An Empirical Examination of the Dynamic Linkages of Faith-Based Socially Responsible Investing

AKASH DANIA AND D.K. MALHOTRA

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AKASH DANIA
is an assistant professor of finance at Alcorn State University's School of Business in Alcorn State, MS.
adania@alcorn.edu

D.K. MALHOTRA
is a professor of finance at Philadelphia University's School of Business Administration in Philadelphia, PA.
malhotrad@philau.edu

Among the fundamental tenets of a generally accepted investment management process is the construction of an efficient frontier, which aims to maximize wealth for a given level of risk (Bodie et al. [2010]; Drake and Fabozzi [2010]).[1] Not all investment processes follow this rule, however, and socially responsible investing (SRI) is one exception to this rule. Created during the early 1990s, SRI includes investors' concern with the ethical, moral, social, or environmental consequences of their investment decisions, besides being focused on financial returns (Basso and Funari [2003]; Boutin-Dufresne and Savaria [2004]; Robson and Wakefield [2007]).

At the beginning of 2010, professionally managed assets following SRI strategies stood at $3.07 trillion, a rise of more than 380% since 1995. In the same time period, a broader universe of conventional assets under professional management increased by only 260%, from $7 trillion to $25.2 trillion. Similarly, between 2007 and 2010, as the overall universe of conventional professionally managed assets remained flat, SRI-based assets grew considerably (Social Investment Forum [2010]). Clearly, investors who seek to align their investment strategies with their principles are rapidly increasing in number.

Research on SRI as an investment strategy can be broadly classified into areas of investment screening, shareholder advocacy, community investing, and social venture investing (Harrington [2003]). We focus on investment screening, which involves the selection of investment opportunities that are based on faith or religious belief (Domini [2001]; Entine [2003]). Faith-based investing is a response to the attempts of institutions to promote religious, ethical, and social criteria in the selection and management of investment portfolios. Therefore, the construction of faith-based SRI portfolios includes investments that have been screened based on religious beliefs.

A good example of faith-based investing is Islamic finance, which began as a relatively modest endeavor in some Arab countries during the late 1970s. Islamic investing distinguishes itself from conventional investing in its apparent compliance with the principles of Islamic law, or sharia (El-Gamal [2006]). Additionally, faith-based investing advises screening before investing in businesses considered (Hasanuzzaman [1997]). The growth of faith-based SRI, such as Islamic investing, has been accelerating in terms of the number of countries in which it operates, monetary value, and product offerings. The surge in Islamic SRI has been possible due to major breakthroughs in religious rulings related to equity investments (Hussein [2004a, 2004b]; Hakim and Rashidian [2004]).

The body of knowledge related to the financial performance of faith-based investing

has been increasing, although scholarly studies are still scant. Hassan [2002] examined the market efficiency and time-varying risk of faith-based index funds. Hakim and Rashidian [2004] used the capital asset pricing model (CAPM) to examine faith-based compliant index correlation with the Dow Jones World Index (DJW) and Dow Jones Sustainability World Index (DJS). Hussein [2004a, 2004b], Hayat [2006], and Girard and Hassan [2005] also studied the performance of faith-based investing.

The purpose of this article is to investigate the extent to which the returns of Islamic index funds in four major global markets (i.e., North America, European Union, Far East, and Pacific Region) respond to their corresponding "conventional" market index funds. And if the Islamic funds do respond to the conventional market funds, are the responses homogenous for all the countries? Answers to these questions are important because the integration of financial markets implies the convergence of risk premiums across conventional global regional markets and Islamic index markets, which might play an important role in forecasting the returns of Islamic index funds. Our results have important implications for fund managers and policymakers of Islamic index funds who seek to reduce spillover effects, not to mention for investors in Islamic index funds.

This study differs from previous studies on faith-based SRI in several ways. First, because we examine the issue for four major markets, our study is comprehensive. For the sake of comparison, we include their corresponding conventional market index funds. Second, no prior study on faith-based SRI has examined the issue of volatility spillover effects originating from conventional market indexes and their corresponding faith-based SRI indexes. Our results present a strong case for generalizing the return behavior of faith-based SRI.

The rest of the article proceeds as follows. After summarizing previous studies, we describe our data and statistics. We then provide the details for the econometric methodology used in this study and discuss our empirical findings and results. The final section presents our conclusions.

LITERATURE REVIEW

Faith-based Islamic investments are created via adherence to sharia principles. This exclusionary process is referred to as qualitative screening. Islamic principles preclude investments in industries such as alcohol, pornography, gambling, and firms that engage in activities that involve interest-bearing debt obligations. The exclusion of interest-bearing issues creates complexity with respect to portfolio construction, as most firms either have cash reserves that are invested, in which case they earn interest, or use leverage, in which case they pay interest.

Islamic finance is based on a principle of shared risk and return in an asset-based system that is unlike the conventional interest-based system. This principle rejects the notion that fiat money has a time value and, consequently, that money (interest) may be earned from it. In such a financial system, all transactions are to be based on the exchange of commodities, goods, or services. To overcome this strict guidance, Islamic jurists have adopted the rule of necessity (the universe of equity securities to choose from would be too small if one were to exclude all companies that either pay or receive interest (El-Gamal [2006]). Under the rule of necessity, three faith-based screenings exclude certain categories of companies. This selective screening process, known as quantitative screening, excludes

- companies for which their accounts receivable constitute a major share of their total assets,
- companies that have too much debt, and
- companies that receive too much interest.[2]

In faith-based SRI as well as conventional market-based fund management, the choice of benchmark index is becoming increasingly important as the global economic structure evolves. Several mutual fund companies throughout the world now offer faith-based (Islamic) investment indexes that are designed to provide

- a relevant benchmark for the Islamic investment community that reflects sharia investment principles while retaining the reliability characteristic for global investors (qualitative screening criteria),
- an investment process that follows the financial ratio screens consistent with sharia principles (quantitative screening criteria), and
- a faith-based consistency characteristic that can be maintained across markets and time.

Mutual fund companies either create their own screening rules or obtain licenses, which they use as a benchmark to form products that are in compliance with religious guidelines.

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Given the recent availability of data on faith-based Islamic SRI, a number of studies on the performance of Islamic investing have been conducted. Evidence from these studies has been mixed, suggesting that faith-based Islamic SRI index funds neither outperform nor underperform their counterpart conventional market index funds. For example, Al-Zoubi and Maghyereh [2007] compared the risk performance of the Dow Jones Islamic Market Index (DJIM) with the DJW and found that the DJIM outperformed the DJW in terms of risk. They also found that the value at risk (VaR) was greater for the DJW than the DJIM. They attributed this result to the profit-and-loss sharing principle of Islamic finance, whereby banks share the profits and bear the losses (*mudarabah*) or share both profits and losses (*musharaka*) with the firm.

In a similar study, Alam and Rajjaque [2010] analyzed whether sharia-compliant equities performed better than non-screened market equities. They found that the portfolio of sharia-compliant equities outperformed the portfolio of non-screened market equities, but the sharia-compliant portfolio slightly underperformed when there was an upward growth trend in the economy. Hussein [2005] compared the DJIM and the FTSE Global Islamic Index to their conventional counterparts, namely, the DJW and the FTSE All-World Index. The study concluded that Islamic indexes are not adversely affected by the application of a sharia screening process. Similarly, Hayat [2006] compared the performance of 59 Islamic Equity Funds (IEFs) relative to conventional equity funds for the 2001–2006 period. The research concluded that under normal market conditions, there was no significant difference between the performance of the IEFs and conventional benchmarks. However, the study did indicate some evidence of conventional funds outperforming the IEFs in 2002.

Hakim and Rashidian [2004] also compared the performance of the DJIM and Dow Jones Wilshire 5000 Index (conventional counterpart). The DJIM was found to have a slightly better risk attribute (standard deviation of 22%) than that of the Wilshire 5000 (standard deviation of 24%). The study also reported competitive risk performance by the DJIM; the Wilshire 5000 exhibited diversified risk (measured by the Sharpe ratio) that was 64% higher during the sample period. Girard and Hassan [2005] examined the DJIM relative to seven counterpart indexes and concluded that it outperformed the conventional sample indexes for most of the 1996–2000 period and underperformed them during the 2001–2005 period.

Using industry type, size, and economic conditions as control variables, Hussein and Omran [2005] examined whether the returns from Islamic indexes differed from those of conventional indexes. Results from their study, for the period from 1996–2003, suggest that Islamic indexes provided investors with positive abnormal returns during bull market periods, but they underperformed their index counterparts during bear market periods. The study also suggests that positive abnormal returns by Islamic indexes were due to investments in basic materials, consumer cyclicals, industrial and telecommunication industries, and small firms.

Given the mixed evidence on the performance faith-based index funds, we extend the literature by investigating the dynamic linkages of the returns of faith-based Islamic index funds to conventional market index funds.

DATA

We use daily data from the MSCI Barra database for the July 2007–September 2010 period. Morgan Stanley, a global financial services firm, maintains the MSCI Barra database. Using the MSCI global Islamic indexes has several key benefits. First, the database uses a standard set of quantitative and qualitative screening across all global faith-based Islamic index funds, thus eliminating any calculation bias. Second, the MSCI Islamic indexes are more relevant as a proxy for a faith-based Islamic fund index because they incorporate a dividend adjustment factor to adjust for any non-sharia-compliant income.

As a proxy for the faith-based global Islamic SRI funds, we include funds based on investments in North America, European Union, Far East, and Pacific Region. For comparison purposes and to assess the dependence of these sample faith-based SRI funds, we also include conventional market index funds for the sample regions. To eliminate the local currency effect, all performance data are in U.S. dollars. We compute the continuously compounded returns for all the indexes in our sample.

Exhibit 1 reports the descriptive statistics for the variables used for this study and shows that the mean returns for all the index funds in the sample have negative returns. The negative average returns may be attributed to the weak performance of financial markets following the 2007 U.S. subprime mortgage financial crisis, which spread to global financial markets. The

faith-based Islamic index funds have lower negative mean returns than their corresponding conventional market index funds, however. Furthermore, except for the Far East, faith-based Islamic index funds for all other sample regions have a lower standard deviation.

In the case of Islamic index funds, only the European Union and North America report a positive skewness, whereas for conventional market funds, the European Union and the Far East report a positive skewness. The presence of positive (negative) skewness indicates a distribution with an asymmetric tail that extends toward more positive (negative) values. A large kurtosis figure (>3) is also observed in our sample, which indicates a relatively peaked distribution. Presence of skewness and kurtosis characteristics in our sample data further motivates the use of a time-series methodology for analysis.

Exhibit 2 reports the coefficient of correlation among the variables of interest. The level of correlation between sample faith-based Islamic index fund returns and conventional market index fund returns is varying. For instance, the European Union Islamic index fund has a high correlation with the conventional European Union market index fund but a low correlation with the conventional Far East, North American, and Pacific Region market index funds. Similarly, the European Union Islamic index fund has a low correlation with the other Islamic index funds in our sample. These varying figures seem consistent with our earlier discussion concerning inherent comparative differences between these different regional groups. However, we still need to investigate dynamic linkages between the faith-based Islamic index fund returns and their corresponding conventional market index returns.

Panels A, B, C, and D of Exhibit 3 show the conditional variance graphs for the faith-based Islamic index returns (for North America, Far East, Pacific Region, and European Union) and their corresponding conventional market index returns (for North America, Far East, Pacific Region, and European Union). All sample index funds display marked volatility during the middle

EXHIBIT 1
Descriptive Statistics

This exhibit reports descriptive statistics for the Islamic index funds, European Union (ISEU), Far East (ISFE), North America (ISNA), and Pacific Region (ISPA), and the conventional index funds, European Union (STEU), Far East (STFE), North America (STNA), and Pacific Region (STPA).

	ISEU	ISFE	ISNA	ISPA	STEU	STFE	STNA	STPA
Mean	–0.0002	–0.0002	–0.0001	–0.0001	–0.0004	–0.0003	–0.0002	–0.0002
Median	0.0001	–0.0001	0.0006	0.0005	0.0000	0.0001	0.0005	0.0007
Maximum	0.1210	0.1058	0.1169	0.1008	0.1129	0.1094	0.1099	0.1033
Minimum	–0.0922	–0.0897	–0.0945	–0.0955	–0.0968	–0.0856	–0.0907	–0.0877
Std. Dev.	0.0197	0.0174	0.0171	0.0178	0.0204	0.0170	0.0183	0.0172
Skewness	0.4037	–0.0406	0.0756	–0.2174	0.2892	0.0601	–0.0437	–0.1225
Kurtosis	9.3458	7.1772	10.4171	7.1201	8.1118	7.5618	8.8469	7.2357

EXHIBIT 2
Coefficient of Correlations among Variables of Interest

This exhibit reports the coefficient of correlations among variables of interest for the Islamic index funds, European Union (ISEU), Far East (ISFE), North America (ISNA), and Pacific Region (ISPA), and the conventional index funds, European Union (STEU), Far East (STFE), North America (STNA), and Pacific Region (STPA).

	ISEU	ISFE	ISNA	ISPA	STEU	STFE	STNA	STPA
ISEU	1.0000	0.2878	0.3051	0.4087	0.9801	0.2818	0.3101	0.4087
ISFE	0.2878	1.0000	0.5444	0.9705	0.2928	0.9843	0.5652	0.9613
ISNA	0.3051	0.5444	1.0000	0.6088	0.2915	0.5471	0.9765	0.5948
ISPA	0.4087	0.9705	0.6088	1.0000	0.4111	0.9581	0.6246	0.9858
STEU	0.9801	0.2928	0.2915	0.4111	1.0000	0.2896	0.3101	0.4176
STFE	0.2818	0.9843	0.5471	0.9581	0.2896	1.0000	0.5718	0.9741
STNA	0.3101	0.5652	0.9765	0.6246	0.3101	0.5718	1.0000	0.6218
STPA	0.4087	0.9613	0.5948	0.9858	0.4176	0.9741	0.6218	1.0000

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part of the sample period. This finding is consistent with the extreme volatility observed in global financial markets around 2007, following the U.S. subprime mortgage financial crisis. Given the observations of similar regimes of volatility, it is important to test for stationary characteristics in the sample series and apply appropriate time-series analysis for any meaningful interpretation of results.

METHODOLOGY

Because the sample of faith-based Islamic index fund returns and corresponding conventional market index returns may act as a system, we choose the VaR model developed by Sims [1980] as an appropriate econometric approach to investigate the postulated relationships between Islamic index fund returns (related to the markets of North America, Far East, European Union,

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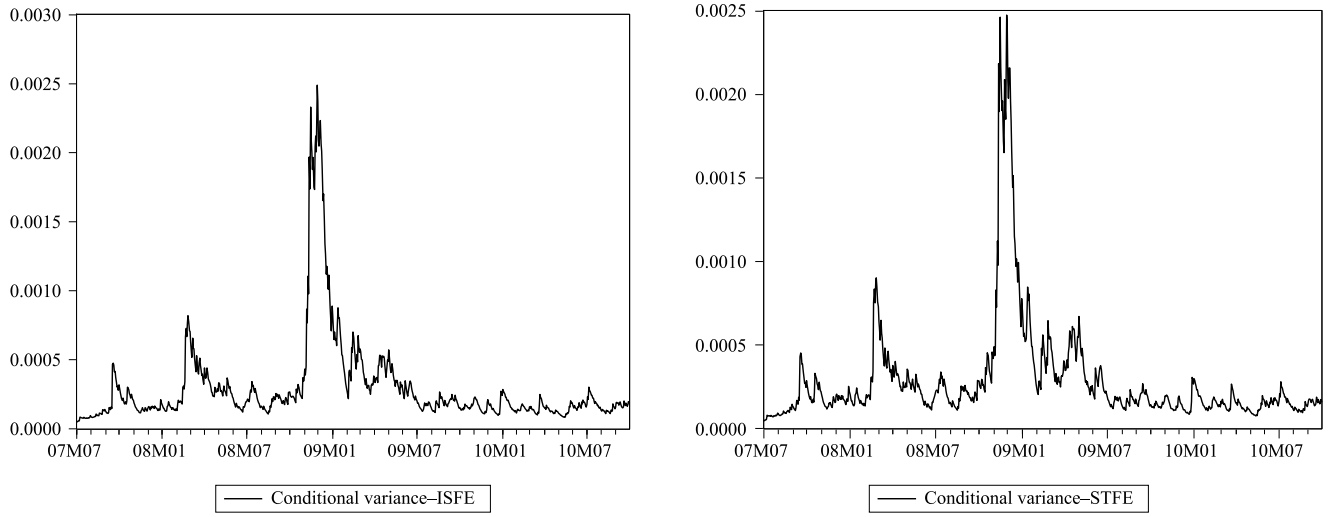
EXHIBIT 3
Conditional Variance Graphs

Panel A: Conditional variance graphs for ISFE (Islamic index–Far East) and STFE (conventional index–Far East)



Panel B: Conditional variance graph for ISNA (Islamic index–North America) and STNA (conventional index–North America)

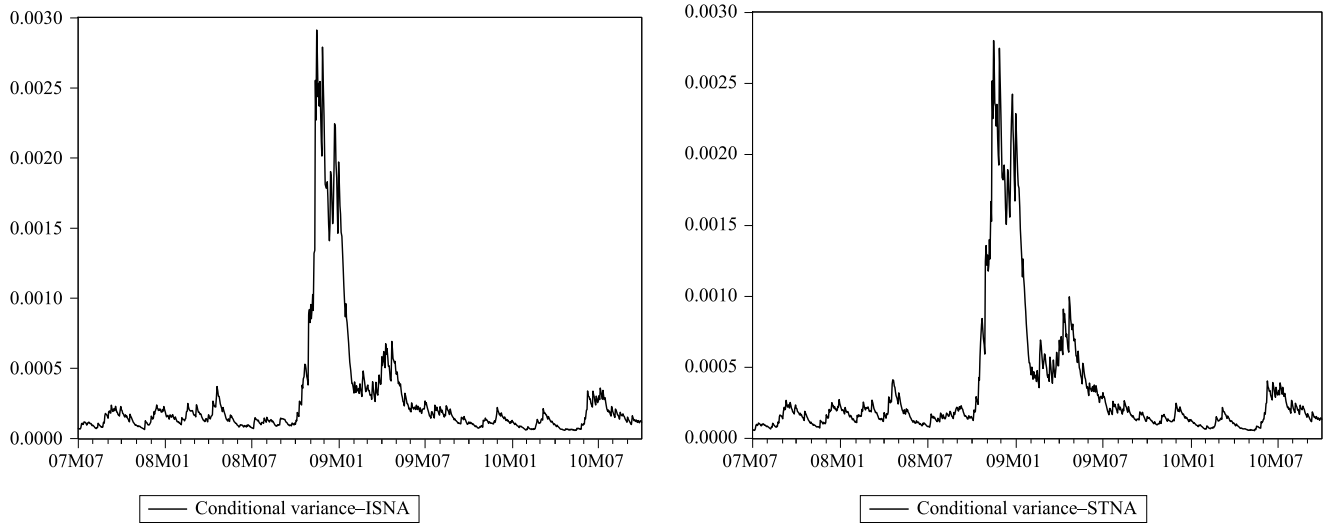
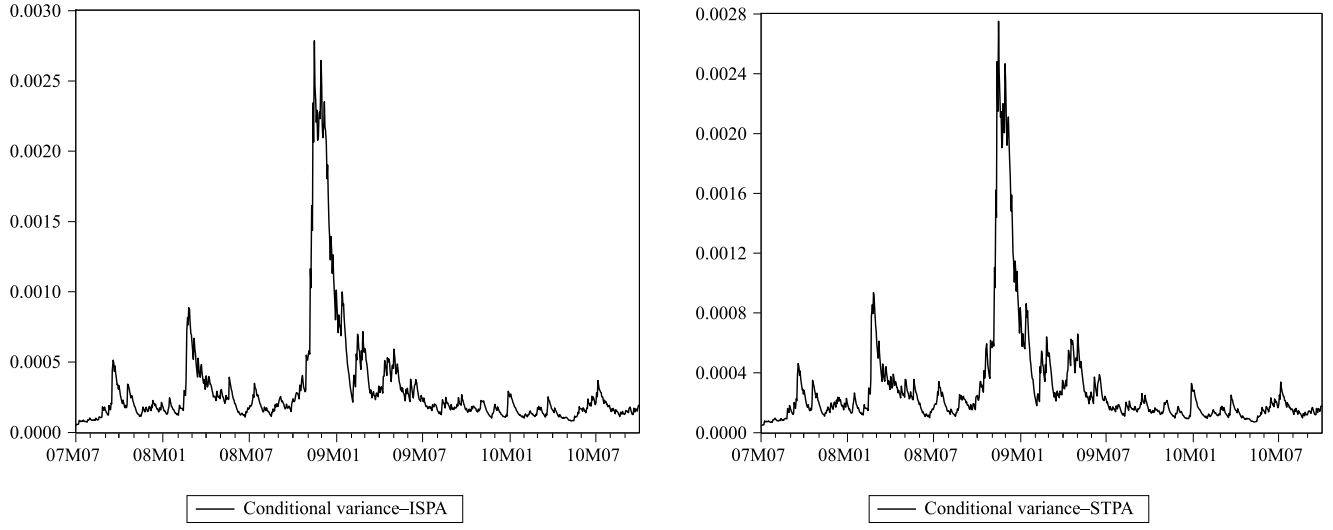
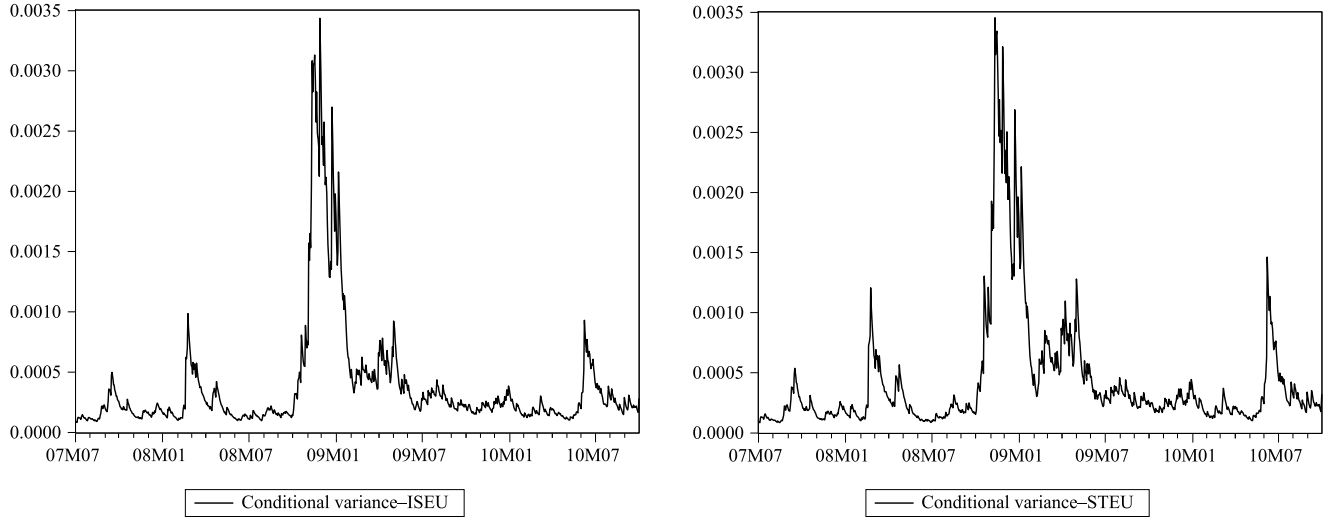


EXHIBIT 3 (*Continued*)

Panel C: Conditional variance graph for ISPA (Islamic index–Pacific Region) and STPA (conventional index–Pacific Region)



Panel D: Conditional variance graph for ISEU (Islamic index–European Union) and STEU (conventional index–European Union)



and Pacific Region) and their corresponding conventional market index fund returns. The requirement for structural modeling is sidestepped by VaR methodology, as it treats each endogenous variable in the system as a function of the lagged values of all of the endogenous variables included in the system. We specify four separate VaR systems that comprise individual conventional market index fund returns with all Islamic index fund returns.

The VaR model can be expressed as follows:[3]

$$\gamma_t = A_1\gamma_{t-1} + A_2\gamma_{t-2} + A_3\gamma_{t-3} + Bx_t + \varepsilon_t \qquad (1)$$

where γ_t is a k vector of endogenous variables, x_t is a d vector of exogenous variables, A_1, …, A_p and B are matrixes of coefficients to be estimated, and ε is a vector of innovations that may be contemporaneously correlated but are uncorrelated with their own lagged values

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and with all of the right-hand side variables. Because only lagged values of the endogenous variables appear on the right-hand side of the equation simultaneity is not a concern and ordinary least squares (OLS) yields consistent estimates.

A primary tool of VaR analysis is the impulse-response function (IRF), which simulates the effects of a shock to one variable in the system on the conditional forecast of another variable. The IRF analysis is used in dynamic models such as a Vector autoregression (VAR)model to describe the impact of an exogenous shock (innovation) in one variable on the other variables of the system. In order to minimize the problems of misspecifications that result from the sensitivity of variable ordering in the Choleski factorization of VaR innovations, we use generalized impulse methodology as described by Pesaran and Shin [1996]. The main benefit of this approach is that an orthogonal set of innovations does not depend on the VaR ordering.

To test for the volatility spillover effect, we utilize a generalized autoregressive conditional heteroskedasticity (GARCH) approach. GARCH modeling enables estimation of the variance of the sample series at a particular point of time. GARCH is parsimonious and avoids overfitting, which consequently is less likely to violate conditions of non-negativity (Enders [2003]). We use a GARCH (1,1) model to test for the volatility spillover effect. A GARCH (1,1) allows the conditional variance to be dependent not only on its past conditional variance, but also on past innovations. Equations (2) and (3) provide basic GARCH (1,1) specification.

$$\gamma_t = c + \tau\, \gamma_{t-1} + \varepsilon_t,\ \varepsilon_t \sim N(0, \sigma_t^2) \tag{2}$$

$$h_t = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \beta_1 h_{t-1} \tag{3}$$

Equation (2) is the mean equation, and Equation (3) is the conditional variance equation; γ_t is the return on the faith-based Islamic fund index of interest; c is the intercept; γ_{t-1} is the previous period return of the same Islamic index; ε_t is the white noise error term; and h_t is the conditional variance. Equation (3) provides the basic volatility model that captures heteroskedasticity in the Islamic index fund of interest. To integrate the spillover effect from the conventional market index fund, its extracted residuals are included as regressors in the volatility equation. Therefore, the specification for the GARCH (1,1) spillover equation can be expressed as

$$h_{t(Spillover)} = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \beta_1 h_{t-1} + \psi \xi_{t-1}^2 \tag{4}$$

where $\alpha_0 > 0$, $\beta_1 \geq 0$, and $\alpha_1 \geq 0$. ε_{t-1}^2 is the lagged squared shock of the Islamic index fund of interest and provides the news about volatility from the previous period. It is measured as the lag of the squared residual from the mean equation, and ξ_{t-1}^2 is the lagged squared shock extracted from the returns of the conventional market index fund. The coefficient ψ represents the volatility spillover coefficient and measures the extent and behavior of the volatility spillover effect (from the conventional market index fund to the faith-based Islamic index fund of interest).

Despite the obvious success of ARCH and GARCH parameterization, these models do not capture the asymmetric news effect discovered by Black [1976]; Nelson [1991]; Engle and Ng [1993]; and Glosten, Jaganathan, and Runkle [1993]. The asymmetric or leverage effect reflects the pragmatic fact that downward movements in market returns are followed by higher volatilities than upward movements of the same magnitude. Statistically, the leverage effect occurs when an unexpected drop in market returns (bad news) increases observed volatility more than an unexpected increase in market returns (good news).

To overcome this shortcoming, we use a threshold-GARCH (TARCH) approach, as the model captures the leverage effect in quadratic form. The specification for a TARCH (1,1) is as follows:

$$\gamma_t = c + \tau\, \gamma_{t-1} + \varepsilon_t \tag{5}$$

$$h_t = \alpha_0 + \beta_1 h_{t-1} + \alpha_1 \varepsilon_{t-1}^2 + \alpha_2 \varepsilon_{t-1}^2 d_{t-1} \tag{6}$$

where ε_{t-1}^2 is the lagged square residual of the faith-based Islamic index market return of interest and d_t is the dummy variable; $d_t = 1$ if $\varepsilon_{t-1} < 0$ (bad news) and $d_t = 0$ if $\varepsilon_{t-1} > 0$ (good news); α_2 is the coefficient that takes the leverage effect into consideration. If α_2 is positive, it implies that there will be a higher increase in volatility because of a negative shock or bad news if a positive shock had occurred. Similarly, if α_2 is negative, the volatility will increase more with a positive shock than with a negative shock.

To capture the spillover effect from the conventional market index to the returns of the corresponding faith-based Islamic index fund by using a TARCH

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model, the conditional volatility equation takes the following form:

$$h_t = \alpha_0 + \beta_1 h_{t-1} + \alpha_1 \varepsilon_{t-1}^2 + \alpha_2 \varepsilon_{t-1}^2 d_{t-1} + \psi_1 \xi_{t-1}^2 + \psi_2 \xi_{t-1}^2 d_{t-1} \quad (7)$$

where ξ_{t-1}^2 is the lagged squared residual from the conventional market index return and ψ_2 captures the leverage effect on the volatility of the faith-based Islamic index of interest. If it is positive, then a large positive shock in the conventional index will result in a larger observed volatility in returns of the faith-based Islamic index of interest.

EMPIRICAL RESULTS

Spurious relation can be a serious issue in standard inference procedures, which may contain an integrated dependent variable or integrated regressors. Therefore, it is important to check the stationarity of a series to determine whether to use a standard VaR or an error-corrected VAR methodology. The formal method to test the stationarity of a series is the unit root test. We therefore evaluate the time-series properties of each variable by performing unit root tests using the augmented Dickey–Fuller (ADF) and Phillips–Perron tests (Dickey and Fuller [1979, 1981]; Phillips and Perron [1988]). Exhibit 4 displays our results. Based on the consistent and asymptotically efficient Aikaike information criterion (AIC) and Schwarz information criterion (SIC) (Diebold [2003]), the appropriate number of lags is determined to be two. In the case of the ADF and Phillips–Perron tests, the null hypothesis of non-stationarity is rejected. The inclusion of drift/trend terms in the ADF test equations also does not change these results.

To analyze the effects of conventional global market returns on sample faith-based Islamic index fund returns of North America (ISNA) and the European Union (ISEU), Far East (ISFE), and Pacific nations (ISPA), we categorize (as specified in the methodology section) the responses based on each conventional market index, thereby creating a separate system for North America (STNA), European Union (STEU), Far East (STFE), and Pacific (STPA) Region. Based on AIC and SIC criteria, we analyze the VaR models with two lags.

Exhibit 5 plots the impulse responses of the sample faith-based Islamic index returns to a one-time standard deviation increase in conventional European Union market index returns (STEU). The effects of STEU returns are observed to be positive and significant on all Islamic index fund returns. The response of ISNA and ISPA are positive and significant for the first two periods and then become insignificant. The response of ISEU is positive and significant for the first period and then becomes insignificant. Interestingly, the response of ISFE is positive and significant for the first two time periods, then becomes insignificant, and is again significant briefly during the sixth time period.

Exhibit 6 plots the impulse responses of the sample Islamic index returns to a one-time standard deviation increase in conventional North American index returns (STNA). The effects of STNA returns are also positive and significant on all Islamic index markets in our sample. The responses of ISNA and ISEU are positive and significant for the first period and then become insignificant. The response of ISFE is positive and significant for two time periods and then becomes insignificant, and the response of ISPA is positive and significant for the first time period, insignificant in the second time period, and again briefly positive and significant in the third time period.

Exhibit 7 plots the impulse responses of the sample Islamic index returns to a one-time standard deviation increase in conventional Far East index returns (STFE).

EXHIBIT 4
Unit Root Test Results

This exhibit reports unit root test results for variables of interest for the Islamic index funds, European Union (ISEU), Far East (ISFE), North America (ISNA), and Pacific Region (ISPA), and the conventional index funds, European Union (STEU), Far East (STFE), North America (STNA), and Pacific Region (STPA).

	ADF		PP	
	Level	1st Diff	Level	1st Diff
ISEU	–13.8866	–15.8068	–30.7325	–241.5613
ISNA	–24.8000	–16.6150	–33.3374	–463.1019
ISFE	–24.2295	–14.0375	–33.2519	–311.7189
ISPA	–30.7749	–13.8963	–30.8982	–289.5773
STEU	–29.8397	–13.8241	–29.9814	–250.9236
STNA	–23.9722	–16.7081	–33.0192	–352.1164
STFE	–24.1582	–14.0412	–33.0757	–827.9852
STPA	–30.7510	–15.9319	–30.8735	–525.0693
1% Critical Value		–3.437874		–3.4624
5% Critical Value		–2.864751		–2.8755
10% Critical Value		–2.568534		–2.5743

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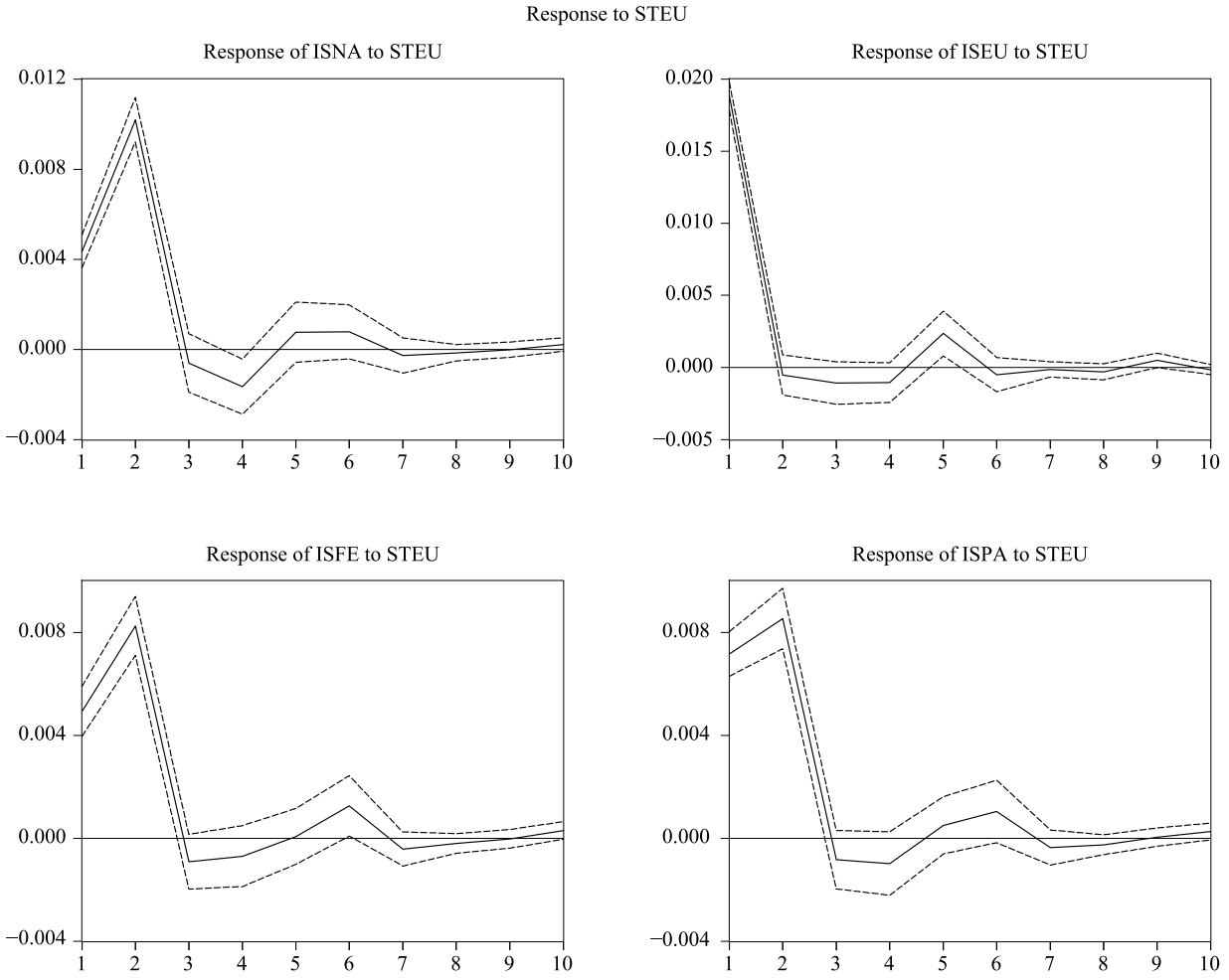
EXHIBIT 5

Impulse Response of Islamic Index Fund Returns (ISNA, ISEU, ISFE, and ISPA) to Conventional European Union Index Fund (STEU) Returns



Notes: The dashed lines on each graph represent the upper and lower 95% confidence bands. When the upper and lower bounds carry the same sign, the response becomes statistically significant.

The response of ISNA is positive and significant for the first two time periods and then becomes insignificant. Similarly, the impact on STFE is observed to be positive and significant for the first time period. The impact on ISFE and ISPA is positive and significant for the first time period, and then the response is negative and significant in the second time period. The negative response indicates that as the conventional Far East market index fund increases, the faith-based Islamic funds for the Far East and Pacific Region then decrease in the second time period.

Exhibit 8 plots the impulse responses of the sample Islamic index returns to a one-time standard deviation increase in conventional Pacific Region market index fund returns (STPA). The response is positive and significant in the first period for ISEU, ISFE, and ISPA and then becomes insignificant. The impact of STPA is positive and significant for the first two periods and then becomes insignificant for the case of ISNA.

We now turn to using the GARCH approach to investigate evidence of volatility spillover from conventional market index fund returns to the sampled faith-based Islamic index fund returns. In order to achieve

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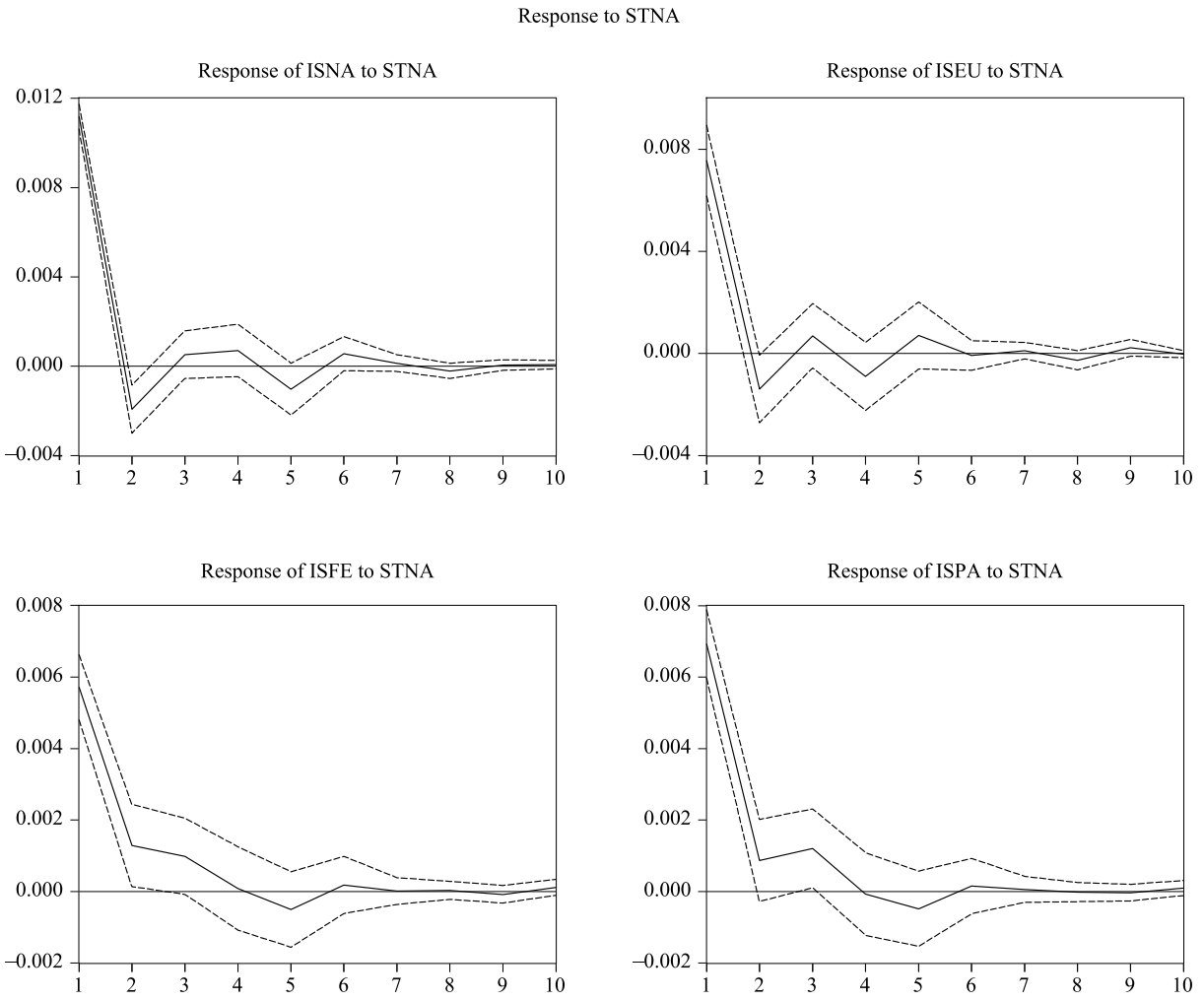
EXHIBIT 6

Impulse Response of Islamic Index Fund Returns (ISNA, ISEU, ISFE, and ISPA) to Conventional North American Index (STNA) Returns



Notes: The dashed lines on each graph represent the upper and lower 95% confidence bands. When the upper and lower bounds carry the same sign, the response becomes statistically significant.

this, we estimate a GARCH (1,1) on individual conventional market index returns and extract the residuals to introduce a variance equation of their corresponding faith-based Islamic index return series. From the basic GARCH model, we observe that both GARCH terms, β, and the ARCH term, α, are significant for all series. Further, $\alpha + \beta$ is very close to 1 in all series, which indicates that the volatility shocks in these series are persistent.[4]

Furthermore, we estimate the GARCH model by introducing the residuals from conventional market index returns in the variance equation of their corresponding sample Islamic index returns series. Exhibit 9 reports the estimation results for the volatility analysis.

Ψ represents the volatility spillover coefficient. As Exhibit 9 shows, the α_1 and β coefficients are significant for all series except for the Far East market index, which indicates evidence of an ARCH and a GARCH structure in the returns of the North American, European Union, and Pacific Region indexes.

It is interesting to note that the α coefficient is negative for the faith-based Islamic index funds of North America and the Pacific Region when innovations from

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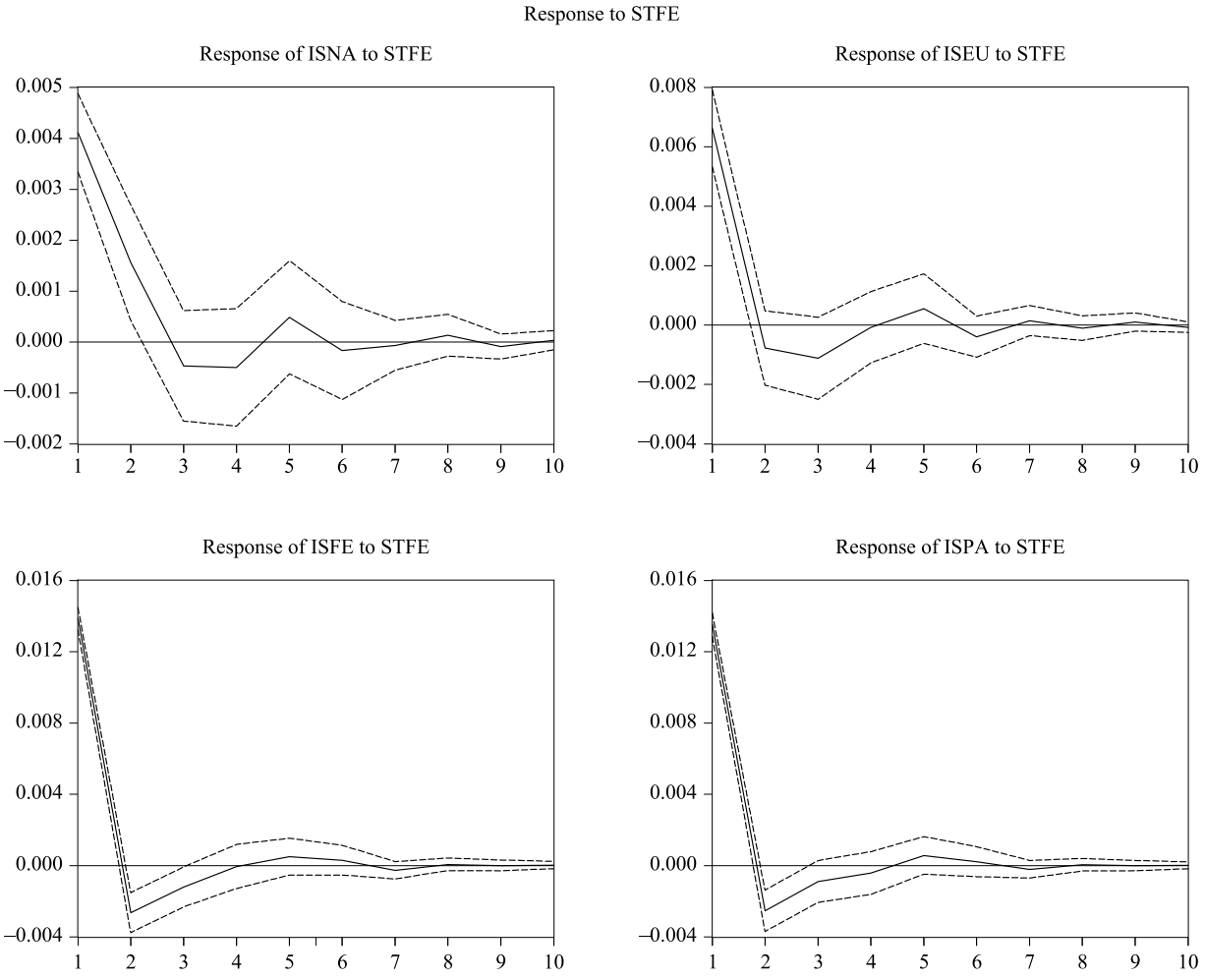
EXHIBIT 7

Impulse Response of Islamic Index Fund Returns (ISNA, ISEU, ISFE, and ISPA) to Conventional Far East Index (STFE) Returns



Notes: The dashed lines on each graph represent the upper and lower 95% confidence bands. When the upper and lower bounds carry the same sign, the response becomes statistically significant.

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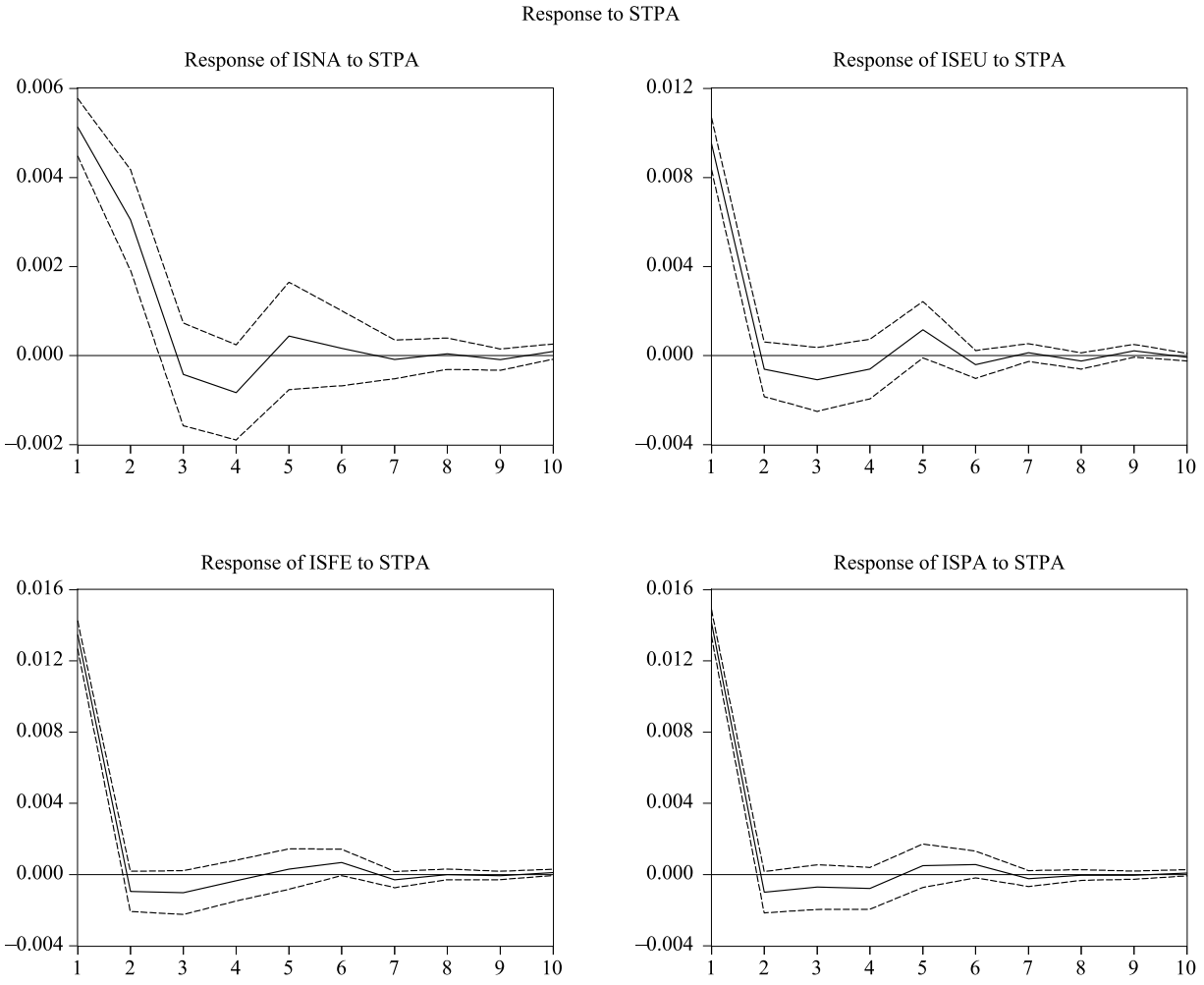
their corresponding conventional indexes are incorporated in the equation. The negative sign is an indication that volatility in these two fund returns increases when past innovations are negative. All other α coefficients that are significant in the series are observed to be positive. Ψ is positive and significant for the faith-based Islamic indexes of North America and the European Union, Far East, and Pacific Region, which indicates evidence of volatility spillover from their corresponding conventional index returns. Furthermore, the positive sign also indicates that the shocks originating in conventional market index fund returns increase the volatility of returns in their corresponding faith-based Islamic index.

Exhibit 10 reports the estimates for the TARCH model. This model not only investigates whether the effect of the shock from the faith-based Islamic index's own return, as measured by α_2, is asymmetric, but also provides information on whether the effects of shocks from the corresponding conventional market index, as measured by ψ_2 , are asymmetric. Coefficient ψ_1 provides information about the spillover effect from conventional market index returns, and ψ_2 captures the

EXHIBIT 8

Impulse Response of Islamic Index Fund Returns (ISNA, ISEU, ISFE, and ISPA) to Conventional Pacific Region Index (STPA) Returns



Notes: The dashed lines on each graph represent the upper and lower 95% confidence bands. When the upper and lower bounds carry the same sign, the response becomes statistically significant.

asymmetric effect. A statistically significant α_2 indicates that the effects from the returns of the faith-based Islamic index's own shock are asymmetric, and α_2 is positive and significant for all faith-based Islamic index funds in North America, European Union, Far East, and Pacific Region. Thus, volatility tends to increase more asymmetrically in response to its own shock.

Having established the spillover effect, we are now interested in confirming the differential news effect, or the ψ_2 coefficient. We observe a positive and significant ψ_2 for the faith-based Islamic indexes of North America, European Union, Far East, and Pacific Region. This confirms the differential or leverage effect of the volatility spillover from conventional market index returns on the conditional variance of the corresponding faith-based Islamic index fund returns. These results indicate that when there is bad news (a negative shock) in, for example, the conventional market index of North America, the volatility of returns in the corresponding faith-based Islamic index of North America is likely to be more than what it would have been compared with positive news of the same magnitude in the conventional North American market index series.

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EXHIBIT 9
Spillover Effects

This exhibit reports spillover results for variables of interest for the Islamic index funds, European Union (ISEU), Far East (ISFE), North America (ISNA), and Pacific Region (ISPA), and the conventional index funds, European Union (STEU), Far East (STFE), North America (STNA), and Pacific Region (STPA).

Coefficient	STNA/ISNA	STEU/ISEU	STFE/ISFE	STPA/ISPA
C	–0.0007***	0.0006***	0.0010	0.0004
α_0	0.0000***	0.0000***	0.0000***	0.0000**
α_1	–0.0963***	0.0180*	0.0002	–0.1128***
β	0.2927***	–0.0166**	0.0000	0.4670***
Ψ	0.4589***	0.8707***	1.0120***	0.4899***

*Note: This exhibit reports the results of the volatility spillover equation; *, **, *** denote significance at 10%, 5%, and 1%, respectively.*

EXHIBIT 10
News Effect Results

This exhibit reports the news effect results for variables of interest for the Islamic index funds, European Union (ISEU), Far East (ISFE), North America (ISNA), and Pacific Region (ISPA), and the conventional index funds, European Union (STEU), Far East (STFE), North America (STNA), and Pacific Region (STPA).

Coefficient	STNA/ISNA	STEU/ISEU	STFE/ISFE	STPA/ISPA
C	0.0025***	0.0028***	0.0016**	0.0040***
α_0	0.0001***	0.0001***	0.0001***	0.0001***
β	0.0503	–0.0185**	–0.0360	–0.0294
α_1	0.0049	0.0106	–0.0245	–0.0628
α_2	0.4123***	0.0349**	0.4687***	0.2866***
Ψ_1	–0.0001***	–0.0001***	–0.0001***	–0.0001***
Ψ_2	0.1389***	0.5338***	0.2360***	0.4106***

*Note: This exhibit reports the results of the volatility spillover equation; *, **, *** denote significance at 10%, 5%, and 1%, respectively.*

SUMMARY AND CONCLUSIONS

Faith-based investment alternatives (Islamic investable funds) that are in compliance with Islamic law are relatively new. The number of Islamic investable funds has grown in terms of the number of countries in which they operate as well as the nature of investable alternatives. The purpose of this article is to extend our understanding of the nature of integration and volatility transmission dynamics between Islamic indexes and their corresponding nonrestrictive indexes.

We analyze the issue of volatility transmission between the two categories of indexes by using vector autoregression and GARCH and TARCH methodologies on four global Islamic indexes and their corresponding conventional indexes. Our results indicate that conventional index returns have a significant and positive impact on their corresponding Islamic index returns. On the nature of volatility spillover, we find evidence of a positive and significant volatility spillover from the nonrestrictive index on the corresponding Islamic index returns for all sample markets (i.e., North America, European Union, Far East, and Pacific Region). The positive sign also indicates that return shocks originating in the nonrestrictive index increase volatility among the returns of the Islamic index returns. We also find evidence of asymmetric volatility transmission in all the corresponding markets.

These results have important implications for both investors and policymakers. The time-series evidence suggests: 1) the Islamic fund returns are dependent on global conventional funds; and, 2) there is a strong evidence of correlation between the two indexes. The results can be attributed to the nature of global markets on the path of convergence.

ENDNOTES

[1]In his seminal article that became the basis for portfolio selection, Markowitz [1952] emphasizes that the "investor does (or should) maximize the discounted (or capitalized) value of future returns."

[2]After experimentation with different cutoff marks for financial ratios, the Dow Jones Islamic Market Index is now the globally accepted standard, excluding companies whose accounts receivable are more than 45% of assets and companies whose debt to moving average of market capitalization exceeds 33%. Generally a third rule related to the first excludes companies whose interest income exceeds 5% (or, for some, 10%) of total income.

[3]EViews 7.0 User's Guide.

[4]Basic GARCH(1,1) results are not reported in a table because we focus on the spillover effect, but they are available on request.

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