_{j,t-1} + \gamma q_{ij,t-1}}{\left[(1 - \phi - \gamma)\bar{q}_{ii} + \phi\sigma_{i,t-1}^2 + \gamma q_{ii,t-1}\right]^{1/2}\left[(1 - \phi - \gamma)\bar{q}_{jj} + \phi\sigma_{j,t-1}^2 + \gamma q_{jj,t-1}\right]^{1/2}}$$

where, q_{ij} is the element on the i^{th} line and j^{th} column on the matrix Q_t. Under the Gaussian assumption, the conditional log likelihood of the parameters introduced by Bollerslev et al. (1988) can be written as follows:

$$L = -\frac{1}{2}\sum_{t=1}^{T}\left[(k\log(2\pi) + \log|D_t|^2 + \varepsilon_t' D_t^{-1} D_t^{-1}\varepsilon_t) + (\log|R_t| + \sigma_t' R_t^{-1}\sigma_t - \sigma_t'\sigma_t)\right]$$

where, k is the number of equations and T is the number of observations. It is also worth mentioning that only the volatility component (D_t) is maximised in Step 1 i.e. the log likelihood is reduced to the sum of the log likelihood of the Univariate GARCH model. In Step 2, however, the correlation component (R_t) is maximised (conditional on the estimated D_t) with the standardised residuals obtained from Step 1. Despite

this, the use of the Gaussian assumption is criticised as it does not hold for daily returns and therefore, underestimates the portfolio risk. In fact, the two-step estimation of the likelihood approach, although consistent (Engle & Sheppard, 2001), could possibly be inefficient under Gaussianity (Pesaran & Pesaran, 2010a).

Test of Mean-Reversion

In the present study, we also considered the mean reverting and the non-mean reverting specifications. The decomposition of H_t allows a unique specification of the conditional volatilities and conditional cross asset returns correlations. For instance, the GARCH (1,1) model for the variance $\sigma^2_{i,t-1}$ can be written as follows:

$$V\{r_{it}|\Omega_{t-1}\} = \sigma^2_{i,t-1} = \sigma^2_i(1-\lambda_{1i}-\lambda_{2i}) + \lambda_{1i}\sigma^2_{i,t-2} + \lambda_{2i}r^2_{i,t-1}$$

where, σ^2_i is the unconditional variance of the i^{th} stock return and λ_1 and λ_2 are the volatilities of individual stock returns. Under the restriction $\lambda_1+\lambda_2=1$, the unconditional variance disappears in the above equation. Next, the Integrated GARCH model is formulated to show that conditional variance is non-stationary and the shock to variance is permanent.

A more general mean reverting specification can be expressed in the following equation:

$$q_{ij,t-1} = \bar{\rho}_{ij}(1-\lambda_1-\lambda_2) + \lambda_1 q_{ij,t-2} + \lambda_2 \tilde{r}_{i,t-1}\tilde{r}_{j,t-1}$$

where, $\bar{\rho}_{ij}$ is the unconditional correlation between r_{it}, r_{jt} and $\lambda_1+\lambda_2<1$. We expect $\lambda_1+\lambda_2$ to be more or less to 1 in order to not revert back to the mean or equilibrium. The non-mean reverting case occurs when $\lambda_1+\lambda_2=1$. Therefore, a restriction of $\lambda_1+\lambda_2=1$ has to be included in testing for the existence of non-mean reversion.

DATA AND EMPIRICAL RESULTS

Data

In this study, the MSCI Malaysia Islamic index returns were used as proxy for Malaysian Islamic stock returns. In addition, this study considered the MSCI Islamic index returns of the Southeast Asian region and the world's top 10 largest equity markets,

namely the United States, China, Japan, Hong Kong, the United Kingdom, Canada, France, Germany, India and Switzerland. In order to explore regional portfolio diversification benefits for Malaysia-based Islamic equity investors, we made use of the Islamic MSCI indices of Southeast Asia, China, Japan, Hong Kong and India. Table 1 shows the complete list of stock indices used in the present study.

We collected the daily time series closing price data covering approximately eight years starting from 29 June, 2007 to 30 June, 2016. All the data were extracted from the Thomson-Reuters DataStream database. The stock index returns were then derived by calculating the differences in the logarithmic daily closing prices of the stock indices, $[\ln(p_t) - \ln(p_{t-1})]$, where p_t and p_{t-1} represent the stock price index at time t and $t-1$, respectively.

Table 1
List of Stock Indices

Stock Indices	Symbols
Islamic Stock Indices	
MSCI Malaysia Islamic Index	IMAS
MSCI Southeast Asia Islamic Index	ISEA
MSCI China Islamic Index	ICHN
MSCI Japan Islamic Index	IJPN
MSCI Hong Kong Islamic Index	IHKG
MSCI India Islamic Index	IIND
MSCI United States Islamic Index	IUS
MSCI United Kingdom Islamic Index	IUK
MSCI Canada Islamic Index	ICAN
MSCI France Islamic Index	IFRA
MSCI Germany Islamic Index	IGER
MSCI Switzerland Islamic Index	ISWT

Model Selection

In order to determine the appropriate model, we obtained both ML estimates of the Gaussian DCC and t-DCC model on the returns of the MSCI Malaysia index and all regional and conventional stock indices. The summary of estimation is reported in Table 2.

Table 2
ML Estimates of the Gaussian DCC and t-DCC model on the Returns of the MSCI Malaysia Islamic Index and all Regional and Conventional Islamic Stock Indices

	Gaussian Model	t-DCC Model	The estimated d.f. for the t-normal distribution
The returns of the MSCI Malaysia Islamic index and the Islamic MSCI Asian indices	45,598.8	45,974.1	7.7123
The returns of the MSCI Malaysia Islamic index and the Islamic MSCI international indices	55,596.1	55,948.1	8.5900

d.f. – Degree of Freedom
More details of the report can be requested from the authors

We found that the maximised log-likelihood values under the t-DCC model were larger than the ones obtained under the Gaussian model and the estimated degree of freedom for the t-normal distribution was below 30 in all cases. Therefore, this result implied that the t-distribution model was a more appropriate model for capturing the fat-tailed nature of the distribution of the returns of all stock indices.

Under the t-DCC model, we observe that the volatility parameters for both conventional and Islamic Asian stock indices were highly significant, indicating a gradual volatility decay. This suggests that the risk involved in the returns may gradually cancel out after following a shock in the market. In addition, we observed that the summation of lambda 1 and lambda 2 for all the stock indices was equal to less than 1 or unity (due to the space constraint, we did not report the results of this section. It can be requested from the authors). This indicated that the volatilities of the stock index returns were not based on the Integrated Generalised Auto Regressive Conditional Heteroskedascticity (IGARCH) or in other words, the shock to the returns volatilities was not permanent. An important implication of this phenomenon was that it signified that the investors and portfolio managers would have a higher chance of losing their investment although they could possibly make a profit in the short run. On the contrary, such market circumstances would favour the interests of speculators and short-term investors.

Regional Diversification Benefits

In order to achieve the main objective of our study, in this section, we assessed the usefulness of the Islamic stock indices of the Southeast Asian region, China, Japan, Hong Kong and India in terms of providing regional portfolio diversification benefits to Malaysia-based Islamic equity investors.

Table 3 represents the ranks of the unconditional volatilities of the Asian Islamic index returns (from lowest to highest). An unconditional volatility that is close to zero implies that the particular index is less volatile, whereas an unconditional volatility that is close to one implies that the particular index is more volatile.

Table 3
Ranks of the unconditional volatilities of the Asian Islamic Index Returns

No	MSCI Islamic Indices	Unconditional Volatility
1	Malaysia	0.010926
2	Southeast Asia	0.012064
3	Hong Kong	0.012955
4	Japan	0.014941
5	India	0.018022
6	China	0.019835

We find that the unconditional volatilities of the MSCI Asian Islamic stock indices are fairly low, ranging from 0.010926 to 0.019835. This indicates that overall, the returns of all Asian Islamic stock indices were less volatile. The MSCI Malaysia Islamic index returns was found to have the lowest volatility among the Asian markets. This could be attributed to a certain level of stability offered by the Malaysian Islamic

equity investment during the 2008 global financial crisis as a result of excluding highly leveraged companies in its asset allocation.

Meanwhile, we have ranked the unconditional correlations of the Asian Islamic index returns with the MSCI Malaysia Islamic index returns in Table 4 (from lowest to highest). We found that the unconditional correlations between the Islamic MSCI index returns of Southeast Asia and the MSCI Malaysia Islamic index returns were the highest among the Asian markets, estimated at +0.7553. The high correlation between the Islamic equity returns in the Malaysian and Southeast Asian markets indicated intra-regional contagion effects that exist within the trade region as explained by Masih and Masih (1999). The lowest unconditional correlation was found between the MSCI Japan Islamic index returns and the MSCI Malaysia Islamic index returns, which was at +0.376. This result suggested that Malaysia-based Islamic equity investors are able to receive higher regional diversification benefits if they opt to diversify their assets in the Japanese market rather than in other Asian markets.

Table 4
Ranking of the unconditional correlations of the Asian Islamic Index Returns with the MSCI Malaysia Islamic Index Returns

No	MSCI Islamic Indices	Unconditional Correlation
1	Japan	0.35407
2	India	0.42242
3	Hong Kong	0.46871
4	China	0.54267
5	Southeast Asia	0.75529

Test for Mean Reversion of Volatility

In this section, we report our findings on the mean reversion characteristics of the Asian Islamic stock indices and the MSCI Malaysia Islamic index. The hypothesis below was tested to see whether one of the index returns had non-mean reverting volatility. The H_0 indicated that that the process was non-mean reverting and the unconditional variance for the index returns did not exist (Pesaran & Pesaran, 2010b).

$$H_0 : \lambda_{1i} + \lambda_{2i} = 1$$

Table 5 presents the test for mean reversion of volatility of the Islamic MSCI Asian index returns. The results showed that all returns of the Asian Islamic stock indices and the MSCI Malaysia Islamic index had statistically significant mean reverting volatilities. In other words, despite a shock occurring in the markets due to a financial crisis, the stock returns will eventually move back to equilibrium. This implies that the previous unconditional volatility matrix in Table 3 can be a reliable source of information for long-term investors to obtain an overall picture of stock index volatility. With regard to the speed of mean reversion, the Japanese Islamic stock index had the fastest ability to return to equilibrium, while the Southeast Asian Islamic index had the slowest ability to return to equilibrium.

Table 5
Results of the mean reversion test of volatility of the Asian Islamic Index Returns and the MSCI Malaysia Islamic Index Returns

MSCI Stock Indices	$1-\hat{\lambda}_1-\hat{\lambda}_2$	Standard Error	T-ratio (Prob.)
IMAS	0.0058167	0.0019057	3.0523 (0.002)
ISEA	0.0055158	0.0012598	4.3783 (0.000)
ICHN	0.0079703	0.0017337	4.5973 (0.000)
IJAP	0.023334	0.0059389	3.9290 (0.000)
IHKG	0.0071780	0.0017604	4.0775 (0.000)
IIND	0.010147	0.0026813	3.7844 (0.000)

The Estimated Conditional Volatilities of the Asian Islamic Stock Index Returns

We then proceeded to estimate the dynamic conditional volatilities for the returns of each Asian Islamic stock index. Figure 1 illustrates the conditional volatilities of the Islamic MSCI Asian stock index returns respectively, together with the MSCI Malaysia Islamic index returns. We observed that the conditional volatilities of those Asian Islamic stock index returns moved more or less simultaneously over time. The highest increase in the conditional volatilities was spotted during the period of the 2008 global financial crisis. During the same period, there was also a high convergence of volatility among the Islamic stock index returns of the Southeast Asian region, China, Japan, Hong Kong and India. This signifies a great level of financial integration between these Asian markets that may turn unfavourable for investors and portfolio managers as it provides fewer portfolio diversification opportunities. However, this is not the case for the Malaysian market, which appeared to be more stable compared to other markets during the 2008 global financial crisis. Consistent with the previous findings on the unconditional volatilities presented in Table 3, the MSCI Malaysia Islamic stock index returns recorded the lowest volatility, while the MSCI China Islamic index returns appeared to have the highest volatility.

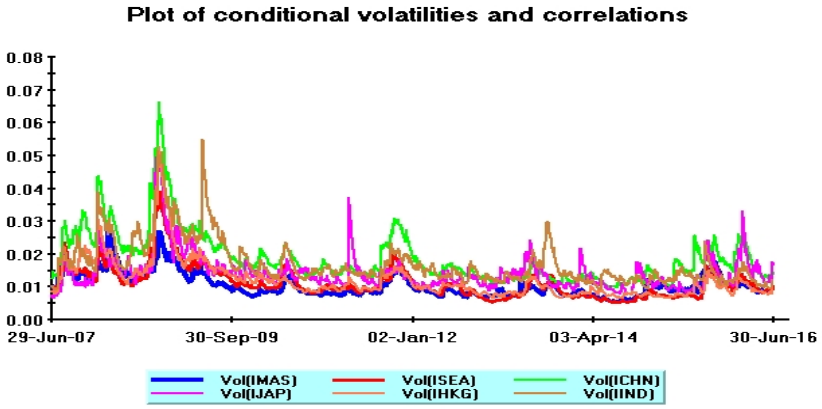

Figure 1. Conditional volatilities of the returns of the MSCI Malaysia Islamic index and the MSCI Islamic Asian indices

The Estimated Conditional Correlations for the Asian Islamic Stock Indices

Lastly, we plotted the conditional correlations of the Asian Islamic stock index returns with the MSCI Malaysia Islamic index returns in Figure 2. The plot indicates that the return correlation of the Malaysian Islamic stock index with the neighbouring markets seemed to move quite closely together, especially during the 2008 global financial crisis. Furthermore, the plot confirms the previous results of the unconditional correlations presented in Table 4, showing that the MSCI Malaysia Islamic index had the highest correlation with the Southeast Asian Islamic market returns and was less correlated to the Japanese Islamic stock index returns. From this, it can be suggested that if Malaysian Islamic equity investors were to invest their assets regionally, they should include the Japanese Islamic stock index in their portfolio in order to gain more diversification benefits compared with other Asian stock indices.

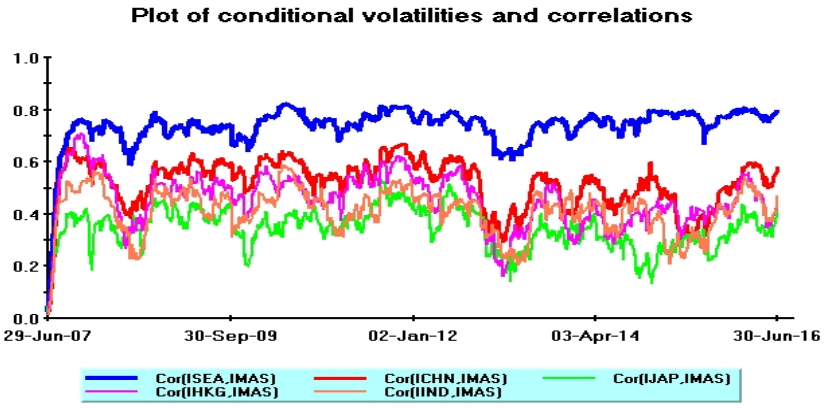

Figure 2. Conditional correlations of the MSCI international Islamic stock index returns with the MSCI Malaysia Islamic index returns

International Diversification Benefits

Next, this study hoped to provide some insightful findings on the usefulness of the Islamic stock indices of the UK, the US, Canada, France, Germany and Switzerland in terms of providing international portfolio diversification benefits to Malaysia-based Islamic equity investors.

Table 6 represents the ranks of the unconditional volatilities of the international Islamic index returns, respectively (from lowest to highest). An unconditional volatility that is close to zero implies that the particular index is less volatile, whereas, an unconditional volatility that is close to one implies that the particular index is more volatile.

Table 6
Ranks of the unconditional volatilities of the International Islamic Index Return

No	MSCI Islamic Indices	Unconditional Volatility
1	Malaysia	0.010926
2	Switzerland	0.011837
3	US	0.012674
4	UK	0.016501
5	Germany	0.017686
6	France	0.017932
7	Canada	0.019034

We found that the unconditional volatilities of the MSCI international Islamic stock indices were fairly low, ranging from 0.010926 to 0.019034. This indicated that overall, the returns of all the Asian Islamic stock indices were less volatile. The MSCI Malaysia Islamic index returns was found to have the lowest volatility among the world's largest international markets. This can be attributed to a certain level of stability offered by the Malaysian Islamic equity investment during the 2008 global financial crisis as a result of excluding highly leveraged companies in its asset allocation.

Meanwhile, we have ranked the unconditional correlations of the international Islamic index returns with the MSCI Malaysia Islamic index returns in Table 7 (from lowest to highest). The unconditional correlation between the MSCI UK Islamic index returns and the MSCI Malaysia Islamic index returns was found to be the highest among other international indices, while the correlation between the MSCI US Islamic index returns and the MSCI Malaysia Islamic index returns was the lowest. This implies that if Malaysia-based Islamic equity investors were to invest internationally, they should include the UK's stock indices in their portfolio in order to gain more diversification benefits compared with other international Islamic indices. Moreover, on average, the MSCI international Islamic index returns displayed a lower magnitude of correlations with the MSCI Malaysia Islamic index returns compared with the Asian Islamic index returns, suggesting that Malaysian Islamic investors would benefit more by investing in the international markets rather than in their own region.

Table 7
Ranks of the unconditional correlations of the International Islamic Index Returns with the MSCI Malaysia Islamic Index Returns

No	MSCI Islamic Indices	Unconditional Correlation
1	US	0.14089
2	Canada	0.25306
3	Switzerland	0.29364
4	France	0.32836
5	Germany	0.33628
6	UK	0.35340

Test for Mean Reversion of Volatility

In this section, we present the data on the mean reversion characteristics of both the international Islamic stock indices and the MSCI Malaysia Islamic index. The hypothesis below was tested to see whether one of the index returns had non-mean reverting volatility. The H_(0)indicated that the process was non-mean reverting and the unconditional variance for the index returns did not exist (Pesaran & Pesaran, 2010b).

$H_0 : \lambda_{1i} + \lambda_{2i} = 1$

Table 8 presents the test for mean reversion of volatility of the MSCI international Islamic index returns. The results showed that all the MSCI Islamic index returns had statistically significant mean reverting volatilities with the exception of the MSCI Malaysia Islamic index. This indicated that despite a shock occurring in the markets due to a financial crisis, the stock returns would eventually move back to equilibrium. This also implied that the previous unconditional volatility matrix in the lower panel of Table 6 could be a reliable source of information for long-term investors to obtain an overall picture of stock index volatility. With regard to the speed of mean reversion, the US Islamic stock index had the fastest ability to return to equilibrium while the Canadian Islamic stock index hds the slowest.

Table 8
Results of the mean reversion test of volatility of the International Islamic Index Returns and the MSCI Malaysia Islamic Index Returns

MSCI Stock Indices	$1 - \hat{\lambda}_1 - \hat{\lambda}_2$	Standard Error	T-ratio (Prob.)
IMAS	0.0094751	0.0034582	2.7399 (0.006)
IUK	0.0061995	0.0012443	4.9825 (0.000)
IUS	0.011652	0.0022970	5.0729 (0.000)
ICAN	0.0050724	0.0011546	4.3931 (0.000)
IFRA	0.0088149	0.0017031	5.1757 (0.000)
IGER	0.0091842	0.0017810	5.1569 (0.000)
ISWT	0.0090689	0.0023138	3.9195 (0.000)

The Estimated Conditional Volatilities of the International Islamic Stock Index Returns

We then proceeded to estimate the dynamic conditional volatilities for each international Islamic stock index returns. Figure 3 illustrates the conditional volatilities of the Islamic MSCI international stock index returns together with the MSCI Malaysia Islamic index returns. We observed that the conditional volatilities of those international Islamic stock index returns moved more or less simultaneously over time. The highest increase in the conditional volatilities was spotted during the period of 2008 global financial crisis. During the same period, there was also a high convergence of volatility among all international Islamic stock index returns with the exception of Malaysia and Switzerland, which appeared to be more stable compared with the other markets during the 2008 global financial crisis. This signified a great level of financial integration in those international markets that may turn unfavourable for investors and portfolio managers as it provides fewer portfolio diversification opportunities. Consistent with the previous findings on the unconditional volatilities in Table 6, the Malaysian Islamic stock index returns recorded the lowest volatility, while France and Canada appeared to have the highest returns volatility among the international Islamic indices. In addition, it was observed that there was a significant increase in volatilities of the international stock indices at the end of 2011 that could be attributed to the European debt crisis that led to the threat to sovereign default and the collapse of several banking institutions.

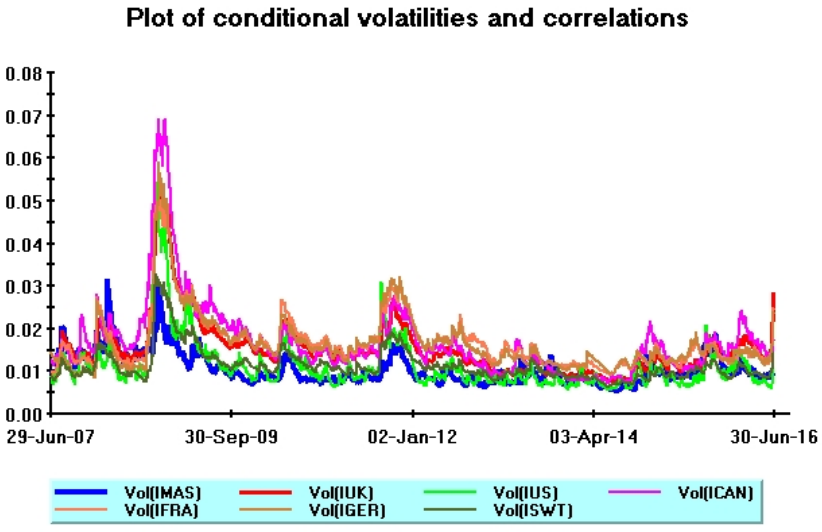

Figure 3. Conditional volatilities of the returns of the MSCI Malaysia Islamic index and the MSCI international Islamic indices

The Estimated Conditional Correlations for the International Islamic Stock Indices

Lastly, we plotted the conditional correlations of both the international Islamic stock index returns with the MSCI Malaysia Islamic index returns in Figure 4. The plot indicated that the return correlations of the Malaysian Islamic stock index with the international Islamic markets seemed to move quite closely together, especially after the 2008 global financial crisis. Moreover, the plot confirmed the previous results of the unconditional correlations in Table 7, showing that the MSCI Malaysia Islamic index had the highest correlation with the UK's Islamic market returns and was less correlated to the US Islamic stock index returns. From this, it can be suggested that if Malaysia-based Islamic equity investors were to invest their assets internationally, they should include the US Islamic stock index in their portfolio to gain more diversification benefits compared with investing in other international Islamic stock indices.

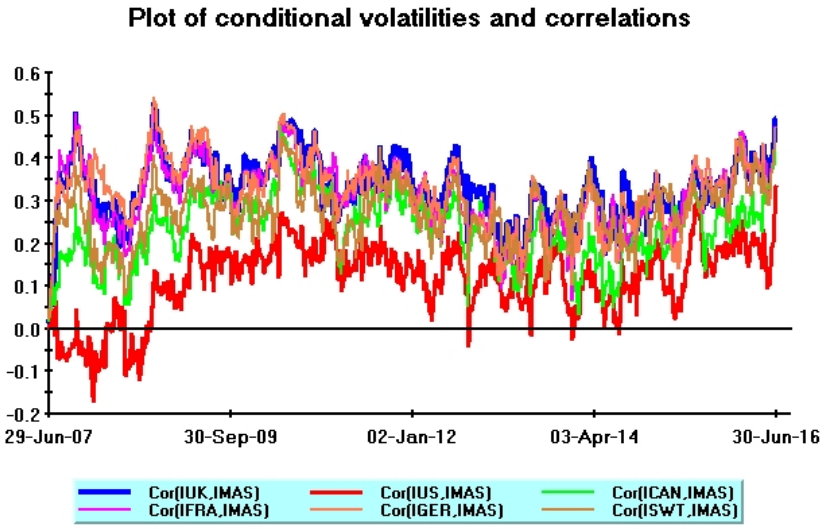

Figure 4. The estimated conditional correlations for the international Islamic stock indices

CONCLUDING REMARKS

The primary objective of this study was to identify potential portfolio diversification benefits as far as Malaysia-based Islamic equity investors are concerned. This was done by examining the dynamic conditional correlations between the Malaysian stock index returns and the returns of the Southeast Asian market index and the world's largest stock markets index, namely the United States, the United Kingdom, China, Japan, Hong Kong, Canada, France, Germany, India and Switzerland using the Multivariate GARCH-DCC test, covering approximately eight years daily starting from 29 June, 2007 to 30 June, 2016.

In summary, the preliminary test indicated that the t-distribution model appeared to be more appropriate for capturing the fat-tailed nature of the distribution of the Islamic stock index returns. Under the t-DCC model, the time-varying conditional volatility parameters of the Islamic MSCI stock indices were found to be highly significant, indicating that the shocks to the returns volatilities were not permanent; hence, the riskiness associated with the stock returns may gradually diminish. In addition, the study found that the highest increase in conditional volatilities of the MSCI Islamic stock index returns happened during the period of the 2008 global financial crisis. During the same period, there was also a high convergence among the Asian and international stock markets with the exception of Malaysia and Switzerland, signifying a great level of market integration among those countries that may reduce diversification benefits for international investors. Another important finding was that the Malaysian Islamic stock index proved to be more stable during the financial crisis compared with other Asian and cross-border Shariah-based markets. In terms of regional portfolio diversification, the results tended to suggest that the Japanese MSCI Islamic index provides more diversification benefits compared with the Southeast Asian region, China, Hong Kong and India. Meanwhile, in terms of international portfolio diversification, the results tended to suggest that the MSCI Islamic index of the US provides more diversification benefits compared with the UK, Canada, France, Germany and Switzerland.

The findings of this paper may have several significant implications for Malaysia-based equity investors and fund managers who seek understanding of return correlations between the Malaysian stock index and the world's largest stock market indices in order to gain higher risk-adjusted returns through portfolio diversification. With regard to policy implications, the findings on market shocks and the extent of the interdependence of the Malaysian market and cross-border markets may provide some useful insights into formulating effective macroeconomic stabilisation policies in efforts to prevent the contagion effect from deteriorating the domestic economy. In addition, the results of the time-varying co-movements between these market returns may provide some good indications about the exchange rate risks to be borne by multinational corporations, assisting the managers of those corporations to formulate their own policies on internal control and risk management.

This paper is not free from limitations. Yet, it provides a number of avenues for future research. This study can be further enriched by considering other markets from different regions in the world such as the Middle East, Africa, North America, Latin America and Oceania. In addition, future studies can possibly conduct similar analyses using various sector indices that cover major industries in Malaysia such as agriculture, finance, transportation,

healthcare, telecommunications and many more. In providing more comprehensive understanding of asset return linkages to international investors, future studies may want to include different asset classes such as bond, commodity, unit trust, REIT, precious metals and structured products in their analysis.

ACKNOWLEDGEMENT

The authors acknowledge that this study was funded by the Ministry of Higher Education of Malaysia through Research Initiative Grant Scheme (RIGS), Research Project ID: RIGS15-008-0008.

REFERENCES

Agmon, T. (1972). The relations among equity markets: A study of share price co-movements in The United States, United Kingdom, Germany and Japan. *The Journal of Finance, 27*(4), 839–855.

Ajmi, A. N., Hammoudeh, S., Nguyen, D. K., & Sarafrazi, S. (2014). How strong are the causal relationships between Islamic stock markets and conventional financial systems? Evidence from linear and nonlinear tests. *Journal of International Financial Markets, Institutions and Money, 28*, 213–227.

Akhtar, S. M., Jahromi, M., John, K., & Moise, C. E. (2012). Intensity of volatility linkages in Islamic and conventional markets. In *AFA 2012 Chicago Meetings Paper*. Cambridge.

Ashraf, D. (2013, July). Genesis of differential performance between Shari'Ah compliant equity indices and conventional indices. In *20th Annual Conference of the Multinational Finance Society June.* Turkey.

Baharumshah, A. Z., Sarmidi, T., & Tan, H. B. (2003). Dynamic linkages of Asian stock markets. *Journal of the Asia Pacific Economy, 8*(2), 180–209.

Baillie, R. T., & Bollerslev, T. (1989). Common stochastic trends in a system of exchange rates. *Journal of Finance, 44*(1), 167–181.

Bauer, R., Otten, R., & Rad, A. T. (2006). Ethical investing in Australia: Is there a financial penalty? *Pacific-Basin Finance Journal, 14*(1), 33–48.

Becker, K. G., Finnerty, J. E., & Gupta, M. (1990). The intertemporal relation between the US and Japanese stock markets. *The Journal of Finance, 45*(4), 1297–1306.

Bernoulli, D. (1738). Specimen theoriae novae de mensura sortis, in Commentarii Academiae Scientiarum Imperialis Petropolitannae. Translated from Latin into English by Sommer, L. (1954) Exposition of a new theory on the measurement of risk. *Econometrica: Journal of the Econometric Society, 22*, 23–36.

Bertero, E., & Mayer, C. (1990). Structure and performance: Global interdependence of stock markets around the crash of October 1987. *European Economic Review, 34*(6), 1155–1180.

Billio, M., & Caporin, M. (2005). Multivariate Markov switching dynamic conditional correlation GARCH representations for contagion analysis. *Statistical Methods and Applications, 14*(2), 145–161.

Bollerslev, T. (1990). Modelling the coherence in short-run nominal exchange rates: a multivariate generalized ARCH model. *The Review of Economics and Statistics, 72*(3), 498–505.

Caporin, M., & McAleer, M. (2013). Ten things you should know about the dynamic conditional correlation representation. *Econometrics, 1*(1), 115–126.

Chiang, T. C., Jeon, B. N., & Li, H. (2007). Dynamic correlation analysis of financial contagion: Evidence from Asian markets. *Journal of International Money and Finance, 26*(7), 1206–1228.

Cho, J. H., & Parhizgari, A. M. (2008). East Asian financial contagion under DCC GARCH. *International Journal of Banking and Finance, 6*(1), 2–14.

Dajcman, S., Festic, M., & Kavkler, A. (2012). European stock market comovement dynamics during some major financial market turmoils in the period 1997 to 2010 – A comparative DCC-GARCH and wavelet correlation analysis. *Applied Economics Letters, 19*(13), 1249–1256.

Das, S. R., & Uppal, R. (2004). Systemic risk and international portfolio choice. *The Journal of Finance, 59*(6), 2809–2834.

Dharani, M., & Natarajan, P. (2011). Equanimity of risk and return relationship between Shariah index and general index in India. *Journal of Economics and Behavioral Studies (JEBS), 2*(5), 213–222.

Driessen, J., & Laeven, L. (2007). International portfolio diversification benefits: Cross-country evidence from a local perspective. *Journal of Banking and Finance, 31*(6), 1693–1712.

Dwyer, G., & Hafer, R. (1988). Are national stock markets linked? *Federal Reserve Bank of St. Louis Review, 70*, 3–14.

Engle, R. (2002). Dynamic conditional correlation: A simple class of multivariate generalized autoregressive conditional heteroskedasticity models. *Journal of Business and Economic Statistics, 20*(3), 339–350.

Engle, R. F., & Sheppard, K. (2001). *Theoretical and empirical properties of dynamic conditional correlation multivariate GARCH.* (NBER working paper no. 8554). National Bureau of Economic Research.

Grubel, H. G. (1968). Internationally diversified portfolios: welfare gains and capital flows. *The American Economic Review, 58*(5), 1299–1314.

Hammoudeh, S., Mensi, W., Reboredo, J. C., & Nguyen, D. K. (2014). Dynamic dependence of the global Islamic equity index with global conventional equity market indices and risk factors. *Pacific-Basin Finance Journal, 30*, 189–206.

Ibrahim, M. H. (2006). Financial integration and international portfolio diversification: US, Japan and ASEAN equity markets. *Journal of Asia-Pacific Business, 7*(1), 5–23.

IFSB. (2015). *Islamic financial services industry stability report 2015.* Kuala Lumpur, Malaysia: Islamic Financial Services Board.

Imam, P., & Kpodar, K. (2013). Islamic banking: How has it expanded? *Emerging Markets Finance and Trade, 49*(6), 112–137.

Iqbal, Z., & Mirakhor, A. (2007). *An introduction to Islamic finance: Theory and practice.* Singapore: John Wiley & Sons (Asia) Pte Ltd.

Iqbal, Z., Mirakhor, A., Krichenne, N., & Askari, H. (2010). *The stability of Islamic finance: Creating a resilient financial environment for a secure future* (Vol. 644). Singapore: John Wiley & Sons.

Ku, Y. H. H. (2008). Student-t distribution based VAR-MGARCH: An application of the DCC model on international portfolio risk management. *Applied Economics, 40*(13), 1685–1697.

Lebo, M. J., & Box-Steffensmeier, J. M. (2008). Dynamic conditional correlations in political science. *American Journal of Political Science, 52*(3), 688–704.

Lee, J. (2006). The comovement between output and prices: Evidence from a dynamic conditional correlation GARCH model. *Economics Letters, 91*(1), 110–116.

Lee, M. C., Chiou, J. S., & Lin, C. M. (2006). A study of value-at-risk on portfolio in stock return using DCC multivariate GARCH. *Applied Financial Economics Letters, 2*(3), 183–188.

Lessard, D. R. (1973). International portfolio diversification: A multivariate analysis for a group of Latin American countries. *The Journal of Finance, 28*(3), 619–633.

Levy, H., & Sarnat, M. (1970). International diversification of investment portfolios. *The American Economic Review, 60*(4), 668–675.

Markowitz, H. (1959). *Portfolio selection, efficient diversification of investments*. New York, NY: John Wiley&Sons.

Masih, A. M., & Masih, R. (1997). A comparative analysis of the propagation of stock market fluctuations in alternative models of dynamic causal linkages. *Applied Financial Economics, 7*(1), 59–74.

Masih, A. M., & Masih, R. (1999). Are Asian stock market fluctuations due mainly to intra regional contagion effects? Evidence based on Asian emerging stock markets. *Pacific Basin Finance Journal, 7*(3), 251–282.

Najeeb, S. F., Bacha, O., & Masih, M. (2015). Does heterogeneity in investment horizons affect portfolio diversification? Some insights using M-GARCH DCC and wavelet correlation analysis. *Emerging Markets Finance and Trade, 51*(1), 188–208.

Rahim, A. M., & Masih, M. (2016). Portfolio diversification benefits of Islamic investors with their major trading partners: Evidence from Malaysia based on MGARCH-DCC and wavelet approaches. *Economic Modelling, 54*, 425–438.

Saiti, B. (2015). Cointegration of Islamic Stock Indices: Evidence from Five ASEAN Countries. *International Journal of Scientific and Engineering Research, 6*(7), 1392–1405.

Saiti, B., Bacha, O. I., & Masih, M. (2014). The diversification benefits from Islamic investment during the financial turmoil: The case for the US-based equity investors. *Borsa Istanbul Review, 14*(4), 196–211.

Saiti, B., Bacha, O. I., & Masih, M. (2016). Testing the conventional and Islamic financial market contagion: evidence from wavelet analysis. *Emerging Markets Finance and Trade, 52*(8), 1832–1849.

Smith, K. L., Brocato, J., & Rogers, J. E. (1993). Regularities in the data between major equity markets: Evidence from Granger causality tests. *Applied Financial Economics, 3*(1), 55–60.

Solnik, B. H. (1974). An equilibrium model of the international capital market. *Journal of Economic Theory, 8*(4), 500–524.

Tobin, J. (1958). Liquidity preference as behavior towards risk. *The review of economic studies, 25*(2), 65–86.

Von Furstenberg, G. M., & Jeon, B. N. (1990). Growing international co-movement in stock price indexes. *Quarterly Review of Economics and Business, 30*(3), 15–30.

Wang, K. M., & Thi, T. B. N. (2007). Testing for contagion under asymmetric dynamics: Evidence from the stock markets between US and Taiwan. *Physica A: Statistical Mechanics and Its Applications, 376*, 422–432.

Xiao, L., & Dhesi, G. (2010). Volatility spillover and time-varying conditional correlation between the European and US stock markets. *Global Economy and Finance Journal, 3*(2), 148–164.

Zawya. (2015). *Global Islamic asset management outlook 2015*. Dubai, United Arab Emirates: Thomson Reuters Zawya.