Online Appendix A

A.1. Stochastic Volatility Model

The trading model in Fleming et al. (1998) assumes that the daily information flow is stochastic. It is proportional to the variance of daily returns and thus generates volatility. In that model, the unpredictable component of returns is due to the arrival of new information. Specifically, let $R_{k,t}$ be the return and $\mu_{k,t}$ be the conditional expected return for asset class *k* on day *t*. We assume that asset class *k* is affected by $I_{k,t}$ information events during day *t*. Let $\varepsilon_{ik,t}$ be the day *t* shock to the return of asset *k*, due to event *i (i=1… $I_{k,t}$)*. We assume the shocks to be i.i.d. normally distributed: $\varepsilon_{ik,t} \sim N(0,\sigma^2_{\varepsilon,k})$, and write the daily return as the sum between the expected and unexpected components:

$$R_{k,t} = \mu_{k,t} + \sum_{i=1}^{I_{k,t}} \varepsilon_{ik,t} \ . \tag{1}$$

The latter component of returns is composed of all the intra-daily shocks that are due to the arrival of new information. Daily returns are thus the sum of incremental intra-daily returns associated with news events. Eq. (1) can be rewritten as:

$$R_{k,t} = \mu_{k,t} + \sigma_{\epsilon,k}\sqrt{I_{k,t}}z_{k,t} \ , \tag{2}$$

where: $$z_{k,t} = \frac{1}{\sqrt{I_{k,t}}}\sum_{i=1}^{I_{k,t}}\left(\frac{\varepsilon_{ik,t}}{\sigma_{\varepsilon,k}}\right) \xrightarrow[I_{k,t}\to\infty]{} N(0,1) \ . \tag{3}$$

The result in (3) is obtained using the Central Limit Theorem. Eqs. (2) and (3) imply that the conditional distribution of $R_{k,t}$ should be approximately $N(\mu_{k,t}, \sigma^2_{\varepsilon,k}I_{k,t})$. This tells us that $Var(R_{k,t}) \propto I_{k,t}$. More precisely:

$$\sigma\left(R_{k,t}\right) = \sigma_{\epsilon,k}\sqrt{I_{k,t}}. \tag{4}$$

Eq. (4) shows the actual link between information flow and volatility: volatility of asset class *k* is stochastic and depends on the information occurring during day *t*.

Using the usual notation from the literature, let $h_{k,t} = \ln(\sigma_{\varepsilon,k}^2 I_{k,t})$ be the log daily variance following an *AR(1)* specification:

$$h_{k,t} = \phi_{k,0} + \phi_{k,1} h_{k,t-1} + u_{k,t} \,, \tag{5}$$

where $u_{k,t}$ are i.i.d. shocks to volatility, with mean zero and variance equal to $\sigma_{u,k}^2$, and independent of $z_{k,t}$. We assume that $|\phi_{k,1}| < 1$, for the variance process to be stationary. Eqs. (2) and (5) imply that the day t returns for asset class k are generated by the joint stochastic process:

$$\begin{cases} R_{k,t} = \mu_{k,t} + \sigma_{\epsilon,k}\sqrt{I_{k,t}} z_{k,t} = \mu_{k,t} + (\exp(h_{k,t}))^{1/2} z_{k,t} \\ h_{k,t} = \phi_{k,0} + \phi_{k,1} h_{k,t-1} + u_{k,t} \end{cases} . \tag{6}$$

A.2. Moment Restrictions

We now focus on the unexpected component of returns:

$$r_{k,t} = R_{k,t} - \mu_{k,t}, \tag{7}$$

which is a stationary process (being the product of two stationary processes). Substituting Eq. (7) into system (6) gives: $r_{k,t} = (\exp(h_{k,t}))^{1/2} z_{k,t}$, (8)

or equivalently: $ln({r_{k,t}}^2) = h_{k,t} + ln({z_{k,t}}^2)$. (9)

We denote by: $y_{k,t} = ln({r_{k,t}}^2) - E[ln({z_{k,t}}^2)]$. (10)

As a result, system (6) becomes:

$$\begin{cases} y_{k,t} = ln({r_{k,t}}^2) - E[ln({z_{k,t}}^2)] = h_{k,t} + \{ln({z_{k,t}}^2) - E[ln({z_{k,t}}^2)]\} = h_{k,t} + \xi_{k,t} \\ h_{k,t} = \phi_{k,0} + \phi_{k,1} h_{k,t-1} + u_{k,t} \end{cases} \tag{11}$$

Since $z_{k,t} \sim N(0,1)$, the mean and variance of $ln(z_{k,t}^2)$ are -1.27 and 4.93, respectively (Abramowitz & Stegun, 1970). Therefore:

$$\xi_{k,t} = ln({z_{k,t}}^2) - E[ln({z_{k,t}}^2)] \tag{12}$$

has mean zero and variance 4.93 (Fleming, Kirby, & Ostdiek, 1998). $\xi_{k,t}$ is independent of $h_{k,t}$. Further, as stated above, $h_{k,t}$ is covariance stationary. Thus:

$$\mu_{h,k} = E[h_{k,t}] = \frac{\phi_{k,0}}{1-\phi_{k,1}} \tag{13}$$

and

$$Var(h_{k,t}) = \frac{\sigma_{u,k}^2}{1-(\phi_{k,1})^2}. \tag{14}$$

Next, we compute the first two moments of $y_{k,t}$ in (11) and obtain:

$$\begin{cases} E[y_{k,t}] = E[h_{k,t}] \\ Var(y_{k,t}) = Var(h_{k,t}) + Var(\xi_{k,t}) \\ Cov(y_{k,t}, y_{k,t+\tau}) = (\phi_{k,1})^{\tau} \frac{\sigma_{u,k}^2}{1-(\phi_{k,1})^2} = (\phi_{k,1})^{\tau} Var(h_{k,t}) \end{cases} \text{ for all integers } \tau > 0. \tag{15}$$

We build a bivariate generalization of system (11) to estimate the cross-markets volatility linkages:

$$\begin{cases} \begin{cases} y_{i,t} = h_{i,t} + \xi_{i,t} \\ y_{j,t} = h_{j,t} + \xi_{j,t} \end{cases} \\ \begin{cases} h_{i,t} = \phi_{i,0} + \phi_{i,1} h_{i,t-1} + u_{i,t} \\ h_{j,t} = \phi_{j,0} + \phi_{j,1} h_{j,t-1} + u_{j,t} \end{cases} \end{cases}. \tag{16}$$

Consistent with the above assumptions, $[h_{i,t}, h_{j,t}]$' is independent of $[\xi_{i,t}, \xi_{j,t}]$'. Note that the correlation between $h_{i,t}$ and $h_{j,t}$ measures the volatility linkage between markets *i* and *j*. In the case that the information spillover between any two given markets is complete, the correlation between their corresponding volatilities should be equal to one.

Similar to system (15), and based on the assumptions stated above, we now construct a set of cross-markets moments for system (16):

$$\begin{cases} Cov(y_{i,t}, y_{j,t}) = Cov(h_{i,t}, h_{j,t}) + Cov(\xi_{i,t}, \xi_{j,t}) \\ Cov(y_{i,t}, y_{j,t+\tau}) = (\phi_{j,1})^{\tau} Cov(h_{i,t}, h_{j,t}) \\ Cov(y_{i,t+\tau}, y_{j,t}) = (\phi_{i,1})^{\tau} Cov(h_{i,t}, h_{j,t}) \end{cases}, \text{ for all } \tau > 0 \text{ integers.} \quad (17)$$

A.3. GMM Estimation

The GMM procedure has served as a cornerstone in the empirical asset pricing literature over the past two decades (see Hall (1992) and Hamilton (1994) for a more comprehensive discussion of the GMM approach). We estimate volatility linkages using the GMM and the relation between information flow and volatility derived above. First, we seasonally adjust both the returns and volatility series of each asset class because the stochastic volatility model of Fleming et al. (1998) requires all observations to be drawn from the same distribution. In the presence of seasonality effects, the distribution of stock returns is not identical for all days of the week and therefore violates that distributional assumption (Gibbons & Hess, 1981). Elliott, Granger, and Timmermann (2006) also discuss the requirement of the return and volatility to be stationary in stochastic volatility models. Seasonality patterns can cause nonstationary and statistical distortions and therefore need to be filtered out (Cho & Daigler, 2014). There are several related studies that also remove seasonality before estimating volatility linkages (Fleischer, 2003; Wang, 2009; Mi & Hodgson, 2018). Seasonality effects such as day-of-the-week effects have also been reported among Islamic assets and in Islamic countries (Lean & Tan, 2010; Dharani & Natarajan, 2013).

The seasonal patterns in returns are removed by regressing them on five weekday dummy variables and one dummy variable for the days following market holidays. The seasonal patterns in volatility are then removed by regressing the log of the residuals squared from the previous regression on a dummy variable for Mondays and a dummy variable for days following market holidays. The day-of-the-week effects may not apply equally to each country in our sample, and there may be differences in the particular days when these effects occur. We therefore implement the above procedure separately for each individual country to allow for country-specific seasonality effects and we adjust accordingly.

We then subtract $E\left[\ln z_{k,t}^2\right]$ from the intercept and residuals of this regression to obtain the seasonally adjusted series $y_{k,t}$ from Eq. (10):

$$y_{k,t} \equiv ln\, r_{k,t}^2 - E\left[\ln z_{k,t}^2\right]. \tag{18}$$

Using the moment restrictions (15) and (17), we next build the corresponding *GMM* disturbance vectors. This is done for each individual asset *k* and for bivariate systems across different asset classes within one country. The univariate estimations involve the moment restrictions for each individual asset *k*, for both Islamic and conventional assets, in Islamic and non-Islamic countries. The *GMM* disturbance vector corresponding to system (15) can be expressed as:

$$e_t(\theta) = \begin{pmatrix} y_{k,t} - \mu_{h,k} \\ (y_{k,t} - \mu_{h,k})^2 - \sigma_{h,k}^2 - \sigma_\xi^2 \\ (y_{k,t} - \mu_{h,k})(y_{k,t+\tau} - \mu_{h,k}) - (\phi_{k,1})^\tau[(y_{k,t} - \mu_{h,k})^2 - \sigma_\xi^2] \end{pmatrix}, \tag{19}$$

where $\theta \equiv [\mu_{h,k},\ \sigma_{h,k}^2, \phi_{k,1}]'$ is the vector of unknown parameters, and $\tau = 1, 2, \ldots,$ L counts the number of autocorrelation restrictions used in the estimation. The first two restrictions identify the mean $(\mu_{h,k})$ and variance $(\sigma_{h,k}^2)$ of the log information flow $h_{k,t}$, and the L remaining restrictions identify the *AR(1)* parameter $\phi_{k,1}$ of the $h_{k,t}$ process.

The cross-market correlations are estimated by fitting various bivariate systems. The pairings involve different asset classes within one country, such as Islamic and conventional stock, bond and money market assets. The bivariate systems combine the univariate disturbance vectors for markets *i* and *j* together with the disturbance vector based on system (17):

$$e_t(\theta_i, \theta_j) = \begin{pmatrix} (y_{i,t} - \mu_{h,i})(y_{j,t} - \mu_{h,j}) - \rho_{h,ij}\sigma_{h,i}\sigma_{h,j} - \sigma_\xi^2\rho_{\xi,ij} \\ (y_{i,t} - \mu_{h,i})(y_{j,t+\tau} - \mu_{h,j}) - (\phi_{j,1})^\tau[(y_{i,t} - \mu_{h,i})(y_{j,t} - \mu_{h,j}) - \sigma_\xi^2\rho_{\xi,ij}] \\ (y_{i,t+\tau} - \mu_{h,i})(y_{j,t} - \mu_{h,j}) - (\phi_{i,1})^\tau[(y_{i,t} - \mu_{h,i})(y_{j,t} - \mu_{h,j}) - \sigma_\xi^2\rho_{\xi,ij}] \end{pmatrix} \tag{20}$$

where $\theta_i \equiv [\mu_{h,i}, \sigma^2_{h,i}, \phi_{i,1}]$ represents the vector of unknown parameters for market *i*, and $\theta_j \equiv [\mu_{h,j}, \sigma^2_{h,j}, \phi_{j,1}]$ corresponds to market *j*. The *i* and *j* subscripts denote the two asset classes across which the volatility linkages are estimated. These asset classes can be Islamic or conventional and refer to either stock, bond or money markets. Further, each bivariate system includes two additional parameters: $\rho_{h,ij}$, which represents the correlation between the information flow across asset classes; and $\rho_{\xi,ij}$, which provides the correlation between the disturbance terms in markets *i* and *j*. As such, the estimated cross-market linkages can be obtained from the correlation of the log information flows between markets, $\widehat{\rho_{h,ij}}$, which reflects the strength of the volatility linkages. Combining the univariate and bivariate systems, the joint system has *4L+5* equations, with eight unknown parameters. The overidentifying *J statistic* has the *Chi squared* distribution $\chi^2_{(4L+5)-8}$. We choose a relatively large value of the lag length (L=40) to account for the highly persistent nature of volatility in our time series data. We have also estimated the volatility linkages for lower lags (10, 20 and 30) , but there are no substantial differences and we follow common practice in the literature to report results for L=40 (Fleming et al., 1998; Wang, 2009; Mi & Hodgson, 2018).

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Online Appendix B

Table B.1: Estimated Volatility Linkages for a Sub-Sample of Countries

This table summarizes volatility correlations for 13 countries using different methodologies. In Panels A and B, the volatility correlations are computed as the Pearson correlation with either daily absolute returns, or squared returns. Panel C provides the *GMM* estimates for the volatility correlations that are computed using Fleming et al.'s (1998) stochastic volatility model. In Panel C the volatility correlations are only reported when the overall *GMM* model cannot be rejected at the 10% level of significance. The lag length in all GMM models is L = 40. Further, dynamic correlations of absolute returns based on Croux et al. (2001) are presented for either static (Panel E), long-term (Panel F), medium-term (Panel G) or short-term (Panel H) specifications. In all panels the volatility correlations are computed between 8 combinations of Islamic (IS) and conventional (C) stock (Stock), government bond (Govt Bond), corporate bond (Corp Bond) and money market (Money) indices.

Assets	**Stock and Bond**						**Stock and Money**	
Panel A: Correlations of Absolute Returns								
Assets	C Stock & C Govt Bond	C Stock & C Corp Bond	IS Stock & C Govt Bond	IS Stock &C Corp Bond	C Stock & IS Corp Bond	IS Stock & IS Corp Bond	C Stock & C Money	IS Stock & C Money
Australia	0.5277	0.5520	0.5223	0.5516			0.5725	0.5727
GCC		0.1324		0.1287	0.0978	0.0898		
Hungary	0.6843	0.3339	0.5764	0.3087			0.6370	0.5554
Indonesia	0.6091	0.3039	0.5025	0.2180			0.5547	0.4555
Japan	0.157		0.1607					
Malaysia	0.4055	0.3699	0.3467	0.3098	0.3773	0.3181	0.4394	0.4098
Morocco		0.3767		0.2862				
Pakistan		0.0581		0.0442				
Qatar		0.1394		0.1348				
Turkey	0.7480	0.4060	0.7013	0.3948			0.6692	0.6376
UAE		0.3305		0.2926	0.2795	0.2459		
UK	0.3490	0.4910	0.3423	0.4860				
USA	0.2734	0.3140	0.2647	0.3056				

Panel B: Correlations of Squared Returns								
Assets	C Stock & C Govt Bond	C Stock & C Corp Bond	IS Stock & C Govt Bond	IS Stock & C Corp Bond	C Stock & IS Corp Bond	IS Stock & IS Corp Bond	C Stock & C Money	IS Stock & C Money
Australia	0.4507	0.4717	0.4546	0.4802			0.3305	0.3180
GCC		0.0298		0.0264	0.0053	0.0023		
Hungary	0.7544	0.4225	0.6941	0.3980			0.7186	0.6492
Indonesia	0.6884	0.1945	0.6164	0.1260			0.5892	0.5353
Japan	0.1764		0.1925					
Malaysia	0.2843	0.2237	0.2052	0.2586	0.2238	0.2062	0.2974	0.3233
Morocco		0.3087		0.2303				
Pakistan		0.7415		0.7382				
Qatar		0.0490		0.0457				
Turkey	0.7748	0.2623	0.7439	0.2235			0.6637	0.6543
UAE		0.3131		0.2412	0.2525	0.1756		
UK	0.3439	0.2181	0.3392	0.2326				

USA	0.2641	0.9815	0.2494	0.9958				

Panel C: GMM Estimates

Assets	C Stock & C Govt Bond	C Stock & C Corp Bond	IS Stock & C Govt Bond	IS Stock & C Corp Bond	C Stock & IS Corp Bond	IS Stock & IS Corp Bond	C Stock & C Money	IS Stock & C Money
Australia		0.4126						
GCC		0.4850				0.3416		
Hungary							0.5315	
Indonesia	0.6901	0.5365	0.6241	0.4059				0.4486
Japan	-0.2902							
Malaysia	0.1538	0.0000		-0.2397	0.0000	-0.1999	0.1548	0.0000
Morocco		0.5843		0.4580				
Pakistan		0.0000		-0.1669				
Qatar		0.3644		0.2293				
Turkey				0.4795				0.3199
UAE		0.4557				0.0878		
UK	0.1170	0.1858						
USA	0.6070	0.8092		0.5103				

Panel D: Kalman Filter Estimates

Assets	C Stock & C Govt Bond	C Stock & C Corp Bond	IS Stock & C Govt Bond	IS Stock & C Corp Bond	C Stock & IS Corp Bond	IS Stock & IS Corp Bond	C Stock & C Money	IS Stock & C Money
Australia	0.8123	0.7895	0.7757	0.7609			0.8191	0.7745
GCC		0.2143		0.1004	0.6131	0.2546		
Hungary								
Indonesia	0.5943	0.4495	0.5339	0.3419			0.5204	0.3731
Japan	0.0851		0.0827					
Malaysia	0.0036	0.2262	-0.0850	0.0441	0.2226	0.0416	0.2310	-0.0006
Morocco		0.6573		0.5797				
Pakistan		0.0819		0.0527				
Qatar		0.3715			0.3001			
Turkey	0.7191	0.4444	0.5983	0.4433			0.3390	0.3979
UAE		0.3852		0.2587	0.2418	0.1556		
UK	0.5546	0.7300	0.5482	0.6852				
USA	0.3845	0.5711	0.4100	0.5656				

Panel E: Static Dynamic Correlations (frequency band [0, π])

Assets	C Stock & C Govt Bond	C Stock & C Corp Bond	IS Stock & C Govt Bond	IS Stock & C Corp Bond	C Stock & IS Corp Bond	IS Stock & IS Corp Bond	C Stock & C Money	IS Stock & C Money
Australia	0.5608	0.5838	0.5567	0.5843			0.6027	0.6037
GCC		0.1749		0.1712	0.1248	0.1169		
Hungary	0.7041	0.3641	0.6037	0.3391			0.6574	0.5808
Indonesia	0.6312	0.3463	0.5266	0.2581			0.5791	0.4802
Japan	0.2268		0.2287					
Malaysia	0.4320	0.3970	0.3725	0.3361	0.4042	0.3442	0.4679	0.4360
Morocco		0.4307		0.3422				

Pakistan		0.0753		0.0607				
Qatar		0.1662		0.1608				
Turkey	0.7593	0.4277	0.7151	0.4190			0.6829	0.6529
UAE		0.3658		0.3305	0.3045	0.2734		
UK	0.3784	0.5152	0.3731	0.5107				
USA	0.3097	0.3559	0.3015	0.3490				

Panel F: Long-term Dynamic Correlations (frequency band [0, π/130] corresponds to cycles with a period longer than a year)

Assets	C Stock & C Govt Bond	C Stock & C Corp Bond	IS Stock & C Govt Bond	IS Stock & C Corp Bond	C Stock & IS Corp Bond	IS Stock & IS Corp Bond	C Stock & C Money	IS Stock & C Money
Australia	0.9226	0.9219	0.9255	0.9243			0.9228	0.9236
GCC		0.7878		0.7787	0.6071	0.5934		
Hungary	0.9413	0.8242	0.9340	0.8218			0.9228	0.9249
Indonesia	0.8675	0.8327	0.7612	0.6994			0.8220	0.6721
Japan	0.8197		0.8100					
Malaysia	0.1964	0.1566	0.0384	-0.0018	0.1801	0.0223	0.3547	0.2045
Morocco		0.9104		0.8509				
Pakistan		0.1769		0.1200				
Qatar		0.8009		0.7609				
Turkey	0.9219	0.7663	0.9084	0.8023			0.9193	0.9038
UAE		0.7935		0.781	0.7789	0.7961		
UK	0.7484	0.8038	0.7460	0.7940				
USA	0.6043	0.7701	0.5948	0.7664				

Panel G: Medium-term Dynamic Correlations (frequency band [2/5 π, 1/130 π] corresponds to cycles with a period between a week and a year)

Assets	C Stock & C Govt Bond	C Stock & C Corp Bond	IS Stock & C Govt Bond	IS Stock & C Corp Bond	C Stock & IS Corp Bond	IS Stock & IS Corp Bond	C Stock & C Money	IS Stock & C Money
Australia	0.6550	0.6823	0.6409	0.6674			0.6910	0.6779
GCC		0.3237		0.3187	0.2804	0.2624		
Hungary	0.7522	0.4088	0.6540	0.3867			0.7132	0.6571
Indonesia	0.6483	0.4164	0.5329	0.2880			0.5934	0.4711
Japan	0.3297		0.3346					
Malaysia	0.4367	0.3952	0.3787	0.3399	0.4055	0.3496	0.4510	0.4143
Morocco		0.5396		0.4169				
Pakistan		0.1100		0.1071				
Qatar		0.2659		0.2119				
Turkey	0.7666	0.4670	0.7162	0.4785			0.7272	0.6792
UAE		0.4483		0.4215	0.3866	0.3664		
UK	0.4085	0.5379	0.4064	0.5224				
USA	0.3794	0.4360	0.3471	0.4166				

Panel H: Short-term Dynamic Correlations (frequency band [2/5 π, π] corresponds to cycles with a period less than a week)

Assets	C Stock & C Govt Bond	C Stock & C Corp Bond	IS Stock & C Govt Bond	IS Stock & C Corp Bond	C Stock & IS Corp Bond	IS Stock & IS Corp Bond	C Stock & C Money	IS Stock & C Money
Australia	0.3669	0.3912	0.3692	0.4052			0.4228	0.4366

GCC		-0.0264		-0.0313	-0.0500	-0.0509		
Hungary	0.6033	0.2136	0.4911	0.1975			0.5653	0.4629
Indonesia	0.5769	0.1706	0.4993	0.1591			0.5260	0.4721
Japan	0.0747		0.0733					
Malaysia	0.448	0.4194	0.3977	0.3648	0.4231	0.3704	0.4892	0.4712
Morocco		0.2237		0.1829				
Pakistan		0.0273		0.0052				
Qatar		0.0106			0.0511			
Turkey	0.7288	0.3338	0.6802	0.2868			0.6127	0.5896
UAE		0.2256		0.1794	0.1838	0.1386		
UK	0.2882	0.4386	0.2766	0.4427				
USA	0.2209	0.1876	0.2332	0.1898				

Table B.2: Differences of Cross-Country Volatility Linkages with the United States as the Base Country

Table B.2 presents the results of testing for zero mean using difference series of cross-country volatility linkages where one stock index is from the US and the other stock index from each of the other countries in our sample. The difference series are obtained by subtracting the correlation that involves at least one Islamic (IS) stock index from the corresponding correlation across two conventional (C) stock indices. The correlations are estimated using Pearson correlation across absolute returns (Panel A) and squared returns (Panel B), *GMM* estimates based on Fleming et al. (1998)'s stochastic volatility model (Panel C), Kalman filter (Panel D), dynamic correlations of absolute returns based on Croux et al. (2001) for either static (Panel E), long-term (Panel F), medium-term (Panel G) or short-term (Panel H) specifications. Data cover the period May 2007 to June 2010. We report results for the total sample, for Islamic countries and for non-Islamic countries. Estimates that are significant at the 1%, 5% and 10% levels are denoted by superscripts a, b and c, respectively (one-tailed test). We report standard and bootstrapped t-statistics.

	C Stock & C Stock - IS stock & C Stock			*C Stock & C Stock - IS stock & IS Stock*		
	All Countries	Islamic Countries	Non-Islamic Countries	All Countries	Islamic Countries	Non-Islamic Countries
Panel A: Volatility Linkages with Absolute Returns						
Mean	0.0155	0.0280	0.0125	0.0223	0.0526	0.0149
T-Statistic	2.1334[b]	1.7358[b]	1.5299[c]	1.5578[c]	1.5449[c]	0.9468
Bootstrapped T-Statistic	4.2685[a]	3.5780[a]	3.0525[a]	3.1500[a]	3.2883[a]	1.9325[b]
Panel B: Volatility Linkages with Squared Returns						
Mean	0.0121	0.0227	0.0095	0.0163	0.0444	0.0094
T-Statistic	1.0701	1.1787	0.7156	0.7101	0.9493	0.3587
Bootstrapped T-Statistic	2.1946[b]	2.4149[a]	1.4744[c]	1.4756[c]	2.0185[b]	0.7596
Panel C: Volatility Linkages in GMM						
Mean	-0.0188	0.0921	-0.0631	0.0251	0.3236	-0.1241
T-Statistic	-0.4373	1.7770[b]	-1.1913	0.2580	3.4444[b]	-1.4181
Bootstrapped T-Statistic	-2.0368	4.7734[a]	-4.8044	0.8220	7.3054[a]	-3.8158
Panel D: Volatility Linkages with Kalman Filter						
Mean	0.0244	0.0487	0.0171	0.0541	0.0966	0.0413
T-Statistic	2.1617[b]	2.3388[a]	1.2949[c]	2.3642[a]	2.5508[a]	1.5106[c]
Bootstrapped T-Statistic	19.2432[a]	10.1938[a]	10.1178[a]	14.9086[a]	8.0977[a]	8.4053[a]
Panel E: Volatility Linkages with Static Dynamic Correlations						
Mean	0.0085	0.0094	0.0083	0.0130	0.0171	0.0119
T-Statistic	2.5812[a]	1.5793[c]	2.1471[b]	2.1601[b]	1.3903[c]	1.7258[b]
Bootstrapped T-Statistic	24.7264[a]	6.9024[a]	18.3217[a]	14.5975[a]	4.4212[a]	10.4840[a]
Panel F: Volatility Linkages with Long-term Dynamic Correlations						
Mean	0.0052	0.0189	0.0018	0.0073	0.0389	-0.0006
T-Statistic	1.3432[c]	1.9230[b]	0.4388	0.8609	1.9585[b]	-0.0631
Bootstrapped T-Statistic	12.8197[a]	8.3843[a]	3.7707[a]	5.8598[a]	6.2441[a]	-0.4013

Panel G: Volatility Linkages with Medium-term Dynamic Correlations						
Mean	0.0102	0.0173	0.0085	0.0142	0.0313	0.0100
T-Statistic	2.6649[a]	2.0807[b]	1.9546[b]	2.0123[b]	1.8044[b]	1.3005[c]
Bootstrapped T-Statistic	25.4453[a]	9.1333[a]	16.7386[a]	25.3582[a]	9.0743[a]	16.7337[a]
Panel H: Volatility Linkages with Short-term Dynamic Correlations						
Mean	0.0103	-0.0001	0.0129	0.0185	-0.0011	0.0234
T-Statistic	2.6314[a]	-0.0216	2.7873[a]	2.2894[b]	-0.0953	2.4403[a]
Bootstrapped T-Statistic	25.1933[a]	-0.0664	23.8665[a]	15.4622[a]	-0.3105	14.8140[a]

Table B.3: Differences of Cross-Country Volatility Linkages

Table B.3 presents results of testing for zero mean using difference series of cross-country volatility linkages where one stock index is from the country as indicated in the first column of the table and the other stock index from each of the other countries in our sample. The difference series are obtained by subtracting the correlation that involves at least one Islamic (IS) stock index from the corresponding correlation across two conventional (C) stock indices. We present correlations that are estimated using Pearson correlation across absolute returns. Similar results hold for squared returns which we do not report in the interest of brevity but are available upon request. Data cover the period May 2007 to June 2010. We report results for the total sample, for Islamic countries and for non-Islamic countries. Estimates that are significant at the 1%, 5% and 10% levels are denoted by superscripts a, b and c, respectively (one-tailed test). We report standard and bootstrapped t-statistics.

	Cross-country correlations of Absolute Returns					
	Two Conventional Stocks – Islamic Stock & Conventional Stock			**Two Conventional Stocks – Two Islamic Stocks**		
	All Countries	Islamic Countries	Non-Islamic Countries	All Countries	Islamic Countries	Non-Islamic Countries
Argentina						
Mean	0.0408	0.0265	0.0443	0.0699	0.0453	0.0759
T-Statistic	5.9939[a]	1.6857[b]	5.7648[a]	5.5165[a]	1.6487[b]	5.2616[a]
Bootstrapped T-Statistic	12.0937[a]	3.4657[a]	11.6351[a]	11.1283[a]	3.5106[a]	10.6673[a]
Australia						
Mean	0.0247	0.0249	0.0247	0.0357	0.0397	0.0347
T-Statistic	3.9049[a]	1.9741[b]	3.4167[a]	2.8694[a]	1.6048[c]	2.4408[a]
Bootstrapped T-Statistic	7.8494[a]	4.0428[a]	6.8502[a]	5.8019[a]	3.4035[a]	4.9578[a]
Austria						
Mean	0.1029	0.0739	0.1099	0.1907	0.1358	0.2041
T-Statistic	11.3509[a]	3.8853[a]	10.8585[a]	14.5380[a]	3.6670[a]	16.4910[a]
Bootstrapped T-Statistic	22.8751[a]	7.9778[a]	21.7480[a]	29.5216[a]	7.7938[a]	33.3711[a]
Belgium						
Mean	0.0536	0.0488	0.0548	0.1054	0.1002	0.1066
T-Statistic	7.3310[a]	3.6451[a]	6.5380[a]	6.9041[a]	3.0717[a]	6.0338[a]
Bootstrapped T-Statistic	14.8346[a]	7.4999[a]	13.0995[a]	13.9305[a]	6.4958[a]	12.2377[a]
Brazil						
Mean	0.0295	0.0209	0.0316	0.0545	0.0400	0.0581
T-Statistic	4.4599[a]	1.3908[c]	4.3129[a]	4.1390[a]	1.3447[c]	3.9593[a]
Bootstrapped T-Statistic	9.0348[a]	2.8706[a]	8.6326[a]	8.3743[a]	2.8502[a]	8.0200[a]
Canada						
Mean	0.0416	0.0340	0.0434	0.0658	0.0562	0.0681
T-Statistic	6.2540[a]	2.2898[b]	5.8142[a]	5.3054[a]	2.0712[b]	4.8364[a]
Bootstrapped T-Statistic	12.5856[a]	4.7246[a]	11.6348[a]	10.7156[a]	4.3887[a]	9.7998[a]
Chile						
Mean	0.0304	0.0143	0.0343	0.0557	0.0261	0.0629
T-Statistic	5.1592[a]	1.4537[c]	5.0210[a]	4.5921[a]	1.7798[b]	4.3637[a]
Bootstrapped T-Statistic	10.3637[a]	2.9862[a]	10.0695[a]	9.2872[a]	3.7688[a]	8.8597[a]

China						
Mean	0.0300	0.0374	0.0282	0.0588	0.0704	0.0560
T-Statistic	6.2238[a]	3.3079[a]	5.2372[a]	6.6356[a]	3.2355[a]	5.7198[a]
Bootstrapped T-Statistic	12.5522[a]	6.7881[a]	10.6072[a]	13.3857[a]	6.8642[a]	11.5807[a]
Colombia						
Mean	0.0515	0.0435	0.0535	0.1003	0.0828	0.1045
T-Statistic	8.5272[a]	3.4113[a]	7.7339[a]	8.7431[a]	3.6252[a]	7.9549[a]
Bootstrapped T-Statistic	17.1294[a]	7.0454[a]	15.5402[a]	17.7807[a]	7.7024[a]	16.1389[a]
Czech Republic						
Mean	0.0252	0.0168	0.0273	0.0414	0.0278	0.0448
T-Statistic	3.4551[a]	1.2170	3.2925[a]	2.9197[a]	0.9917	2.8003[a]
Bootstrapped T-Statistic	6.9511[a]	2.5058[a]	6.6307[a]	5.8702[a]	2.1057[b]	5.6703[a]
Denmark						
Mean	0.0638	0.0502	0.0671	0.1087	0.0873	0.1139
T-Statistic	8.9429[a]	3.4032[a]	8.4756[a]	8.4133[a]	3.4501[a]	7.8670[a]
Bootstrapped T-Statistic	17.9809[a]	6.9991[a]	17.0676[a]	16.9954[a]	7.3305[a]	15.9631[a]
Egypt						
Mean	0.0397	0.0510	0.0373	0.0777	0.0914	0.0748
T-Statistic	8.3876[a]	3.0993[a]	8.2872[a]	7.8975[a]	2.4386[a]	8.2534[a]
Bootstrapped T-Statistic	16.8385[a]	6.3669[a]	16.7319[a]	15.9676[a]	5.2300[a]	16.8287[a]
Finland						
Mean	0.0294	0.0268	0.0301	0.0597	0.0551	0.0608
T-Statistic	5.7804[a]	2.0754[b]	5.4463[a]	6.2631[a]	1.9525[b]	6.4962[a]
Bootstrapped T-Statistic	11.6463[a]	4.2955[a]	10.9456[a]	12.6717[a]	4.1448[a]	13.1777[a]
France						
Mean	0.0086	0.0055	0.0094	0.0051	0.0069	0.0047
T-Statistic	1.1852	0.3942	1.1207	0.4294	0.3106	0.3361
Bootstrapped T-Statistic	2.3521[a]	0.7998	2.2397[b]	0.8856	0.6658	0.7140
GCC						
Mean	0.0151	0.0153	0.0151	0.0267	0.0333	0.0253
T-Statistic	2.5558[a]	1.3308[c]	2.2277[b]	2.4877[a]	1.4681[c]	2.0521[b]
Bootstrapped T-Statistic	5.1444[a]	2.7468[a]	4.4583[a]	5.0098[a]	3.1332[a]	4.1467[a]
Germany						
Mean	0.0015	0.0133	-0.0014	-0.0095	0.0305	-0.0192
T-Statistic	0.1629	0.7454	-0.1331	-0.5973	1.0831	-1.0296
Bootstrapped T-Statistic	0.2991	1.5314[c]	-0.2654	-1.2330	2.2975[b]	-2.0862

Greece						
Mean	0.0337	0.0253	0.0357	0.0495	0.0426	0.0512
T-Statistic	4.9821[a]	2.0583[b]	4.3981[a]	4.0094[a]	3.3784[a]	2.2727[b]
Bootstrapped T-Statistic	10.0184[a]	4.2141[a]	8.9078[a]	8.1181[a]	4.8294[a]	6.8658[a]
Hungary						
Mean	0.0768	0.0403	0.0856	0.1477	0.0800	0.1641
T-Statistic	10.2662[a]	2.7304[a]	10.2273[a]	10.7101[a]	2.5135[a]	11.5753[a]
Bootstrapped T-Statistic	20.5944[a]	5.6231[a]	20.5207[a]	21.5835[a]	5.3158[a]	23.4010[a]
India						
Mean	0.0575	0.0215	0.0148	0.1114	0.0418	0.0241
T-Statistic	5.8359[a]	3.2892[a]	3.0066[a]	6.2295[a]	3.2025[a]	2.4114[a]
Bootstrapped T-Statistic	11.7399[a]	6.7836[a]	6.0217[a]	12.5728[a]	6.7795[a]	4.9076[a]
Indonesia						
Mean	0.0844	0.0601	0.0895	0.1582	0.1082	0.1688
T-Statistic	9.8166[a]	3.2528[a]	9.3433[a]	13.4199[a]	2.5272[a]	15.9014[a]
Bootstrapped T-Statistic	19.7700[a]	6.7049[a]	18.8240[a]	27.0568[a]	5.3651[a]	32.2321[a]
Ireland						
Mean	0.1744	0.1152	0.1888	0.3337	0.2429	0.3558
T-Statistic	10.4425[a]	3.5133[a]	10.0514[a]	21.1018[a]	5.9287[a]	24.4889[a]
Bootstrapped Standard Error	0.0083	0.0159	0.0093	0.0078	0.0193	0.0072
Bootstrapped T-Statistic	20.9983[a]	7.2551[a]	20.3246[a]	42.5494[a]	12.6138[a]	49.5127[a]
Italy						
Mean	0.0407	0.0250	0.0445	0.0617	0.0425	0.0664
T-Statistic	6.6139[a]	1.8808[b]	6.3099[a]	4.9467[a]	1.7620[b]	4.5295[a]
Bootstrapped T-Statistic	13.3014[a]	3.8695[a]	12.7322[a]	9.9987[a]	3.7373[a]	9.2071[a]
Japan						
Mean	0.0083	0.0128	0.0072	0.0131	0.0246	0.0104
T-Statistic	1.8572[b]	1.0692	1.5919[c]	1.4138[c]	1.1976	1.0306
Bootstrapped T-Statistic	3.7302[a]	2.1963[b]	3.1963[a]	2.8647[a]	2.5333[a]	2.1183[b]
Malaysia						
Mean	0.0141	0.0295	0.0108	0.0219	0.0458	0.0168
T-Statistic	4.2618[a]	2.9420[a]	3.1858[a]	3.0471[a]	2.4311[a]	2.1291[b]
Bootstrapped T-Statistic	8.5832[a]	6.1012[a]	6.4313[a]	6.1178[a]	5.2002[a]	4.3244[a]
Mexico						
Mean	0.0321	0.0291	0.0328	0.0599	0.0554	0.0610
T-Statistic	4.7803[a]	1.9473[b]	4.3070[a]	4.6254[a]	2.2655[b]	4.0089[a]

Bootstrapped T-Statistic	9.5980[a]	4.0024[a]	8.6644[a]	9.3380[a]	4.7996[a]	8.1625[a]
Morocco						
Mean	0.0853	0.0454	0.0937	0.1639	0.0944	0.1786
T-Statistic	9.0802[a]	2.6864[a]	8.7980[a]	14.9067[a]	3.5251[a]	16.2019[a]
Bootstrapped T-Statistic	18.1732[a]	5.5551[a]	17.7203[a]	30.1993[a]	7.5130[a]	32.7789[a]
Netherlands						
Mean	0.0534	0.0446	0.0555	0.0962	0.0860	0.0987
T-Statistic	9.2809[a]	3.3351[a]	8.8530[a]	8.4479[a]	2.8381[a]	7.8509[a]
Bootstrapped T-Statistic	18.7467[a]	6.8573[a]	17.8535[a]	17.1024[a]	6.0315[a]	15.9067[a]
New Zealand						
Mean	0.0264	0.0373	0.0237	0.0552	0.0719	0.0512
T-Statistic	4.5629[a]	2.6681[a]	3.7694[a]	5.1115[a]	2.7321[a]	4.3847[a]
Bootstrapped T-Statistic	9.2077[a]	5.4866[a]	7.6530[a]	10.3469[a]	5.8155[a]	8.8707[a]
Norway						
Mean	0.0407	0.0399	0.0409	0.0716	0.0694	0.0721
T-Statistic	6.3990[a]	2.8810[a]	5.7800[a]	5.9625[a]	2.6000[a]	5.3846[a]
Bootstrapped T-Statistic	12.8658[a]	5.9162[a]	11.5878[a]	12.0473[a]	5.5143[a]	10.9299[a]
Pakistan						
Mean	0.0005	-0.0055	0.0018	0.0009	-0.0129	0.0038
T-Statistic	0.1273	-0.4877	0.4279	0.1132	-0.5430	0.4486
Bootstrapped T-Statistic	0.2361	-1.0127	0.8210	0.2101	-1.1542	0.9054
Peru						
Mean	0.0488	0.0375	0.0516	0.0895	0.0640	0.0957
T-Statistic	7.1125[a]	2.6841[a]	6.6088[a]	7.8023[a]	2.4513[a]	7.7916[a]
Bootstrapped T-Statistic	14.1895[a]	5.4658[a]	13.3188[a]	15.7140[a]	5.2096[a]	15.7703[a]
Philippines						
Mean	0.0677	0.0906	0.0621	0.1318	0.1726	0.1219
T-Statistic	9.6699[a]	5.7523[a]	8.2323[a]	12.2741[a]	5.9941[a]	11.2471[a]
Bootstrapped T-Statistic	19.4947[a]	11.8402[a]	16.5389[a]	24.8887[a]	12.7135[a]	22.7194[a]
Poland						
Mean	0.0501	0.0391	0.0188	0.0931	0.0743	0.0500
T-Statistic	8.5818[a]	3.3610[a]	7.9143[a]	8.4924[a]	3.1193[a]	8.0242[a]
Bootstrapped T-Statistic	17.3547[a]	6.9142[a]	15.8809[a]	17.0827[a]	6.6246[a]	16.3393[a]
Qatar						
Mean	0.0589	0.0456	0.0617	0.1085	0.0854	0.1134
T-Statistic	10.7075[a]	2.8572[a]	10.7210[a]	10.5987[a]	2.6903[a]	10.7853[a]
Bootstrapped T-Statistic	21.5477[a]	5.9195[a]	21.4950[a]	21.4218[a]	5.7476[a]	21.8165[a]

Russia						
Mean	0.0209	0.0149	0.0223	0.0385	0.0260	0.0416
T-Statistic	2.4226[a]	0.9354	2.2224[b]	2.2891[b]	0.8235	2.1165[b]
Bootstrapped T-Statistic	4.8391[a]	1.9338[b]	4.4595[a]	4.6221[a]	1.7519[b]	4.2772[a]
Singapore						
Mean	0.0157	0.0329	0.0115	0.0267	0.0551	0.0197
T-Statistic	2.9882[a]	2.1827[b]	2.1503[b]	2.6249[a]	1.8523[b]	1.9205[b]
Bootstrapped T-Statistic	5.9608[a]	4.4663[a]	4.3405[a]	5.3460[a]	3.9362[a]	3.9189[a]
South Africa						
Mean	0.0156	0.0174	0.0151	0.0237	0.0303	0.0221
T-Statistic	2.5595[a]	1.1343	2.2713[b]	2.0462[b]	1.1593	1.6933[b]
Bootstrapped T-Statistic	5.1373[a]	2.3481[a]	2.4556[a]	4.1359[a]	4.6378[a]	3.4569[a]
South Korea						
Mean	0.0167	0.0295	0.0136	0.2513	0.0607	0.0248
T-Statistic	2.9676[a]	1.8482[b]	2.3314[a]	2.8767[a]	2.0695[b]	2.1213[b]
Bootstrapped T-Statistic	5.9783[a]	3.8039[a]	4.6987[a]	5.7802[a]	4.3979[a]	4.3105[a]
Spain						
Mean	0.0484	0.0301	0.0579	0.0761	0.0514	0.0828
T-Statistic	6.7024[a]	2.0733[b]	6.8146[a]	5.2705[a]	1.6566[b]	5.1020[a]
Bootstrapped T-Statistic	13.5392[a]	4.2545[a]	13.6760[a]	10.6477[a]	3.5154[a]	10.3203[a]
Sweden						
Mean	0.0454	0.0326	0.0486	0.0786	0.0632	0.0824
T-Statistic	7.5336[a]	2.1687[b]	7.4358[a]	6.5111[a]	2.2507[b]	6.1214[a]
Bootstrapped T-Statistic	15.1430[a]	4.4536[a]	14.9957[a]	13.1443[a]	4.7725[a]	12.3826[a]
Switzerland						
Mean	0.0539	0.0459	0.0559	0.0915	0.0862	0.0928
T-Statistic	9.9292[a]	3.1876[a]	9.5856[a]	8.5392[a]	2.8743[a]	8.2065[a]
Bootstrapped T-Statistic	20.0128[a]	6.5553[a]	19.3134[a]	17.2637[a]	6.0875[a]	16.6642[a]
Thailand						
Mean	0.0415	0.0346	0.0432	0.0759	0.0543	0.0811
T-Statistic	7.9191[a]	2.6102[a]	7.5693[a]	7.5776[a]	1.8690[b]	7.8925[a]
Bootstrapped T-Statistic	15.9125[a]	5.3846[a]	15.3021[a]	15.3420[a]	3.9667[a]	16.0779[a]
Turkey						
Mean	-0.0059	-0.0081	-0.0055	-0.0119	-0.0206	-0.0100
T-Statistic	-0.9794	-0.4192	-0.8698	-1.1384	-0.5896	-0.9379
Bootstrapped T-Statistic	-1.9912	-0.8877	-1.7630	-2.3141	-1.2649	-1.8796

United Arab Emirates						
Mean	0.0117	0.0136	0.0113	0.0174	0.0258	0.0156
T-Statistic	2.4057[a]	1.0744	2.1465[b]	1.8058[b]	0.8442	1.5887
Bootstrapped T-Statistic	4.8396[a]	2.2290[b]	4.3590[a]	3.6442[a]	1.8106[b]	3.2286[a]
United Kingdom						
Mean	0.0172	0.0129	0.0183	0.0215	0.0204	0.0217
T-Statistic	2.7432[a]	0.8382	2.6488[a]	1.9776[b]	0.9374	1.7313[b]
Bootstrapped T-Statistic	5.5059[a]	1.7341[b]	5.3158[a]	4.0192[a]	2.0002[b]	3.5390[a]
United States						
Mean	0.0155	0.0280	0.0125	0.0223	0.0526	0.0149
T-Statistic	2.1334[b]	1.7358[b]	1.5299[c]	1.5578[c]	1.5449[c]	0.9468
Bootstrapped T-Statistic	4.2685[a]	3.5780[a]	3.0525[a]	3.1500[a]	3.2883[a]	1.9325[b]
World						
Mean	0.0376	0.0413	0.0367	0.0609	0.0749	0.0575
T-Statistic	6.0548[a]	2.6752[a]	5.4192[a]	4.9385[a]	2.5368[a]	4.2134[a]
Bootstrapped T-Statistic	12.1547[a]	5.4857[a]	10.9188[a]	9.9334[a]	5.3754[a]	8.5618[a]

Table B.4: Differences of Volatility Linkages by Country Type

Table B.4 presents the results of testing for zero mean using three difference series of volatility linkages and a combination of them, where the total sample is partitioned into Islamic countries and non-Islamic countries.. The difference series are obtained by subtracting the correlation that involves at least one Islamic (IS) asset from the corresponding correlation across two conventional (C) assets. Assets include stock, government (Govt) bond, corporate (Corp) bond and money instruments. The correlations are estimated using Pearson correlation across absolute returns (Panel A) and squared returns (Panel B), *GMM* estimates based on Fleming et al. (1998)'s stochastic volatility model and the arising moment conditions from Eq. (20) (Panel C), Kalman filter (Panel D), dynamic correlations of absolute returns based on Croux et al. (2001) for either static (Panel E), long-term (Panel F), medium-term (Panel G) or short-term (Panel H) specifications. Data cover the period May 2007 to June 2010. Estimates that are significant at the 1%, 5% and 10% levels are denoted by superscripts a, b and c, respectively (one-tailed test). We report standard and bootstrapped t-statistics.

Differences	*Total Differences*		*C Stock & C Govt Bond - IS Stock & C Govt Bond*		*C Stock & C Corp Bond - IS Stock & C Corp Bond*		*C Stock & C Money - IS Stock & C Money*	
Sample	Islamic	Non-Islamic	Islamic	Non-Islamic	Islamic	Non-Islamic	Islamic	Non-Islamic
Panel A: Correlations of Absolute Returns								
Mean	0.0417	0.0244	0.0504	0.0248	0.0373	0.0205	0.035	0.0274
T-Statistic	5.4862[a]	6.3593[a]	2.0920[b]	3.7129[a]	3.3083[a]	3.8097[a]	1.4252[c]	4.1969[a]
Bootstrapped T-Statistic	27.0192[a]	54.2801[a]	4.8172[a]	22.0025[a]	10.5352[a]	16.6203[a]	3.3053[a]	19.2336[a]
Test for Equal Means								
Difference	0.0173		0.0256		0.0168		0.0076	
T-Statistic	2.0690[b]		1.1705		1.4169[c]		0.3427	
Bootstrapped T-Statistic	10.7396[a]		2.4365[a]		4.4614[a]		0.7019	
Panel B: Correlations of Squared Returns								
Mean	0.034	0.0252	0.0361	0.0274	0.0367	0.0224	0.0042	0.0242
T-Statistic	4.2373[a]	4.3803[a]	2.9244[a]	3.5105[a]	3.5056[a]	2.6234[a]	0.2314	3.4010[a]
Bootstrapped T-Statistic	20.7767[a]	37.4006[a]	6.7480[a]	15.1793[a]	11.1697[a]	11.4608[a]	0.5272	15.5733[a]
Test for Equal Means								
Difference	0.0088		0.0088		0.0142		-0.0199	
T-Statistic	0.9065		0.5857		1.1047		-1.1537	
Bootstrapped T-Statistic	4.9592[a]		1.5569[c]		3.7374[a]		-2.4677[a]	
Panel C: GMM Estimates[i]								
Mean	0.1573	0.1556	0.0661	0.1077	0.1597	0.3497	0.1548	0.1086
T-Statistic	5.5479[a]	2.2881[b]		0.9456	7.5246[a]	1.6042[c]		1.6032[c]
Bootstrapped T-Statistic	19.3149[a]	11.8877[a]		2.9977[a]	18.8306[a]	4.2994[a]		5.1046[a]
Test for Equal Means								
Difference	0.0018		-0.0416		-0.1899		0.0462	

T-Statistic	0.0247		-0.3876		-0.9502		0.7236	
Bootstrapped T-Statistic	0.0969		-1.1568		-2.3333[a]		2.1690[b]	
Panel D: Kalman Filter Estimates								
Mean	0.0637	0.0445	0.0899	0.0516	0.0776	0.0419	0.0780	0.0587
T-Statistic	2.2540[b]	2.2875[b]	5.1440[a]	1.5296[c]	3.6995[a]	1.7844[b]	1.1579	1.3965[c]
Bootstrapped T-Statistic	10.8466[a]	17.0963[a]	10.9828[a]	7.4681[a]	11.7768[a]	7.1501[a]	2.6726[a]	5.5718[a]
Test for Equal Means								
Difference	0.0192		0.0383		0.0357		0.0193	
T-Statistic	0.5703		1.0646		1.1845		0.2721	
Bootstrapped T-Statistic	2.9894[a]		3.5996[a]		4.0556[a]		0.6368	
Panel E: Static Dynamic Correlations (frequency band [0, π])								
Mean	0.0436	0.0308	0.0694	0.0237	0.0369	0.0199	0.0355	0.0256
T-Statistic	6.3389[a]	4.7103[a]	3.8298[a]	3.6653[a]	3.2360[a]	3.7718[a]	1.4687[c]	4.0774[a]
Bootstrapped T-Statistic	32.4026[a]	40.9031[a]	8.1058[a]	21.7792[a]	10.3078[a]	16.4673[a]	3.3971[a]	18.6963[a]
Test for Equal Means								
Difference	0.0127		0.0457		0.0170		0.0099	
T-Statistic	1.3620[c]		2.8358[a]		1.4300[c]		0.4523	
Bootstrapped T-Statistic	8.2569[a]		5.3144[a]		4.5082[a]		0.9299	
Panel F: Long-term Dynamic Correlations (frequency band [0, π/130] corresponds to cycles with a period longer than a year)								
Mean	0.0704	0.0178	0.0926	0.0186	0.0544	0.0186	0.0850	0.0139
T-Statistic	4.8016[a]	4.0360[a]	2.1906[b]	2.5424[a]	2.7000[a]	2.2836[b]	2.2621[b]	1.6911[b]
Bootstrapped T-Statistic	24.3785[a]	35.2492[a]	4.6391[a]	15.0328[a]	8.6083[a]	9.9901[a]	5.2138[a]	7.7555[a]
Test for Equal Means								
Difference	0.0526		0.0740		0.0358		0.0712	
T-Statistic	3.5052[a]		2.0992[b]		1.7386[b]		2.1236[b]	
Bootstrapped T-Statistic	18.0419[a]		3.7112[a]		5.4017[a]		4.3479[a]	

Panel G: Medium-term Dynamic Correlations (frequency band [2/5 π, 1/130 π] corresponds to cycles with a period between a week and a year)								
Mean	0.0490	0.0327	0.0746	0.0236	0.0486	0.0275	0.0464	0.0270
T-Statistic	5.8663[a]	4.8789[a]	3.6359[a]	3.0479[a]	2.9139[a]	4.0321[a]	1.5702[c]	4.0667[a]
Bootstrapped T-Statistic	29.9196[a]	42.5068[a]	7.7032[a]	18.0435[a]	9.2754[a]	17.5659[a]	3.6271[a]	18.5985[a]
Test for Equal Means								
Difference	0.0162		0.0510		0.0212		0.0194	
T-Statistic	1.5399[c]		2.7730[a]		1.2402		0.7349	
Bootstrapped T-Statistic	8.9933[a]		5.2383[a]		3.8589[a]		1.5054[c]	
Panel H: Short-term Dynamic Correlations (frequency band [2/5 π, π] corresponds to cycles with a period less than a week)								
Mean	0.0303	0.0304	0.0588	0.0238	0.0206	0.0141	0.0187	0.0268
T-Statistic	5.1164[a]	4.2501[a]	6.2614[a]	3.7791[a]	2.0293[b]	2.0200[b]	1.2337	3.5495[a]
Bootstrapped T-Statistic	26.0015[a]	37.0940[a]	13.2674[a]	22.3305[a]	6.4434[a]	8.8265[a]	2.8563[a]	16.2115[a]
Test for Equal Means								
Difference	-0.0001		0.0350		0.0066		-0.0080	
T-Statistic	-0.0055		3.5487[a]		0.5591		-0.5336	
Bootstrapped T-Statistic	-0.0361		7.6750[a]		1.8284[b]		-1.1864	

Table B.5: Percentage Differences by Country Type

Table B.5 extends Table B.3 and presents the results of testing for zero mean using three difference series of volatility linkages and a combination of them where we calculate percentage differences rather instead of standard differences. The total sample is partitioned into Islamic countries and non-Islamic countries. The percentage difference series are expressed as decimals and are obtained by subtracting the correlation that involves at least one Islamic (IS) asset from the corresponding correlation across two conventional (C) assets and then dividing this difference by the correlation across two conventional (C) assets. Assets include stock, government (Govt) bond, corporate (Corp) bond and money instruments. The correlations are estimated using Pearson correlation across absolute returns (Panel A) and squared returns (Panel B), *GMM* estimates based on Fleming et al. (1998)'s stochastic volatility model and the arising moment conditions from Eq. (20) (Panel C), Kalman filter (Panel D), dynamic correlations of absolute returns based on Croux et al. (2001) for either static (Panel E), long-term (Panel F), medium-term (Panel G) or short-term (Panel H) specifications. Data cover the period May 2007 to June 2010. Estimates that are significant at the 1%, 5% and 10% levels are denoted by superscripts a, b and c, respectively (one-tailed test). We report standard and bootstrapped t-statistics.

Differences	*Total Differences*		*C Stock & C Govt Bond - IS Stock & C Govt Bond*		*C Stock & C Corp Bond - IS Stock & C Corp Bond*		*C Stock & C Money - IS Stock & C Money*	
Sample	Islamic	Non-Islamic	Islamic	Non-Islamic	Islamic	Non-Islamic	Islamic	Non-Islamic
Panel A: Correlations of Absolute Returns								
Mean	0.1113	0.0493	0.0860	0.0574	0.1375	0.0627	-0.0173	0.0237
T-Statistic	3.7526[a]	2.9399[a]	1.8013[b]	2.5948[a]	4.0623[a]	4.3335[a]	-0.1461	0.5134
Bootstrapped T-Statistic	18.3805[a]	25.0505[a]	4.1362[a]	15.3621[a]	12.8915[a]	18.9212[a]	-0.3412	2.3367[a]
Test for Equal Means								
Difference	0.0619		0.0286		0.07482		-0.0411	
T-Statistic	1.8506[b]		0.6122		2.1447[b]		-0.3657	
Bootstrapped T-Statistic	9.7335[a]		1.3725[c]		6.7034[a]		-0.7928	
Panel B: Correlations of Squared Returns								
Mean	0.1675	0.0428	0.0752	0.0042	0.1645	0.0685	-0.0646	0.0853
T-Statistic	3.1732[a]	1.2170	5.3033[a]	0.0579	4.4301[a]	2.7248[a]	-0.8114	3.5027[a]
Bootstrapped T-Statistic	15.5431[a]	10.3325[a]	12.2317[a]	0.3112	14.0498[a]	11.9373[a]	-1.8865	16.0620[a]
Test for Equal Means								
Difference	0.1247		0.0711		0.0960		-0.1498	
T-Statistic	2.0014[b]		0.9891		2.2489[b]		-2.0555	
Bootstrapped T-Statistic	10.8626[a]		5.2170[a]		7.3806[a]		-4.3083	
Panel C: GMM Estimates[ii]								
Mean	0.2295	0.3291	0.0957	-0.0693	0.2267	0.8857		0.2800
T-Statistic	2.0193[b]	2.0339[b]		-0.4461	4.3351[a]	2.2539[b]		1.2946[c]
Bootstrapped T-Statistic	6.4077[a]	9.1098[a]		-1.1948	10.0162[a]	5.6478[a]		3.9060[a]

Test for Equal Means								
Difference	-0.0996		0.1651		-0.6589		0.7200	
T-Statistic	-0.5228		1.1635		-1.8595		3.5582[a]	
Bootstrapped T-Statistic	-1.9564		2.8556[a]		-4.1503		10.0915[a]	
Panel D: Kalman Filter Estimates								
Mean	1.2795	-5.1867	8.2925	0.0910	0.2937	0.2451	0.2191	0.2216
T-Statistic	1.1452	-1.3746	1.0165	1.2695	3.5165[a]	1.4548[c]	0.7669	1.7546[b]
Bootstrapped T-Statistic	5.4971[a]	-10.2756	2.1578[b]	6.2334[a]	11.1773[a]	5.8199[a]	1.7739[b]	7.0461[a]
Test for Equal Means								
Difference	6.4662		8.2015		0.0486		-0.0025	
T-Statistic	1.6602[b]		1.2313		0.2687		-0.0091	
Bootstrapped T-Statistic	11.6701[a]		2.1355[b]		0.9781		-0.0215	
Panel E: Static Dynamic Correlations (frequency band [0, π])								
Mean	0.1194	0.0725	0.1206	0.0499	0.1230	0.0556	0.0123	0.0421
T-Statistic	5.1852[a]	3.7995[a]	3.7438[a]	2.7421[a]	4.2641[a]	4.2876[a]	0.1427	1.9664[b]
Bootstrapped T-Statistic	26.4955[a]	33.1693[a]	7.9424[a]	16.2327[a]	13.5799[a]	18.7303[a]	0.3206	9.0276[a]
Test for Equal Means								
Difference	0.0469		0.0707		0.0674		-0.0297	
T-Statistic	1.5914[c]		2.2212[b]		2.2474[b]		-0.3824	
Bootstrapped T-Statistic	9.3872[a]		4.5483[a]		7.0767[a]		-0.7947	
Panel F: Long-term Dynamic Correlations (frequency band [0, π/130] corresponds to cycles with a period longer than a year)								
Mean	0.1821	0.2762	0.3139	0.0121	0.1860	0.0060	-0.0345	1.0025
T-Statistic	2.4072[a]	1.0582	1.2694	0.7061	1.7045[b]	0.3077	-0.1349	1.0255
Bootstrapped T-Statistic	12.2788[a]	9.2217[a]	2.6882[a]	4.2085[a]	5.4339[a]	1.3431[c]	-0.3158	4.7017[a]
Test for Equal Means								
Difference	-0.0940		0.3018		0.1800		-1.0370	
T-Statistic	-0.3488		1.4897[c]		1.7203[b]		-1.0600	

Bootstrapped T-Statistic	-2.8269		2.5999[a]		5.2060[a]		-4.3250	
Panel G: Medium-term Dynamic Correlations (frequency band [2/5 π, 1/130 π] corresponds to cycles with a period between a week and a year)								
Mean	0.1065	0.0594	0.1255	0.0481	0.1315	0.0395	0.0291	0.0170
T-Statistic	4.8459[a]	2.9041[a]	3.8490[a]	2.5774[a]	3.3801[a]	1.7511[b]	0.3093	0.4310
Bootstrapped T-Statistic	24.7004[a]	25.3119[a]	8.1547[a]	15.2892[a]	10.7755[a]	7.6367[a]	0.7272	1.97833[b]
Test for Equal Means								
Difference	0.0472		0.0774		0.0920		0.0121	
T-Statistic	1.5935[c]		2.3937[a]		2.1535[b]		0.1340	
Bootstrapped T-Statistic	9.6509[a]		4.9284[a]		6.9643[a]		0.2763	
Panel H: Short-term Dynamic Correlations (frequency band [2/5 π, π] corresponds to cycles with a period less than a week)								
Mean	-0.1208	0.1010	0.1045	0.0778	-0.2754	0.0320	-0.0165	0.0939
T-Statistic	-0.7163	3.1576[a]	5.2342[a]	2.4595[a]	-0.6089	0.4214	-0.2144	3.4635[a]
Bootstrapped T-Statistic	-3.6272	27.5678[a]	11.0859[a]	14.5957[a]	-1.9288	1.8460[b]	-0.4899	15.8293[a]
Test for Equal Means								
Difference	-0.2219		0.0267		-0.3074		-0.1105	
T-Statistic	-1.3181		0.7587		-0.7105		-1.5388	
Bootstrapped T-Statistic	-6.6545		2.4799[a]		-2.1570		-3.2543	

Table B.6: Differences by Derivatives Use, Credit to Private Sector, Stocks Traded & Market Segmentation using Squared Returns as an Alternative Proxy

Table B.6 extends Table 2 and presents the results of testing for zero mean using three difference series of volatility linkages and a combination of them, where we use squared returns instead of absolute returns (as in Table 2) to estimate volatility linkages. The difference series are obtained by subtracting the correlation that involves at least one Islamic (IS) asset from the corresponding correlation across two conventional (C) assets. Assets include stock, government (Govt) bond, corporate (Corp) bond and money instruments. The correlations are estimated using Pearson correlation across absolute returns. Data cover the period May 2007 to June 2010. The total sample is partitioned into countries with low versus high derivatives usage (Panel A), low versus high credit to private sector (Panel B), low versus high stocks traded (Panel C) and low versus high market segmentation (Panel D). Country groupings are summarised in Table A.3. Estimates that are significant at the 1%, 5% and 10% levels are denoted by superscripts a, b and c, respectively (two-tailed test). Some of the individual difference terms by asset type have a small sample size. To address this issue we utilize a bootstrapping technique to estimate t-statistics and report these in addition to our standard t-statistics.

Panel A: Low versus high derivatives usage

	Total Differences		C Stock and C Govt Bond - IS Stock and C Govt Bond		C Stock and C Corp Bond - IS Stock and C Corp Bond		C Stock and C Money - IS Stock and C Money	
	Low	High	Low	High	Low	High	Low	High
Mean	0.0312	0.0234	0.0321	0.0277	0.0259	0.0207	0.0341	0.0179
T-Statistic	2.4547[b]	3.5844[a]	1.3075	2.5570[b]	1.9649[b]	1.4232	2.0397[b]	2.4068[b]
Bootstrapped T-Statistic	12.5317[a]	22.9561[a]	4.7197[a]	11.7289[a]	5.2837[a]	4.5367[a]	5.8209[a]	8.3571[a]
Differences (Low minus High)								
Mean	0.0078		0.0045		0.0052		0.0045	
T-Statistic	0.5559		0.1732		0.2881		0.1732	
Bootstrapped T-Statistic	2.8791[a]		0.6064		0.7875		0.6272	

Panel B: Low versus high credit to private sector

	Total Differences		C Stock and C Govt Bond - IS Stock and C Govt Bond		C Stock and C Corp Bond - IS Stock and C Corp Bond		C Stock and C Money - IS Stock and C Money	
	Low	High	Low	High	Low	High	Low	High
Mean	0.0249	0.0269	0.0143	0.0388	0.0352	0.0077	0.0236	0.0176
T-Statistic	4.0525[a]	3.0793[a]	1.0625	2.6143[a]	4.1148[a]	0.8308	2.5851[a]	1.8122[c]
Bootstrapped T-Statistic	27.4571[a]	18.9155[a]	4.2346[a]	11.9834[a]	17.4672[a]	2.5062[b]	9.7270[a]	5.7317[a]
Differences (Low minus High)								
Mean	-0.0020		-0.0244		0.0275			0.0059
T-Statistic	-0.1919		-1.2537		2.2940[b]			0.4676
Bootstrapped T-Statistic	-1.2151		-5.2115		7.5174[a]			1.5093

Panel C: Low versus high stocks traded

	Total Differences		C Stock and C Govt Bond - IS Stock and C Govt Bond		C Stock and C Corp Bond - IS Stock and C Corp Bond		C Stock and C Money - IS Stock and C Money	
	Low	High	Low	High	Low	High	Low	High
Mean	0.0352	0.0144	0.0403	0.0164	0.0410	0.0088	0.0222	0.0175
T-Statistic	4.1762[a]	3.4850[a]	1.9951[b]	2.3726[b]	4.5084[a]	1.2890	2.1767[b]	2.3016[b]
Bootstrapped T-Statistic	28.8802[a]	21.4727[a]	8.5022[a]	10.1085[a]	18.7261[a]	4.4742[a]	8.4664[a]	7.3066[a]
Differences (Low minus High)								
Mean	0.0208		0.0240		0.0322		0.0047	
T-Statistic	2.2395[b]		1.1558		2.9481[a]		0.3842	

Bootstrapped T-Statistic	15.0144[a]	4.7817[a]	10.9674[a]	1.3196

Panel D: Low versus high market segmentation

	Total Differences		C Stock and C Govt Bond - IS Stock and C Govt Bond		C Stock and C Corp Bond - IS Stock and C Corp Bond		C Stock and C Money - IS Stock and C Money	
	Low	High	Low	High	Low	High	Low	High
Mean	0.0410	0.0185	0.0608	0.0068	0.0399	0.0297	0.0225	0.0166
T-Statistic	4.1795[a]	2.9065[a]	2.3932[b]	0.5488	3.9017[a]	2.6232[a]	1.8796[c]	1.7622[c]
Bootstrapped T-Statistic	22.5722[a]	15.6778[a]	7.6368[a]	1.6532[c]	12.9943[a]	8.7500[a]	5.9840[a]	5.8624[a]
Differences (Low minus High)								
Mean	0.0226		0.0540		0.0103		0.0059	
T-Statistic	1.9656[b]		2.0270[b]		0.7104		0.4094	
Bootstrapped T-Statistic	10.4245[a]		6.0028[a]		2.2440[b]		1.2595	

Table B.7: Percentage Differences by Derivatives Usage, Credit to Private Sector, Stocks Traded and Market Segmentation

Table B.7 extends Table 2 and presents the results of testing for zero mean using three difference series of volatility linkages and a combination of them, where we calculate percentage differences rather instead of standard differences. The percentage difference series are expressed as decimals and are obtained by subtracting the correlation that involves at least one Islamic (IS) asset from the corresponding correlation across two conventional (C) assets and then dividing this difference by the correlation across two conventional (C) assets. Assets include stock, government (Govt) bond, corporate (Corp) bond and money instruments. The correlations are estimated using Pearson correlation across absolute returns and squared returns. Data cover the period May 2007 to June 2010. The total sample is partitioned into countries with low versus high derivatives usage (Panel A), low versus high credit to private sector (Panel B), low versus high stocks traded (Panel C) and low versus high market segmentation (Panel D). Country groupings are summarised in Table A.3. Estimates that are significant at the 1%, 5% and 10% levels are denoted by superscripts a, b and c, respectively (two-tailed test). We report standard and bootstrapped t-statistics.

Panel A: Low versus high derivatives usage

Pearson Correlation of Absolute Returns

	Total Differences		C Stock and C Govt Bond - IS Stock and C Govt Bond		C Stock and C Corp Bond - IS Stock and C Corp Bond		C Stock and C Money - IS Stock and C Money	
	Low	High	Low	High	Low	High	Low	High
Mean	0.0806	0.0335	0.0630	0.0625	0.0838	0.0597	0.1080	-0.0406
T-Statistic	2.7812[a]	1.4102[c]	1.0870	3.7079[a]	3.3484[a]	2.3065[b]	3.8992[a]	-0.5306
Bootstrapped T-Statistic	14.1774[a]	9.0395[a]	3.9250[a]	17.0217[a]	8.9709[a]	7.3455[a]	11.1706[a]	-1.8372

Differences (Low minus High)

Mean	0.0471	0.0005	0.0241	0.1486
T-Statistic	1.2773	0.0087	0.7224	1.9227[b]
Bootstrapped T-Statistic	6.9051[a]	0.0380	1.9386[b]	6.1590[a]

Pearson Correlation of Squared Returns

Mean	0.0382	0.0398	-0.0144	0.0146	0.0747	0.0675	0.0971	0.0630
T-Statistic	0.4855	0.9914	-0.0882	0.1894	1.9831[b]	1.5712[c]	2.0553[b]	2.1080[b]
Bootstrapped T-Statistic	2.4670[a]	6.3378[a]	-0.3440	0.8424	5.3213[a]	4.9853[a]	5.8721[a]	7.3537[a]

Differences (Low minus High)

Mean	-0.0016	-0.0290	0.0072	0.0340
T-Statistic	-0.0189	-0.1673	0.1348	0.6523
Bootstrapped T-Statistic	-0.0944	-0.5916	0.3591	1.8393[b]

Panel B: Low versus high credit to private sector

Pearson Correlation of Absolute Returns

	Total Differences	C Stock and C Govt Bond - IS Stock and C Govt Bond	C Stock and C Corp Bond - IS Stock and C Corp Bond	C Stock and C Money - IS Stock and C Money

	Low	High	Low	High	Low	High	Low	High
Mean	0.0660	0.0493	0.0271	0.0896	0.1110	0.0522	0.0518	-0.0426
T-Statistic	3.3735[a]	1.7809[b]	0.6987	3.7474[a]	5.2666[a]	2.4310[a]	1.2698	-0.4417
Bootstrapped T-Statistic	23.0023[a]	11.0418[a]	2.8115[a]	17.1771[a]	22.3523[a]	7.3270[a]	4.7660[a]	-1.3996
Differences (Low minus High)								
Mean	0.0166		-0.0624		0.0588		0.0945	
T-Statistic	0.4965		-1.4148		2.0494[b]		0.9534	
Bootstrapped T-Statistic	3.0944[a]		-5.6848		6.7924[a]		2.9440[a]	
Pearson Correlation of Squared Returns								
Mean	0.0438	0.0582	-0.0606	0.0601	0.1312	0.0238	0.0499	0.0845
T-Statistic	1.0276	1.2212	-0.5173	0.6997	4.9341[a]	0.6464	1.3097[c]	1.9834[b]
Bootstrapped T-Statistic	6.9515[a]	7.5035[a]	-2.0657	3.2005[a]	20.8948[a]	1.9524[b]	4.9535[a]	6.3097[a]
Differences (Low minus High)								
Mean	-0.0144		-0.1207		0.1074		-0.0346	
T-Statistic	-0.2282		-0.8574		2.4945[a]		-0.6360	
Bootstrapped T-Statistic	-1.4231		-3.4884		7.8417[a]		-2.0379	

Panel C: Low versus high stocks traded

	Pearson Correlation of Absolute Returns							
	Total Differences		C Stock and C Govt Bond - IS Stock and C Govt Bond		C Stock and C Corp Bond - IS Stock and C Corp Bond		C Stock and C Money - IS Stock and C Money	
	Low	High	Low	High	Low	High	Low	High
Mean	0.0869	0.0199	0.0758	0.0483	0.0991	0.0711	0.0864	-0.0962
T-Statistic	4.8414[a]	0.7264	1.7874[b]	3.1650[a]	4.5558[a]	3.0028[a]	3.9024[a]	-0.9679
Bootstrapped T-Statistic	33.6373[a]	4.4894[a]	7.6239[a]	13.3612[a]	18.8335[a]	10.4397[a]	15.1504[a]	-3.0906
Differences (Low minus High)								
Mean	0.0670		0.0275		0.0280		0.1826	
T-Statistic	2.0718[b]		0.6299		0.9083		1.9002[b]	
Bootstrapped T-Statistic	13.0447[a]		2.6041[a]		3.2580[a]		5.7657[a]	
Pearson Correlation of Squared Returns								

Mean	0.0609	0.0348	-0.0173	0.0207	0.1372	0.0471	0.0687	0.0464
T-Statistic	1.1505	1.6836[b]	-0.1215	0.6797	5.0471[a]	1.4402	2.1813[b]	0.8969
Bootstrapped T-Statistic	8.0090[a]	10.4149[a]	-0.5139	2.8874[a]	20.8619[a]	5.0136[a]	8.4667[a]	2.8465[a]
Differences (Low minus High)								
Mean	0.0261		-0.0380		0.0901		0.0223	
T-Statistic	0.4647		-0.2693		2.2087[b]		0.3889	
Bootstrapped T-Statistic	3.1524[a]		-1.1108		7.8466[a]		1.2413	

Panel D: Low versus high market segmentation

Pearson Correlation of Absolute Returns

	Total Differences		C Stock and C Govt Bond - IS Stock and C Govt Bond		C Stock and C Corp Bond - IS Stock and C Corp Bond		C Stock and C Money - IS Stock and C Money	
	Low	High	Low	High	Low	High	Low	High
Mean	0.0898	0.0465	0.1273	0.0667	0.1055	0.0969	0.0348	-0.0199
T-Statistic	3.8182[a]	1.3369[c]	3.2987[a]	2.9020[a]	4.2151[a]	3.0898[a]	0.6414	-0.2222
Bootstrapped T-Statistic	20.6711[a]	7.2068[a]	10.5782[a]	8.7625[a]	14.0784[a]	10.3151[a]	2.0337[b]	-0.7344
Differences (Low minus High)								
Mean	0.0433		0.0607		0.0086		0.0548	
T-Statistic	1.0492		1.4354[c]		0.2272		0.5512	
Bootstrapped T-Statistic	5.5132[a]		4.2409[a]		0.7405		1.7270[b]	

Pearson Correlation of Squared Returns

Mean	0.1051	0.0142	0.1514	-0.1704	0.1308	0.0945	0.0301	0.0818
T-Statistic	3.1842[a]	0.2837	1.8598[b]	-1.1580	4.4400[a]	2.0886[b]	0.5841	2.1737[b]
Bootstrapped T-Statistic	17.1508[a]	1.5492[c]	5.9093[a]	-3.5165	14.7936[a]	6.9562[a]	1.8678[b]	7.2550[a]
Differences (Low minus High)								
Mean	0.0908		0.3219		0.0364		-0.0517	
T-Statistic	1.5391[c]		2.0420[b]		0.7102		-0.8573	
Bootstrapped T-Statistic	8.1378[a]		5.8600[a]		2.2486[b]		-2.6055	

Table B.8: Multivariate Analysis of the Stock-Bond Volatility Linkages for Islamic and non-Islamic Countries

Table B.8 extends Panel A of Table 3 and presents individual coefficient estimates with their t-statistics for all Islamic asset variables, as well as a joint test of these variables for Islamic countries and non-Islamic countries. The volatility correlations are estimated between stock and bond markets. Different versions of the model below are tested: without control variables, with control variables, and either with or without country-level fixed effects (FE):

$$\rho_{i,a,b,t} = \beta_0 + \beta_2 I_{\{Islamic\ Stock\ and\ Islamic\ Bond\}} + \beta_3 I_{\{Islamic\ Stock\ and\ Conventional\ Bond\}} + \beta_4 I_{\{Islamic\ Bond\ and\ Conventional\ Stock\}} + X'_{it}\,\gamma + \varepsilon_{it}$$

The control group for dummies 2–4 is when the volatility linkage is estimated between conventional stock and bond. Panels A and B refer to the Islamic countries and non-Islamic countries samples, respectively. Each specification is run using either absolute returns or squared returns as the volatility proxy. Time-invariant variables on the country level drop out when we include fixed effects. Data cover the period May 2007 to June 2010. Superscripts a, b and c denote the 1%, 5% and 10% levels of significance, respectively. Superscripts next to the t-statistics and p-values refer to one-tailed tests and two-tailed tests, respectively.

Test	No control variables		No control variables but with FE		With control variables but no FE		With control variables and with FE	
Volatility Proxy	Absolute Return	Squared Return	Absolute Return	Squared Return	Absolute Return	Squared Return	Absolute Return	Squared Return
Panel A: Islamic countries (Observations=1100)								
$\widehat{\beta_2}$	0.0441	-0.0625	-0.0212	-0.0503	0.0070	-0.0138	0.0037	-0.0219
T-Statistic	1.3671	-1.7556[b]	-0.6936	-1.5202[c]	0.2135	-0.3809	0.1096	-0.5845
$\widehat{\beta_3}$	-0.0334	-0.0533	-0.0334	-0.0533	-0.0343	-0.0521	-0.0345	-0.0525
T-Statistic	-1.8027[b]	-2.3368[a]	-1.8938[b]	-2.7817[a]	-1.8893[b]	-2.5870[a]	-1.8536[b]	-2.5118[a]
$\widehat{\beta_4}$	0.0550	-0.0336	-0.0104	-0.0214	0.0179	0.0165	0.0147	0.0087
T-Statistic	1.6469	-0.9265	-0.3274	-0.6380	0.5285	0.4478	0.4234	0.2281
R^2_{adj} (in %)	17.54	9.72	28.11	34.92	34.92	42.13	34.22	41.10
F-Statistic (Joint Test)	4.0880	2.2167	1.2266	2.8097	1.6854	2.7310	1.5321	2.4332
P-value	0.0067[a]	0.0846[c]	0.2987	0.0384[b]	0.1684	0.0427[b]	0.2045	0.0636[c]
Country fixed effects	no	no	yes	yes	no	no	yes	yes
Panel B: Non-Islamic countries (Observations=3663)								
$\widehat{\beta_2}$	-0.0549	-0.0838	-0.1108	-0.1256	-0.0377	-0.0951	-0.0966	-0.1039
T-Statistic	-1.0358	-1.5637[c]	-1.8679[b]	-2.0314[b]	-0.5800	-1.4123[c]	-1.4542[c]	-1.4414[c]
$\widehat{\beta_3}$	-0.0171	-0.0135	-0.0206	-0.0184	-0.0143	-0.0124	-0.0197	-0.0162
T-Statistic	-1.8197[b]	-1.2348	-2.2893[b]	-1.8128[b]	-1.3481[c]	-0.9993	-1.9931[b]	-1.3886[c]
$\widehat{\beta_4}$	-0.0548	-0.0888	-0.1108	-0.1306	-0.0382	-0.1016	-0.0967	-0.1101
T-Statistic	-1.0990	-1.7120[b]	-1.9585[b]	-2.1648[b]	-0.6386	-1.5799[c]	-1.5528[c]	-1.5751[c]
R^2_{adj} (in %)	1.90	0.61	13.17	16.42	16.68	19.48	19.95	22.34
F-Statistic (Joint Test)	1.7358	1.9007	3.4202	3.1149	0.7673	1.5771	2.3083	1.6486
P-value	0.1574	0.1272	0.0166[b]	0.0252[b]	0.5122	0.1928	0.0745[c]	0.1760
Country fixed effects	no	no	yes	yes	no	no	yes	yes

Table B.9: Multivariate Analysis of the Stock-Money Market Volatility Linkages for Islamic and non-Islamic Countries

Table B.9 extends Panel B of Table 3 and reports the results for the individual significance of the Islamic stock and conventional money market variable (coefficient β_2) for Islamic and non-Islamic countries. The model is run with and without control variables and either with or without country-level fixed effects:

$$\rho_{i,a,b,t} = \beta_0 + \beta_2 I_{\{Islamic\ Stock\ and\ Money\ Market\}} + X'_{it}\,\gamma + \varepsilon_{it}$$

The control group for dummy 2 is when the volatility linkage is estimated between conventional stock and money market. Panels A and B include the β_2 coefficient estimate and the corresponding t-statistic and p-value for Islamic countries and for non-Islamic countries, respectively. Each specification is run using either absolute returns or squared returns as the volatility proxy. Time-invariant variables on the country level drop out when we include fixed effects. Data cover the period May 2007 to June 2010. Superscripts a, b and c refer to one-tailed tests and denote the 1%, 5% and 10% levels of significance, respectively.

Test	No control variables		No control variables but with FE		With control variables but no FE		With control variables and with FE	
Volatility Proxy	Absolute Return	Squared Return	Absolute Return	Squared Return	Absolute Return	Squared Return	Absolute Return	Squared Return
Panel A: Islamic countries (Observations = 296)								
$\widehat{\beta_2}$	-0.0299	-0.0346	-0.0299	-0.0346	-0.0264	-0.0294	-0.0265	-0.0296
T-Statistic	-0.8058	-0.8668	-0.9416	-1.0045	-0.9431	-0.9589	-0.9410	-0.9589
R^2_{adj} (in %)	-0.12	-0.08	26.68	25.48	44.05	37.84	43.80	37.53
Country fixed effects	no	no	yes	yes	no	no	yes	yes
Panel B: Non-Islamic countries (Observations = 1446)								
$\widehat{\beta_2}$	-0.0227	-0.0217	-0.0312	-0.0312	-0.0307	-0.0305	-0.0319	-0.0319
T-Statistic	-1.4723[c]	-1.2448	-2.2377[b]	-1.9407[b]	-2.0395[b]	-1.7965[b]	-2.342[a]	-2.0570[b]
R^2_{adj} (in %)	1.13	0.76	21.99	18.19	30.41	25.53	34.37	29.46
Country fixed effects	no	no	yes	yes	no	no	yes	yes

Table B.10: Barillas-Shanken (2007) Mean-Variance Spanning Test on Islamic Stock Indices

Table B.10 presents Barillas and Shanken (2007) [BS] mean-variance spanning tests on country level (Panel A) and on a regional level (Panel B). First, we run a regression of excess returns of the Islamic index portfolio on the excess return of the market portfolio (i.e., the conventional world index), and the international HML and SMB portfolio returns for each country separately, and we test whether the intercept is strictly greater than zero which implies that a long position in the Islamic asset can expand the mean-variance frontier, H_1: $\alpha_i > 0$, for each country *c* from a regression of

$$R_{it}^{IS} - rf_t = \alpha_i + \beta_{i1}(R_t^{market} - rf_t) + \beta_{i2}HML + \beta_{i3}SMB + \epsilon_{it},$$

Second, we group countries by regions that match those for which the international HML and SMB portfolio returns are provided and test whether the intercepts are jointly non-zero in a multivariate framework (i.e., R_{it}^{IS} is the J-vector of the returns on Islamic stock indices in countries *j* that form a regional group). Regions include North America (NA), Europe (EU), Asia-Pacific excluding Japan (AP), Developed (DE) and Emerging (EM) countries. Superscripts next to each country in Panel A indicate in which region(s) the country is included. The p-values in Panel A for individual countries are one-sided (right-tail test), and superscripts a, b and c next to the p-values denote the 1%, 5% and 10% levels of significance, respectively. All t-statistics and p-values are bootstrapped. Data is in monthly frequency and covers the period May 2007 to June 2010.

Panel A: Individual countries

Country	Alpha	T-Statistic	P-value	Country	Alpha	T-Statistic	P-value
Argentina[EM]	-0.08343	-0.85	0.8175	Malaysia[EM]	0.01430	0.27	0.3950
Australia[DE,AP]	0.04992	1.55	0.0605[c]	Mexico[EM]	0.02528	0.76	0.2250
Austria[DE, EU]	-0.07034	-1.79	0.9370	Morocco[EM]	-0.02069	-0.49	0.6890
Belgium[DE, EU]	-0.01975	-1.16	0.7955	Netherlands[DE, EU]	0.01030	0.44	0.3305
Brazil[EM]	0.09502	1.23	0.1095	New Zealand[DE, AP]	0.00051	0.01	0.4960
Canada[DE, NA]	0.03330	1.06	0.1825	Norway[DE, EU]	0.00768	0.18	0.4265
Chile[EM]	0.08249	1.25	0.0425[b]	Pakistan[EM]	-0.13307	-0.75	0.7730
China[EM]	0.07550	1.59	0.0355[b]	Peru[EM]	0.06006	0.72	0.2355
Colombia[EM]	0.06612	1.29	0.0760[c]	Philippines[EM]	0.05806	0.88	0.1895
Czech[EM]	0.00282	0.05	0.4805	Poland[EM]	-0.02059	-0.35	0.6380
Denmark[DE, EU]	0.04379	1.25	0.0555[b]	Qatar[EM]	0.07867	1.22	0.1105
Egypt[EM]	0.00806	0.12	0.4515	Russia[EM]	-0.01241	-0.16	0.5645
Finland[DE, EU]	-0.05265	-1.2	0.8850	Singapore[DE, AP]	0.03642	1.34	0.0910[c]
France[DE, EU]	-0.01306	-0.5	0.6915	South Africa[EM]	0.02188	0.78	0.2180
GCC[EM]	0.01533	0.37	0.3545	South Korea[EM]	0.00051	0.01	0.4960
Germany[DE, EU]	0.00683	0.28	0.3890	Spain[DE, EU]	-0.01285	-0.33	0.6295
Greece[DE, EU]	-0.02382	-0.43	0.6655	Sweden[DE, EU]	0.01419	0.38	0.3505
Hungary[EM]	-0.04230	-0.64	0.7395	Switzerland[DE, EU]	0.01464	0.61	0.2715
India[EM]	0.06819	1.55	0.0605[c]	Thailand[EM]	0.04439	0.78	0.2185
Indonesia[EM]	0.08077	1.04	0.1500	Turkey[EM]	0.02657	0.31	0.3790
Ireland[DE, EU]	0.00286	0.03	0.4895	UAE[EM]	-0.11048	-1.04	0.8500
Italy[DE, EU]	-0.02344	-0.73	0.7685	UK[DE, EU]	-0.00525	-0.26	0.6040
Japan[DE]	-0.01162	-0.82	0.7935	US[DE, NA]	0.00461	0.48	0.3170

Panel B: Joint tests

	F-Statistic	p-value
North America	0.2948	0.8093
Europe	0.6242	0.9978
Asia-Pacific (ex. Japan)	1.0478	0.7527

Developed	0.7547	0.9782
Emerging	1.4968	0.7549

Table B.11: Mean-Variance Spanning Tests on International Conventional Assets with the United States as the Base Country

Table B.11 presents joint tests for three sets of mean-variance spanning tests from the perspective of a conventional investor who is based in the United States and considers diversifying with conventional assets from another country (as indicated in the first column). The benchmark assets are conventional stock and bond market indices in the United States, while the test assets are conventional stock and bond market indices in each of the additional countries or regions (as indicated in column two). To enable comparison with our main analysis in Table 5, the set of conventional test assets in Table B.11 comprises comparable types of assets (i.e., stock or corporate bond indices) to the Islamic test assets in Table 5. The first test is based on the traditional Huberman and Kandal (1987) [HK] F-test of H_0: $\alpha = 0_N$, $\delta = 0_N$, from a regression of

$$R_{2t} = \alpha + \beta R_{1t} + \epsilon_t,$$

where R_{1t} is the K-vector of the returns on the K benchmark assets (conventional assets in the United States), $R_{2t}$is the N-vector of the returns on the N test assets (Conventional assets in the other country as specified in Column 2). The second test is a step-down test developed in Kan and Zhou (2012) [KZ] where F_1 is an F-test of $\alpha = 0_N$ and F_2 is an F-test test of $\delta = 0_N$ conditional on $\alpha = 0_N$. The reported p-values for the first two sets of tests are exact under the normality assumptions on the residuals (see KZ). The third set of tests is also developed in KZ and is estimated via GMM and involves Wald tests W_a (valid under general distribution) and W_a^e(only valid when returns follow a multivariate elliptical distribution). They both have an asymptotic χ^2_{2N} distribution, where N is the number of test assets, and the reported p-values are asymptotic ones (see KZ). Data cover the period May 2007 to June 2010.

				HK Test		***KZ Step-down test***				***KZ GMM test***			
Country of test assets	Conventional test asset	$\hat{\alpha}$	$\hat{\delta}$	F-test	p-value	F_1	p-value	F_2	p-value	W_a^e	p-value	W_a	p-value
World	Bonds	0.00002	0.05505	0.067	0.935	0.000	0.985	0.138	0.712	0.403	0.818	1.219	0.544
	Stocks	-0.00086	0.45528	112.171	0.000	12.495	0.001	158.322	0.000	0.085	0.958	0.285	0.867
	All			30.212	0.000	6.443	0.004	81.626	0.000	1.176	0.882	1.602	0.808
Argentina	Stocks	-0.00399	-0.63656	0.197	0.822	0.246	0.623	0.152	0.700	0.244	0.885	0.324	0.850
Australia	Stocks	0.00136	-0.56952	0.842	0.440	0.140	0.711	1.584	0.217	1.323	0.516	2.170	0.338
Austria	Stocks	-0.01007	-1.33039	2.850	0.072	4.256	0.047	1.318	0.259	4.508	0.105	7.347	0.025
Belgium	Stocks	-0.00982	-1.25920	3.922	0.030	5.998	0.020	1.609	0.213	5.502	0.064	7.471	0.024
Brazil	Stocks	0.00801	0.58570	0.965	0.391	1.879	0.180	0.050	0.825	1.804	0.406	2.189	0.335
Canada	Stocks	0.00401	0.28719	0.583	0.564	1.140	0.293	0.027	0.870	1.091	0.580	1.500	0.472
Chile	Stocks	0.00364	0.72113	0.641	0.533	0.611	0.440	0.678	0.416	0.758	0.685	0.822	0.663
China	Stocks	0.00312	-0.28395	0.221	0.803	0.222	0.640	0.225	0.638	0.447	0.800	0.449	0.799
Colombia	Stocks	0.00631	-0.71533	1.972	0.155	1.691	0.202	2.208	0.147	3.598	0.165	4.456	0.108
Czech Republic	Stocks	-0.00119	-1.73496	2.790	0.076	0.056	0.815	5.682	0.023	0.310	0.856	0.919	0.632
Denmark	Stocks	-0.00126	-0.25726	0.128	0.881	0.117	0.735	0.142	0.708	0.162	0.922	0.261	0.878
Egypt	Stocks	0.00031	-1.19603	0.840	0.441	0.002	0.963	1.728	0.197	1.209	0.546	1.333	0.513
Finland	Stocks	-0.00524	-1.04242	1.300	0.286	1.229	0.276	1.362	0.251	2.169	0.338	3.780	0.151
France	Stocks	-0.00381	-0.60668	1.558	0.226	1.946	0.172	1.139	0.293	2.485	0.289	4.662	0.097
GCC	Bonds	0.00132	0.44761	0.215	0.808	0.083	0.776	0.356	0.555	0.263	0.877	0.443	0.801
	Stocks	0.00145	0.44261	3.265	0.051	1.538	0.224	4.915	0.033	4.768	0.092	8.470	0.014
	All			1.512	0.209	0.746	0.482	2.386	0.108	4.158	0.385	9.111	0.058
Germany	Stocks	-0.00277	-0.97778	2.439	0.103	0.872	0.357	4.020	0.053	3.528	0.171	4.897	0.086
Greece	Stocks	-0.01225	-1.02053	1.904	0.165	3.605	0.066	0.188	0.668	3.593	0.166	5.428	0.066
Hungary	Stocks	-0.00177	-1.50604	1.273	0.293	0.077	0.783	2.538	0.120	1.351	0.509	2.650	0.266
India	Stocks	0.00427	-0.31408	0.527	0.595	0.599	0.445	0.462	0.501	1.048	0.592	1.512	0.469
Indonesia	Stocks	0.00372	-2.42817	4.350	0.021	0.338	0.565	8.529	0.006	5.228	0.073	8.181	0.017

Ireland	Stocks	-0.01391	-0.01149	4.859	0.014	8.676	0.006	0.850	0.363	10.523	0.005	11.410	0.003
Italy	Stocks	-0.00692	-0.66435	3.059	0.060	5.529	0.025	0.520	0.476	5.565	0.062	11.825	0.003
Japan	Stocks	-0.00427	-0.04744	2.405	0.106	4.474	0.042	0.304	0.585	5.055	0.080	5.605	0.061
Malaysia	Bonds	0.00098	0.28862	0.176	0.839	0.087	0.769	0.273	0.605	0.231	0.891	0.627	0.731
	Stocks	0.00115	0.40471	1.746	0.190	0.629	0.434	2.896	0.098	2.900	0.235	3.439	0.179
	All			0.943	0.445	0.334	0.718	1.624	0.212	3.449	0.486	4.029	0.402
Mexico	Stocks	-0.00038	-1.28149	4.026	0.027	0.015	0.904	8.276	0.007	4.213	0.122	8.937	0.011
Morocco	Stocks	-0.00159	0.10448	0.078	0.925	0.094	0.761	0.064	0.801	0.170	0.918	0.228	0.892
Netherlands	Stocks	-0.00337	-0.66396	1.749	0.190	1.679	0.204	1.784	0.191	2.281	0.320	9.242	0.010
New Zealand	Stocks	-0.00295	-0.20009	0.282	0.756	0.555	0.462	0.009	0.925	0.562	0.755	1.619	0.445
Norway	Stocks	0.00055	0.80886	0.468	0.631	0.009	0.924	0.954	0.336	0.595	0.743	1.623	0.444
Pakistan	Stocks	0.00417	3.43210	2.059	0.144	0.133	0.718	4.089	0.051	1.606	0.448	1.660	0.436
Peru	Stocks	-0.00075	-3.53276	5.590	0.008	0.010	0.920	11.504	0.002	6.624	0.036	14.464	0.001
Philippines	Stocks	0.00202	-0.04250	0.114	0.892	0.183	0.672	0.047	0.829	0.238	0.888	0.377	0.828
Poland	Stocks	-0.00204	-1.60184	1.616	0.214	0.116	0.736	3.200	0.083	1.956	0.376	5.568	0.062
Qatar	Stocks	0.00319	-1.33852	1.819	0.178	0.303	0.586	3.404	0.074	3.115	0.211	2.995	0.224
Russia	Stocks	0.00429	0.72993	0.274	0.762	0.317	0.577	0.235	0.631	0.403	0.818	0.613	0.736
Singapore	Stocks	0.00170	-0.26106	0.361	0.700	0.235	0.631	0.498	0.485	0.618	0.734	0.821	0.663
South Africa	Stocks	0.00174	-0.81831	1.427	0.255	0.195	0.661	2.722	0.108	2.230	0.328	2.584	0.275
South Korea	Stocks	0.00250	-0.53162	0.472	0.628	0.213	0.648	0.749	0.393	0.950	0.622	0.620	0.734
Spain	Stocks	-0.00581	-1.39671	2.762	0.078	1.962	0.171	3.465	0.071	3.837	0.147	13.592	0.001
Sweden	Stocks	-0.00122	-0.38687	0.239	0.789	0.105	0.748	0.383	0.540	0.292	0.864	0.553	0.759
Switzerland	Stocks	-0.00143	-0.29155	0.371	0.693	0.340	0.564	0.410	0.526	0.703	0.704	0.656	0.720
Thailand	Stocks	0.00265	-0.81294	0.806	0.455	0.219	0.643	1.426	0.241	1.150	0.563	2.179	0.336
Turkey	Stocks	0.00733	0.95125	0.584	0.563	0.885	0.354	0.284	0.597	1.000	0.607	1.959	0.375
UAE	Bonds	0.00123	2.24327	2.385	0.108	0.030	0.863	4.879	0.034	3.292	0.193	4.053	0.132
	Stocks	0.00098	0.38793	2.043	0.146	0.582	0.451	3.548	0.068	3.183	0.204	5.390	0.068
	All			1.551	0.198	0.289	0.751	3.001	0.063	4.655	0.325	9.109	0.058
UK	Stocks	-0.00146	0.70812	4.238	0.023	0.553	0.462	8.030	0.008	6.561	0.038	8.888	0.012

Table B.12 Mean-Variance Spanning Tests on International Islamic Bond (Sukuk) Assets

Table B.12 presents the full results of joint tests for three sets of mean-variance spanning tests, expanding on Table 6. The benchmark assets are conventional stock, bond and money market indices within a given country or region (as indicated in the first column), and the test assets are four Islamic bond (*sukuk*) indices from the GCC, Malaysia, the UAE and a World index. Here we present the full set of results with estimated $\hat{\alpha}$ and $\hat{\delta}$ coefficients, as well as the test statistics and p-values for each individual Sukuk. The mean-variance tests are conducted on a world index level (i.e., conventional world indices as our test assets), followed by tests conducted with test assets from each country. The first test is based on the traditional Huberman and Kandel (1987) HK F-test of H_0: $\alpha = 0_N$, $\delta = 0_N$, from a regression of

$$R_{2t} = \alpha + \beta R_{1t} + \epsilon_t,$$

where R_{1t} is the K-vector of the returns on the K benchmark assets (conventional assets), $R_{2t}$is the N-vector of the returns on the N test assets (Islamic bonds). The second test is a step-down test developed in Kan and Zhou (2012) [KZ] where F_1 is an F-test of $\alpha = 0_N$ and F_2 is an F-test test of $\delta = 0_N$ conditional on $\alpha = 0_N$. The reported p-values for the first two sets of tests are exact under the normality assumptions on the residuals (see KZ). The third set of tests is also developed in KZ and is estimated via GMM and involves Wald tests W_a (valid under general distribution) and W_a^e(only valid when returns follow a multivariate elliptical distribution). They both have an asymptotic χ^2_{2N} distribution, where N is the number of test assets, and the reported p-values are asymptotic ones (see KZ). Data cover the period May 2007 to June 2010.

				HK Test		***KZ Step-down test***				***KZ GMM test***			
Country of conventional benchmark assets	Country of Islamic test asset (Islamic bond)	$\hat{\alpha}$	$\hat{\delta}$	F-test	p-value	F_1	p-value	F_2	p-value	W_a^e	p-value	W_a	p-value
World	GCC	0.00325	1.37598	6.016	0.006	3.944	0.055	7.461	0.010	7.340	0.025	43.757	0.000
	Malaysia	0.00191	0.18805	1.097	0.345	2.105	0.156	0.087	0.770	2.360	0.307	3.106	0.212
	UAE	0.00398	1.21032	3.576	0.039	3.635	0.065	3.271	0.079	4.747	0.093	24.532	0.000
	World	0.00297	1.98589	4.360	0.021	1.330	0.257	7.320	0.010	3.694	0.158	3.705	0.157
	All			3.238	0.004	1.356	0.272	5.686	0.001	13.987	0.082	48.804	0.000
Argentina	GCC	0.00329	1.02418	59.751	0.000	3.681	0.064	107.120	0.000	21.686	0.000	633.082	0.000
	Malaysia	0.00247	0.99447	73.020	0.000	2.679	0.112	136.423	0.000	31.518	0.000	622.605	0.000
	UAE	0.00421	1.02948	38.424	0.000	3.853	0.058	67.185	0.000	13.424	0.000	363.261	0.000
	World	0.00511	1.55737	85.493	0.000	5.498	0.025	145.636	0.000	29.487	0.000	115.020	0.000
	All			21.860	0.000	1.973	0.125	87.542	0.000	112.621	0.000	1949.000	0.000
Australia	GCC	0.00320	0.98133	56.167	0.000	3.948	0.056	99.496	0.000	53.530	0.000	439.319	0.000
	Malaysia	0.00070	0.65471	41.142	0.000	0.297	0.590	83.773	0.000	57.743	0.000	71.193	0.000
	UAE	0.00404	0.96695	32.528	0.000	3.788	0.060	56.496	0.000	29.278	0.000	353.337	0.000
	World	0.00149	0.81628	12.030	0.000	0.257	0.615	24.350	0.000	11.581	0.003	13.664	0.001
	All			16.599	0.000	0.923	0.464	64.494	0.000	133.140	0.000	819.427	0.000
Austria	GCC	0.00415	1.09442	73.843	0.000	6.530	0.015	121.896	0.000	57.327	0.000	550.208	0.000
	Malaysia	0.00184	0.68225	46.948	0.000	2.103	0.156	88.988	0.000	56.988	0.000	103.914	0.000
	UAE	0.00511	1.06134	43.143	0.000	6.097	0.019	69.996	0.000	31.305	0.000	282.267	0.000
	World	0.00408	1.00222	22.674	0.000	2.311	0.138	41.483	0.000	13.983	0.001	39.693	0.000
	All			17.911	0.000	1.797	0.155	63.195	0.000	107.973	0.000	732.220	0.000
Belgium	GCC	0.00371	1.04096	68.107	0.000	5.037	0.031	117.610	0.000	42.765	0.000	398.264	0.000
	Malaysia	0.00189	0.66428	50.502	0.000	2.400	0.131	94.810	0.000	43.954	0.000	167.208	0.000
	UAE	0.00457	0.98945	38.597	0.000	4.719	0.037	65.515	0.000	23.235	0.000	324.811	0.000

	World	0.00316	0.89856	17.559	0.000	1.261	0.269	33.607	0.000	8.983	0.011	55.695	0.000
	All			17.822	0.000	1.440	0.244	65.451	0.000	99.775	0.000	716.516	0.000
Brazil	GCC	0.00247	1.01358	14.831	0.000	1.918	0.176	26.994	0.000	11.993	0.002	73.785	0.000
	Malaysia	0.00033	0.55375	7.508	0.002	0.053	0.819	15.404	0.000	9.013	0.011	17.756	0.000
	UAE	0.00258	0.84423	6.229	0.005	1.292	0.264	11.068	0.002	4.628	0.099	40.399	0.000
	World	-0.00032	0.73505	3.791	0.033	0.013	0.910	7.802	0.009	3.854	0.146	10.240	0.006
	All			8.689	0.000	0.711	0.591	25.512	0.000	50.797	0.000	143.917	0.000
Canada	GCC	0.00310	1.03535	32.002	0.000	3.341	0.076	56.861	0.000	18.305	0.000	298.772	0.000
	Malaysia	0.00056	0.59548	17.364	0.000	0.173	0.680	35.392	0.000	15.630	0.000	29.157	0.000
	UAE	0.00374	1.00324	18.169	0.000	2.940	0.096	31.644	0.000	9.350	0.009	115.581	0.000
	World	0.00168	0.87567	8.538	0.001	0.357	0.554	17.031	0.000	4.311	0.116	28.336	0.000
	All			11.137	0.000	0.778	0.548	35.177	0.000	54.336	0.000	680.848	0.000
Chile	GCC	0.00186	0.96477	21.861	0.000	1.061	0.311	42.583	0.000	12.796	0.002	98.323	0.000
	Malaysia	0.00179	0.77926	16.946	0.000	1.183	0.285	32.528	0.000	12.361	0.002	27.389	0.000
	UAE	0.00216	0.90724	12.038	0.000	0.898	0.350	23.249	0.000	6.677	0.035	62.207	0.000
	World	0.00239	1.19871	12.278	0.000	0.641	0.429	24.180	0.000	7.158	0.028	16.367	0.000
	All			9.046	0.000	0.490	0.743	27.992	0.000	44.277	0.000	350.096	0.000
China	GCC	0.00430	1.58482	3.070	0.060	4.270	0.047	1.702	0.201	2.695	0.260	14.776	0.001
	Malaysia	-0.00117	-0.53263	0.459	0.636	0.477	0.495	0.447	0.508	0.481	0.786	0.911	0.634
	UAE	0.00443	1.19710	1.516	0.235	2.759	0.106	0.260	0.614	1.719	0.423	5.059	0.080
	World	0.00412	2.11456	1.582	0.221	1.334	0.257	1.811	0.188	1.132	0.568	4.144	0.126
	All			2.499	0.020	1.914	0.135	3.229	0.026	9.672	0.289	26.084	0.001
Colombia	GCC	0.00209	0.86253	12.786	0.000	1.490	0.231	23.730	0.000	9.982	0.007	61.687	0.000
	Malaysia	0.00086	0.65777	13.016	0.000	0.439	0.512	26.034	0.000	13.985	0.001	31.083	0.000
	UAE	0.00257	0.74970	6.316	0.005	1.424	0.241	11.066	0.002	4.988	0.083	36.602	0.000
	World	0.00021	0.75606	3.432	0.045	0.005	0.942	7.071	0.012	2.597	0.273	19.150	0.000
	All			7.162	0.000	0.474	0.755	20.320	0.000	36.230	0.000	209.250	0.000
Czech Republic	GCC	0.00276	1.07658	54.757	0.000	2.474	0.126	102.464	0.000	58.382	0.000	428.639	0.000
	Malaysia	0.00154	0.72696	49.144	0.000	1.520	0.227	95.267	0.000	89.364	0.000	116.105	0.000
	UAE	0.00370	1.02595	31.327	0.000	2.736	0.108	56.923	0.000	31.649	0.000	256.502	0.000
	World	0.00112	0.85123	12.804	0.000	0.155	0.696	26.122	0.000	12.497	0.002	31.497	0.000
	All			17.559	0.000	0.820	0.523	71.402	0.000	145.597	0.000	831.870	0.000
Denmark	GCC	0.00302	1.01905	61.721	0.000	3.398	0.074	112.346	0.000	40.964	0.000	539.164	0.000
	Malaysia	0.00152	0.67058	45.342	0.000	1.478	0.232	88.003	0.000	52.524	0.000	116.496	0.000
	UAE	0.00368	0.96034	33.632	0.000	3.069	0.089	60.614	0.000	20.832	0.000	261.572	0.000
	World	0.00196	0.84299	15.664	0.000	0.532	0.471	31.214	0.000	8.925	0.012	58.045	0.000
	All			17.681	0.000	0.951	0.448	68.729	0.000	105.024	0.000	1074.591	0.000
Egypt	GCC	0.00519	1.58324	6.209	0.005	6.627	0.015	4.969	0.033	5.816	0.055	15.682	0.000
	Malaysia	0.00223	0.99594	3.443	0.044	1.614	0.213	5.179	0.029	5.578	0.061	13.681	0.001
	UAE	0.00685	1.75960	5.535	0.008	7.850	0.008	2.680	0.111	5.389	0.068	12.337	0.002

	World	0.00694	2.68374	5.724	0.007	3.740	0.062	7.133	0.012	4.870	0.088	4.502	0.105
	All			3.786	0.001	2.961	0.036	4.832	0.004	17.814	0.023	185.733	0.000
Finland	GCC	0.00350	1.04507	55.942	0.000	4.341	0.045	98.170	0.000	51.798	0.000	373.323	0.000
	Malaysia	0.00184	0.65101	42.086	0.000	2.345	0.135	78.798	0.000	66.928	0.000	114.843	0.000
	UAE	0.00434	0.99326	32.213	0.000	4.210	0.048	55.156	0.000	27.281	0.000	280.018	0.000
	World	0.00253	0.83462	12.310	0.000	0.783	0.382	23.985	0.000	8.537	0.014	34.745	0.000
	All			15.683	0.000	1.299	0.292	54.641	0.000	94.233	0.000	798.425	0.000
France	GCC	0.00377	1.06862	68.030	0.000	5.259	0.028	116.609	0.000	68.455	0.000	617.611	0.000
	Malaysia	0.00180	0.66696	44.845	0.000	2.041	0.162	85.119	0.000	74.232	0.000	115.710	0.000
	UAE	0.00464	1.02276	38.890	0.000	4.920	0.033	65.522	0.000	35.180	0.000	322.413	0.000
	World	0.00317	0.93369	17.620	0.000	1.265	0.269	33.720	0.000	13.215	0.001	31.545	0.000
	All			17.076	0.000	1.398	0.258	61.544	0.000	107.896	0.000	861.159	0.000
GCC	GCC	0.00131	0.30953	1.801	0.181	0.869	0.358	2.743	0.107	2.151	0.341	1.004	0.605
	Malaysia	0.00144	0.63536	6.692	0.004	0.960	0.334	12.439	0.001	9.224	0.010	18.682	0.000
	UAE	0.00154	0.09252	0.399	0.674	0.766	0.388	0.033	0.858	0.774	0.679	0.923	0.630
	World	0.00262	0.89450	4.406	0.020	1.059	0.311	7.739	0.009	2.979	0.226	4.125	0.127
	All			5.241	0.000	0.643	0.636	12.758	0.000	20.718	0.008	233.881	0.000
Germany	GCC	0.00346	1.08879	58.413	0.000	4.352	0.045	102.644	0.000	54.517	0.000	533.901	0.000
	Malaysia	0.00177	0.65608	40.578	0.000	2.179	0.149	76.402	0.000	63.726	0.000	106.339	0.000
	UAE	0.00424	1.03252	32.756	0.000	4.029	0.053	56.586	0.000	27.092	0.000	285.205	0.000
	World	0.00251	0.88547	13.508	0.000	0.801	0.377	26.365	0.000	9.442	0.009	29.751	0.000
	All			15.933	0.000	1.237	0.316	56.422	0.000	95.412	0.000	748.097	0.000
Greece	GCC	0.00414	1.02078	126.205	0.000	7.329	0.011	207.552	0.000	92.676	0.000	1021.130	0.000
	Malaysia	0.00306	0.86971	103.605	0.000	4.559	0.040	183.947	0.000	178.184	0.000	86.885	0.000
	UAE	0.00521	0.99433	74.630	0.000	7.073	0.012	121.163	0.000	50.479	0.000	584.049	0.000
	World	0.00396	0.88418	31.045	0.000	2.185	0.149	57.942	0.000	22.232	0.000	152.262	0.000
	All			30.038	0.000	2.893	0.038	130.496	0.000	247.262	0.000	2495.447	0.000
Hungary	GCC	0.00340	1.09734	35.501	0.000	4.209	0.048	60.875	0.000	20.414	0.000	333.794	0.000
	Malaysia	0.00208	0.93910	36.480	0.000	2.225	0.146	68.202	0.000	25.668	0.000	96.600	0.000
	UAE	0.00429	1.14621	23.628	0.000	4.049	0.053	39.552	0.000	13.432	0.001	208.966	0.000
	World	0.00304	1.11466	13.399	0.000	1.233	0.275	25.386	0.000	7.291	0.026	25.878	0.000
	All			12.431	0.000	1.381	0.265	38.928	0.000	62.526	0.000	624.029	0.000
India	GCC	0.00261	0.99705	15.267	0.000	2.577	0.118	26.718	0.000	13.519	0.001	115.137	0.000
	Malaysia	0.00114	0.45205	7.564	0.002	1.196	0.282	13.851	0.001	10.754	0.005	13.540	0.001
	UAE	0.00322	0.91709	8.210	0.001	2.382	0.132	13.490	0.001	7.331	0.026	63.242	0.000
	World	0.00114	0.87656	4.290	0.022	0.186	0.669	8.599	0.006	3.159	0.206	17.618	0.000
	All			6.329	0.000	0.740	0.572	16.232	0.000	29.221	0.000	215.887	0.000
Indonesia	GCC	0.00216	0.93080	16.179	0.000	1.413	0.243	30.562	0.000	8.272	0.016	76.450	0.000
	Malaysia	0.00060	0.72732	19.711	0.000	0.205	0.653	40.185	0.000	14.106	0.001	55.579	0.000
	UAE	0.00280	0.88741	9.230	0.001	1.511	0.228	16.691	0.000	4.265	0.119	64.777	0.000

	World	-0.00108	0.53138	2.703	0.082	0.137	0.714	5.410	0.026	2.470	0.291	22.689	0.000
	All			8.450	0.000	0.542	0.706	25.223	0.000	41.793	0.000	192.225	0.000
Ireland	GCC	0.00425	0.94093	69.547	0.000	5.735	0.022	117.468	0.000	70.499	0.000	754.946	0.000
	Malaysia	0.00305	0.68981	69.105	0.000	5.449	0.026	117.786	0.000	108.613	0.000	150.421	0.000
	UAE	0.00533	0.88824	40.630	0.000	5.687	0.023	66.648	0.000	39.955	0.000	478.852	0.000
	World	0.00427	0.76261	16.250	0.000	2.003	0.166	29.648	0.000	13.188	0.001	51.075	0.000
	All			20.871	0.000	2.405	0.071	75.265	0.000	145.601	0.000	2230.377	0.000
Italy	GCC	0.00368	1.05680	71.428	0.000	4.784	0.036	124.244	0.000	20.105	0.000	599.053	0.000
	Malaysia	0.00202	0.68271	48.696	0.000	2.369	0.133	91.345	0.000	15.223	0.000	118.387	0.000
	UAE	0.00458	1.01515	41.130	0.000	4.578	0.040	70.285	0.000	11.698	0.003	324.383	0.000
	World	0.00318	0.93056	19.328	0.000	1.250	0.272	37.134	0.000	5.162	0.076	45.253	0.000
	All			17.793	0.000	1.438	0.246	66.215	0.000	65.791	0.000	877.312	0.000
Japan	GCC	0.00430	1.17410	52.857	0.000	7.781	0.009	82.039	0.000	54.661	0.000	200.617	0.000
	Malaysia	0.00236	0.68767	22.367	0.000	2.899	0.098	39.682	0.000	45.286	0.000	57.521	0.000
	UAE	0.00524	1.10764	28.668	0.000	6.837	0.013	43.281	0.000	28.577	0.000	112.443	0.000
	World	0.00204	0.59606	3.766	0.033	0.486	0.491	7.151	0.011	3.899	0.142	13.684	0.001
	All			15.751	0.000	2.398	0.071	48.178	0.000	98.658	0.000	578.932	0.000
Malaysia	GCC	0.00252	0.90605	9.303	0.001	2.220	0.146	15.801	0.000	12.604	0.002	55.504	0.000
	Malaysia	-0.00002	-0.00924	0.389	0.681	0.038	0.847	0.762	0.389	1.217	0.544	1.134	0.567
	UAE	0.00299	0.75613	4.091	0.026	1.866	0.181	6.154	0.018	5.301	0.071	27.953	0.000
	World	0.00010	0.27013	0.307	0.738	0.001	0.972	0.632	0.432	0.411	0.814	0.773	0.679
	All			5.965	0.000	0.750	0.566	15.083	0.000	36.241	0.000	171.168	0.000
Mexico	GCC	0.00244	0.81971	6.665	0.004	1.780	0.191	11.291	0.002	3.171	0.205	37.702	0.000
	Malaysia	0.00061	0.45582	4.065	0.026	0.216	0.645	8.100	0.007	2.677	0.262	11.916	0.003
	UAE	0.00270	0.69606	3.054	0.061	1.361	0.252	4.697	0.037	1.484	0.476	14.128	0.001
	World	0.00052	0.39561	0.625	0.541	0.032	0.859	1.254	0.271	0.317	0.854	2.420	0.298
	All			4.945	0.000	0.573	0.684	12.072	0.000	17.765	0.023	95.474	0.000
Morocco	GCC	0.00246	0.87452	71.723	0.000	2.169	0.150	136.712	0.000	30.621	0.000	397.849	0.000
	Malaysia	0.00158	0.76758	84.196	0.000	1.373	0.249	165.257	0.000	55.092	0.000	145.875	0.000
	UAE	0.00313	0.83356	41.625	0.000	2.227	0.145	78.277	0.000	17.860	0.000	263.805	0.000
	World	0.00096	0.78257	18.209	0.000	0.105	0.748	37.267	0.000	7.614	0.022	101.837	0.000
	All			22.660	0.000	0.817	0.524	103.431	0.000	132.840	0.000	2326.753	0.000
Netherlands	GCC	0.00340	1.04443	63.277	0.000	4.373	0.044	111.440	0.000	49.184	0.000	461.546	0.000
	Malaysia	0.00172	0.66763	44.294	0.000	1.915	0.175	84.464	0.000	60.294	0.000	110.189	0.000
	UAE	0.00421	0.99603	36.163	0.000	4.154	0.049	62.536	0.000	26.119	0.000	306.006	0.000
	World	0.00251	0.89621	15.932	0.000	0.819	0.372	31.207	0.000	10.529	0.005	36.359	0.000
	All			16.743	0.000	1.222	0.322	61.023	0.000	101.046	0.000	696.569	0.000
New Zealand	GCC	0.00385	0.94384	72.981	0.000	5.474	0.026	124.151	0.000	20.095	0.000	134.857	0.000
	Malaysia	0.00164	0.72194	67.897	0.000	1.570	0.219	132.012	0.000	23.172	0.000	58.599	0.000
	UAE	0.00469	0.88972	41.248	0.000	5.150	0.030	68.931	0.000	12.358	0.002	83.517	0.000

	World	0.00195	0.73829	15.073	0.000	0.469	0.498	30.147	0.000	3.835	0.147	22.788	0.000
	All			21.199	0.000	1.643	0.189	85.340	0.000	48.135	0.000	292.614	0.000
Norway	GCC	0.00346	0.94176	26.000	0.000	3.920	0.056	44.277	0.000	65.304	0.000	371.673	0.000
	Malaysia	0.00086	0.69286	20.156	0.000	0.350	0.558	40.741	0.000	118.899	0.000	115.687	0.000
	UAE	0.00435	0.93436	16.289	0.000	3.850	0.058	26.506	0.000	34.412	0.000	255.135	0.000
	World	0.00229	0.74330	5.757	0.007	0.615	0.438	11.024	0.002	14.540	0.001	28.483	0.000
	All			9.675	0.000	0.916	0.467	28.470	0.000	172.998	0.000	1651.351	0.000
Pakistan	GCC	0.00241	0.87120	229.789	0.000	2.390	0.131	439.729	0.000	107.999	0.000	1952.079	0.000
	Malaysia	0.00117	0.91825	280.164	0.000	0.621	0.436	565.832	0.000	202.082	0.000	502.340	0.000
	UAE	0.00280	0.85029	133.966	0.000	1.973	0.169	258.763	0.000	58.725	0.000	959.134	0.000
	World	0.00040	0.84412	62.262	0.000	0.019	0.891	128.096	0.000	26.140	0.000	169.660	0.000
	All			45.823	0.000	0.822	0.521	337.617	0.000	396.425	0.000	3375.865	0.000
Peru	GCC	0.00199	0.80436	7.559	0.002	1.212	0.279	13.817	0.001	5.705	0.058	46.688	0.000
	Malaysia	0.00065	0.58469	6.888	0.003	0.223	0.640	13.879	0.001	7.289	0.026	28.057	0.000
	UAE	0.00262	0.79110	4.714	0.016	1.339	0.256	8.007	0.008	3.547	0.170	32.123	0.000
	World	-0.00025	0.34817	0.608	0.551	0.007	0.933	1.246	0.272	0.550	0.760	1.154	0.562
	All			4.322	0.000	0.455	0.768	10.479	0.000	19.476	0.013	134.648	0.000
Philippines	GCC	0.00189	0.76309	8.710	0.001	1.160	0.289	16.184	0.000	7.049	0.029	17.263	0.000
	Malaysia	-0.00040	0.24321	2.540	0.094	0.115	0.736	5.097	0.031	3.448	0.178	6.763	0.034
	UAE	0.00180	0.53901	2.852	0.072	0.690	0.412	5.061	0.031	2.072	0.355	10.357	0.006
	World	0.00066	0.77762	3.131	0.057	0.047	0.830	6.395	0.016	2.502	0.286	16.140	0.000
	All			6.594	0.000	0.520	0.722	17.843	0.000	31.853	0.000	50.342	0.000
Poland	GCC	0.00311	1.07052	65.606	0.000	3.263	0.080	120.177	0.000	49.067	0.000	499.146	0.000
	Malaysia	0.00189	0.78470	59.649	0.000	2.031	0.163	113.909	0.000	100.742	0.000	148.668	0.000
	UAE	0.00388	1.07253	41.003	0.000	3.162	0.084	74.258	0.000	27.345	0.000	363.168	0.000
	World	0.00208	0.91232	17.333	0.000	0.532	0.471	34.598	0.000	11.077	0.004	58.857	0.000
	All			18.721	0.000	1.033	0.406	74.357	0.000	119.640	0.000	698.681	0.000
Qatar	GCC	0.00178	0.39504	4.893	0.014	1.682	0.203	7.949	0.008	7.866	0.020	4.691	0.096
	Malaysia	0.00159	0.85696	26.686	0.000	1.720	0.198	50.610	0.000	65.560	0.000	76.775	0.000
	UAE	0.00243	0.34845	2.554	0.093	1.769	0.192	3.267	0.079	3.896	0.143	2.147	0.342
	World	0.00081	0.73543	4.134	0.025	0.093	0.762	8.393	0.006	4.818	0.090	7.841	0.020
	All			7.087	0.000	0.763	0.557	18.691	0.000	32.282	0.000	262.478	0.000
Russia	GCC	0.00218	0.74129	8.286	0.001	1.631	0.211	14.660	0.001	6.300	0.043	45.815	0.000
	Malaysia	0.00063	0.51517	5.827	0.007	0.185	0.670	11.760	0.002	6.514	0.039	12.236	0.002
	UAE	0.00253	0.63544	3.738	0.035	1.348	0.254	6.065	0.019	2.710	0.258	20.521	0.000
	World	0.00106	0.55763	1.992	0.153	0.159	0.693	3.926	0.056	1.509	0.470	6.800	0.033
	All			6.344	0.000	0.480	0.750	17.233	0.000	32.543	0.000	133.816	0.000
Singapore	GCC	0.00310	1.05873	10.499	0.000	3.227	0.082	16.678	0.000	9.818	0.007	82.289	0.000
	Malaysia	0.00010	0.08989	0.247	0.783	0.012	0.913	0.496	0.486	0.398	0.820	0.624	0.732
	UAE	0.00366	0.93431	5.399	0.009	2.780	0.105	7.620	0.009	5.117	0.077	53.087	0.000

	World	0.00163	0.22988	0.363	0.698	0.426	0.519	0.305	0.584	0.482	0.786	0.516	0.772
	All			4.388	0.000	0.780	0.547	9.885	0.000	19.339	0.000	129.985	0.000
South Africa	GCC	0.00247	0.91714	22.323	0.000	1.903	0.177	41.605	0.000	15.717	0.000	106.141	0.000
	Malaysia	0.00225	0.93427	38.912	0.000	2.640	0.114	71.622	0.000	35.489	0.000	191.192	0.000
	UAE	0.00332	0.90040	13.491	0.000	2.183	0.149	23.940	0.000	8.858	0.012	58.570	0.000
	World	0.00088	0.93908	8.998	0.001	0.087	0.769	18.417	0.000	6.603	0.037	25.149	0.000
	All			11.009	0.000	1.107	0.372	33.772	0.000	62.291	0.000	881.059	0.000
South Korea	GCC	0.00252	1.04678	52.423	0.000	2.389	0.132	98.436	0.000	59.978	0.000	295.491	0.000
	Malaysia	0.00249	0.63198	47.556	0.000	5.451	0.026	79.283	0.000	95.763	0.000	181.469	0.000
	UAE	0.00340	0.98448	31.506	0.000	2.847	0.101	57.065	0.000	35.416	0.000	298.224	0.000
	World	0.00192	0.70572	9.285	0.001	0.533	0.470	18.288	0.000	10.983	0.000	15.253	0.000
	All			15.649	0.000	1.940	0.129	50.907	0.000	110.822	0.000	745.863	0.000
Spain	GCC	0.00311	1.06102	62.060	0.000	3.291	0.079	113.408	0.000	52.350	0.000	456.465	0.000
	Malaysia	0.00212	0.72617	52.769	0.000	2.765	0.106	97.838	0.000	96.028	0.000	128.716	0.000
	UAE	0.00390	1.01914	36.157	0.000	3.228	0.081	64.950	0.000	27.388	0.000	285.874	0.000
	World	0.00261	1.01708	20.726	0.000	0.846	0.364	40.785	0.000	15.371	0.000	46.756	0.000
	All			17.395	0.000	1.133	0.359	65.473	0.000	110.510	0.000	705.862	0.000
Sweden	GCC	0.00382	1.04083	57.847	0.000	5.552	0.025	97.136	0.000	62.993	0.000	270.273	0.000
	Malaysia	0.00127	0.67360	37.332	0.000	0.966	0.333	73.771	0.000	73.727	0.000	83.423	0.000
	UAE	0.00448	0.98030	30.429	0.000	4.462	0.042	51.183	0.000	29.749	0.000	163.134	0.000
	World	0.00382	0.75579	11.611	0.000	2.059	0.161	20.522	0.000	10.897	0.004	51.418	0.000
	All			17.095	0.000	1.568	0.208	61.177	0.000	124.392	0.000	502.949	0.000
Switzerland	GCC	0.00382	1.03979	64.914	0.000	5.542	0.024	110.012	0.000	63.950	0.000	589.823	0.000
	Malaysia	0.00160	0.65740	42.447	0.000	1.595	0.215	81.908	0.000	57.562	0.000	120.025	0.000
	UAE	0.00458	0.96338	34.654	0.000	4.905	0.034	57.940	0.000	30.328	0.000	217.101	0.000
	World	0.00263	0.71650	11.141	0.000	0.951	0.336	21.361	0.000	7.057	0.029	24.177	0.000
	All			17.592	0.000	1.433	0.246	64.193	0.000	105.533	0.000	868.487	0.000
Thailand	GCC	0.00274	1.10849	24.831	0.000	2.815	0.103	44.537	0.000	15.030	0.001	132.859	0.000
	Malaysia	0.00115	0.73607	14.859	0.000	0.676	0.417	29.314	0.000	14.658	0.001	26.607	0.000
	UAE	0.00333	1.05818	14.273	0.000	2.607	0.116	24.801	0.000	8.418	0.015	99.417	0.000
	World	0.00038	0.68322	3.203	0.053	0.018	0.893	6.573	0.015	1.798	0.407	14.477	0.001
	All			9.237	0.000	0.855	0.502	26.615	0.000	40.235	0.000	241.319	0.000
Turkey	GCC	0.00292	0.99453	15.033	0.000	3.020	0.092	25.488	0.000	9.435	0.009	106.692	0.000
	Malaysia	0.00131	0.70615	9.361	0.001	0.784	0.383	18.058	0.000	6.948	0.031	19.308	0.000
	UAE	0.00366	0.98533	9.736	0.000	2.995	0.093	15.537	0.000	6.531	0.038	76.157	0.000
	World	0.00223	0.51251	1.545	0.229	0.623	0.436	2.496	0.124	1.121	0.571	5.555	0.062
	All			5.936	0.000	0.827	0.519	14.768	0.000	23.788	0.002	182.599	0.000
UAE	GCC	0.00243	0.44145	6.471	0.004	3.741	0.061	8.532	0.006	8.379	0.015	3.492	0.174
	Malaysia	0.00165	0.62925	8.575	0.001	1.240	0.273	15.801	0.000	17.251	0.000	14.463	0.001
	UAE	0.00278	0.23784	2.012	0.149	2.959	0.095	1.008	0.322	3.468	0.177	3.116	0.211

	World	0.00305	0.75440	4.200	0.023	1.403	0.244	6.916	0.013	3.342	0.188	4.965	0.084
	All			8.312	0.000	1.906	0.134	19.580	0.000	36.553	0.000	400.864	0.000
UK	GCC	0.00319	0.91471	28.516	0.000	3.779	0.060	49.229	0.000	27.717	0.000	326.259	0.000
	Malaysia	0.00270	0.74468	26.076	0.000	3.714	0.063	44.857	0.000	37.264	0.000	70.263	0.000
	UAE	0.00413	0.93557	18.978	0.000	3.861	0.058	31.449	0.000	18.368	0.000	179.400	0.000
	World	0.00218	0.55265	4.531	0.018	0.752	0.392	8.371	0.007	4.054	0.132	10.240	0.006
	All			10.814	0.000	1.572	0.207	30.451	0.000	63.363	0.000	408.589	0.000
US	GCC	0.00392	1.40190	14.393	0.000	5.021	0.032	21.251	0.000	15.445	0.000	82.666	0.000
	Malaysia	0.00120	0.41964	1.827	0.177	0.669	0.419	3.014	0.092	3.049	0.218	3.739	0.154
	UAE	0.00441	1.33071	8.063	0.001	3.861	0.058	11.314	0.002	8.216	0.016	61.570	0.000
	World	0.00392	1.35021	4.885	0.014	1.830	0.185	7.751	0.009	4.479	0.107	3.945	0.139
	All			5.210	0.000	1.493	0.229	10.812	0.000	24.530	0.002	125.468	0.000

Table B.13: Differences between Volatility Linkages that Involve Two Conventional Assets, and Volatility Linkages that Involve at Least One Islamic Asset (Controlling for the Oil Index)

Table B.13 reports the results of testing for zero mean using five difference series of daily volatility linkages and all the combined difference series, after orthogonalizing them on the oil index. The difference series of volatility linkages are obtained by subtracting the correlation that involves at least one Islamic (IS) asset from the corresponding correlation between conventional (C) assets. Assets include stock, government (Govt) bond, corporate (Corp) bond and money instruments. The correlations are estimated using Pearson correlation across absolute returns (Panel A) and squared returns (Panel B). Data cover the period May 2007 to June 2010. Estimates that are significant at the 1%, 5% and 10% levels are denoted by superscripts a, b and c, respectively. Next to the t-statistics, these superscripts denote one-tailed tests, and next to the p-values, they refer to two-tailed tests.

Differences	*C Stock and C Govt Bond - IS Stock and C Govt Bond*	*C Stock and C Corp Bond - IS Stock and C Corp Bond*	*C Stock and C Money - IS Stock and C Money*	*C Stock and C Corp Bond - C Stock and IS Corp Bond*	*C Stock and C Corp Bond - IS Stock and IS Corp Bond*	*Total Differences*
Panel A: Correlations of Absolute Returns						
Mean	0.0262	0.0260	0.0267	0.0801	0.1038	0.0316
T-Statistic	3.747[a]	4.869[a]	4.1244[a]	1.3183	2.4407[b]	6.5282[a]
P-value	0.0006[a]	0.0000[a]	0.0004[a]	0.2790	0.1001[c]	0.0000[a]
Panel B: Correlations of Squared Returns						
Mean	0.0302	0.0282	0.0200	0.1110	0.1351	0.0348
T-Statistic	2.7092[a]	4.1723[a]	3.2001[a]	1.7538[c]	2.3248[c]	5.4052[a]
P-value	0.0103[a]	0.0003[a]	0.0040[a]	0.1777	0.1026	0.0000[a]

Table B.14: Differences in Volatility Linkages during Crisis and Non-Crisis Sub-Periods

Table B.14 presents the results of testing for zero mean using three difference series of daily volatility linkages and all the combined difference series, for non-crisis and crisis sub-periods. The difference series are obtained by subtracting the correlation that involves at least one Islamic (IS) asset from the corresponding correlation across two conventional (C) assets. Assets include stock, government (Govt) bond, corporate (Corp) bond and money instruments. The correlations are estimated using Pearson correlation across absolute returns (Panels A and C) and squared returns (Panels B and D). We report percentage point differences that are consistent with our main analysis in Panels A and B, while we also present percentage changes (expressed as decimals) in Panels C and D. The entire sample period is divided into a non-crisis period (31 May 2007 to 16 March 2008) and a crisis period (17 March 2008 to 8 June 2010). Estimates that are significant at the 1%, 5% and 10% levels are denoted by superscripts a, b and c, respectively (one-tailed test). We report standard and bootstrapped t-statistics.

Differences	*Total Differences*		*C Stock & C Govt Bond - IS Stock & C Govt Bond*		*C Stock & C Corp Bond - IS Stock & C Corp Bond*		*C Stock & C Money - IS Stock & C Money*	
Sample	Crisis	Non-crisis	Crisis	Non-crisis	Crisis	Non-crisis	Crisis	Non-crisis
Panel A: Correlations of Absolute Returns (percentage point differences)								
Mean	0.0347	0.0332	0.0267	0.0230	0.0266	0.0239	0.0277	0.0329
T-Statistic	5.9466[a]	6.1795[a]	4.0007[a]	2.8166[a]	4.6910[a]	3.3988[a]	4.1331[a]	3.5033[a]
Bootstrapped T-Statistic	58.6539[a]	60.8847[a]	24.7116[a]	17.3070[a]	24.7995[a]	18.0769[a]	20.6455[a]	17.4078[a]
Test for Equal Means								
Difference	0.0015		0.0038		0.0028		-0.0052	
T-Statistic	0.1917		0.3620		0.3150		-0.4619	
Bootstrapped T-Statistic	1.9163[b]		2.1850[b]		1.6031[c]		-2.2512	
Panel B: Correlations of Squared Returns (percentage point differences)								
Mean	0.0370	0.0397	0.0301	0.0270	0.0297	0.0221	0.0232	0.0413
T-Statistic	5.3392[a]	5.7121[a]	2.9821[a]	2.9748[a]	4.0388[a]	2.6897[a]	3.5290[a]	3.5212[a]
Bootstrapped T-Statistic	52.4432[a]	56.5861[a]	18.4318[a]	18.2887[a]	21.4103[a]	14.2264[a]	17.6399[a]	17.6873[a]
Test for Equal Means								
Difference	-0.0027		0.0031		0.0076		-0.0181	
T-Statistic	-0.2806		0.2302		0.7045		-1.3730	
Bootstrapped T-Statistic	-2.7426		1.4172[c]		3.6681[a]		-6.7506	
Panel C: Correlations of Absolute Returns (percentage changes expressed as decimals)								
Mean	0.0903	0.7759	0.0555	0.1189	0.0837	2.2365	0.0550	0.2539
T-Statistic	5.0679[a]	1.0788	2.4122[a]	0.8735	5.1946[a]	0.8520	3.3281[a]	2.0216[b]
Bootstrapped T-Statistic	49.7816[a]	10.6571[a]	14.8987[a]	5.2604[a]	27.5290[a]	4.6270[a]	16.5841[a]	10.0999[a]
Test for Equal Means								

Difference	-0.6857	-0.0634	-2.1527	-0.1989
T-Statistic	-0.9581	-0.4543	-0.8568	-1.6041
Bootstrapped T-Statistic	-9.4012	-2.7424	-4.4702	-7.8742

Panel D: Correlations of Squared Returns (percentage changes expressed as decimals)

Mean	0.0664	0.2715	0.0193	-0.0608	0.1040	0.7610	-0.0778	0.1366
T-Statistic	1.2936[c]	1.7290[b]	0.2478	-0.4149	4.3601[a]	1.4918	-0.5419	3.0271[a]
Bootstrapped T-Statistic	12.7797[a]	16.9914[a]	1.5209[c]	-2.5369	23.0347[a]	7.8906[a]	-2.7012	15.1349[a]

Test for Equal Means

Difference	-0.2051	0.0801	-0.6570	-0.2144
T-Statistic	-1.2479	0.4894	-1.3110	-1.4551
Bootstrapped T-Statistic	-12.2168	2.9650[a]	-6.7966	-7.1367

Table B.15: Average Risk-Return Profiles for Conventional and Islamic Asset Returns

This table reports the annualized mean returns and standard deviations (using 252 trading days per year) of daily returns for conventional stocks, corporate bonds, government (Govt) bonds and money, and Islamic stocks and bonds. We report average results across all countries, and results for world indices. Panels A–B provide results for the entire period, while Panels C–D and E–F focus on the non-crisis and crisis sub-periods, respectively. The entire sample period is 31 May 2007 to 8 June 2010 and is divided into a non-crisis sub-period (31 May 2007 to 16 March 2008) and a crisis sub-period (17 March 2008 to 8 June 2010).

	Conventional Stock	*Islamic Stock*	*Money*	*Conventional Corporate Bond*	*Conventional Govt Bond*	*Islamic Corporate Bond*
Panel A: Entire period, across all sample countries [annualized %]						
Average	12.1342	12.9918	9.2140	8.4167	9.0156	1.5338
Standard deviation	17.1069	17.9080	6.5127	24.7629	7.1382	4.5502
Panel B: Entire period, world [annualized %]						
Average	-3.3761	-2.9935		0.5774		1.4411
Standard deviation	11.7910	11.5512		1.3582		6.7296
Panel C:Non-crisis period, across all sample countries [annualized %]						
Average	14.1082	17.6442	11.4855	5.3423	13.0267	2.8312
Standard deviation	12.8417	13.6438	4.4682	3.8954	4.9912	1.9456
Panel D: Non-crisis period, world [annualized %]						
Average	-5.6104	-0.4777		1.0714		0.8586
Standard deviation	6.8954	7.0075		1.3343		0.8261
Panel E: Crisis period, across all sample countries [annualized %]						
Average	11.4329	11.3392	8.4086	9.5018	7.5889	1.0721
Standard deviation	18.3855	19.1954	7.0971	28.7103	7.7581	5.1701
Panel F: Crisis period, world [annualized %]						
Average	-3.3761	-2.9935		0.5774		1.4411
Standard deviation	11.7910	11.5512		1.3582		6.7296

Table B.16: Differences between Volatility Linkages that Involve Two Conventional Assets, and Volatility Linkages that Involve at Least One Islamic Asset for *GARCH*-Implied Volatilities

Panel A reports the results of testing for zero mean using five difference series of daily volatility linkages and all the difference series combined. The difference series of volatility linkages are obtained by subtracting the correlation that involves at least one Islamic (IS) asset from the corresponding correlation between conventional (C) assets. Assets include stock, government (Govt) bond, corporate (Corp) bond and money instruments. The correlations are estimated using Pearson correlation across *GARCH*-implied volatilities. We choose a *GARCH(1,1)* model for our return series based on the Akaike and the Schwarz Bayesian information criteria, and by examining the model residuals. In Panel B, the sample is split into Islamic and non-Islamic countries. Estimates that are significant at the 1%, 5% and 10% levels are denoted by superscripts a, b and c, respectively. Next to the t-statistics, these superscripts denote one-tailed tests, and next to the p-values, they refer to two-tailed tests.

Panel A: Correlation of GARCH-implied Volatilities

Differences	*C Stock and C Govt Bond - IS Stock and C Govt Bond*	*C Stock and C Corp Bond - IS Stock and C Corp Bond*	*C Stock and C Money - IS Stock and C Money*	*C Stock and C Corp Bond - C Stock and IS Corp Bond*	*C Stock and C Corp Bond - IS Stock and IS Corp Bond*	*Total Differences*
Mean	0.0288	0.0231	0.0203	0.1853	0.2151	0.0448
T-Statistic	1.5853	2.3954[b]	1.8607[c]	1.5319	1.9043	3.7133[a]
P-value	0.1216	0.0241[b]	0.0756[c]	0.2231	0.1530	0.0003[a]

Panel B: Differences by Country Type

Differences	*C Stock & C Govt Bond - IS Stock & C Govt Bond*		*C Stock &C Corp Bond - IS Stock & C Corp Bond*		*C Stock & C Money - IS Stock & C Money*		*Total Differences*	
Sample	Islamic	Non-Islamic	Islamic	Non-Islamic	Islamic	Non-Islamic	Islamic	Non-Islamic
Mean	0.0610	0.0260	0.0399	0.0147	0.0398	0.0164	0.0438	0.0205
T-Statistic	3.0017[b]	1.3204	2.8973[a]	1.1764	3.1839[a]	1.2831	4.9134[a]	1.9830[c]
P-value	0.0954[b]	0.1958	0.0200[b]	0.2556	0.0499[a]	0.2149	0.0002[a]	0.0512[c]

Test for equal means

Difference	0.0350	0.0252	0.0234	0.0234
T-Statistic	1.2386	1.3537	1.3123	1.7103
P-value	0.2548	0.1908	0.2169	0.3002

Table B.17: List of Data Sources for the Stock, Bond and Money Market Indices Used in the Robustness Section

This table contains a list of the names, sources and time periods for the stock, bond and money market indices used in our robustness section.

Country	Index Name	Source and Period
Panel A: Stock indices		
Canada, UK, US	Dow Jones Islamic Index	30 December 1999– 8 June 2010, Datastream
Malaysia	FTSE Bursa Malaysia Hijrah Shariah Index	31 May 2005–8 June 2010, Provided by FTSE Group Australia [info@ftse.com]
Australia, Canada, Egypt, Hungary, Indonesia, Malaysia, Pakistan, South Korea, UK, US	MSCI Large Cap Index, MSCI Large Cap Islamic Index, MSCI Mid Cap Index, MSCI Mid Cap Islamic Index, MSCI Small Cap Index, MSCI SMID Cap Index, MSCI IMI Cap Index	31 May 2007–8 June 2010, MSCI Barra [www.mscibarra.com/products/indices]
Panel B: Bond and money market indices		
Gulf Cooperation Council (GCC) and United Arab Emirates (UAE)	GCC Sukuk Index and UAE Sukuk Index	31 May 2005–8 June 2010, Dubai International Financial Exchange, [http://www.hsbc-nasdaqdubai.com/Default.aspx]
Canada, UK, US	FTSE Global Government All Maturities	31 May 2005–8 June 2010, Datastream
Malaysia	JPM GBI-EM Divers, JPM EMBI Global	31 May 2005–8 June 2010, Datastream
Australia	UBS Treasury All Maturities, Macquarie BK Corporate Bond, FTSE Global Government All Maturities	31 May 2007–8 June 2010, Datastream
Hungary	Hungary Government DMA MAX Bill Index	31 May 2007–8 June 2010, Datastream
Indonesia, Pakistan	Barclays EM Asia	31 May 2007–8 June 2010, Datastream
South Korea	HSBC ADBI Korea	31 May 2007–8 June 2010, Datastream
Malaysia	JPM EMBI Global	31 May 2007–8 June 2010, Datastream
Malaysia	Malaysian Government Bond Index	31 May 2007–8 June 2010, Quant Shop [www.quantshop.com/malaysian%20bond%20v1.htm]

Table B.18: Sensitivity of Volatility Linkage Estimates to Alternative Sample Periods using Pearson Correlation and the Absolute Return Volatility Proxy for a Sub-Sample of Countries

This table presents additional robustness results (with volatility linkages computed using Pearson correlation across absolute returns) for extended periods of time. The volatility linkages for the six countries below involve Islamic (IS) and conventional stock, corporate bond (Corp Bond) and government bond (Govt Bond) markets. The sample periods considered are: 31 December 1999 to 8 June 2010 (Panel A), 31 May 2005 to 8 June 2010 (Panel B), and 31 May 2007 to 8 June 2010 (Panel C).

Country	Canada	GCC	Malaysia	UAE	UK	USA
Panel A: Years 2000 – 2010						
C Stock & C Govt Bond	0.3831				0.2074	0.2258
IS Stock & C Govt Bond	0.3062				0.1940	0.1901
Panel B: Years 2005 – 2010						
C Stock & C Govt Bond	0.4979		0.4174		0.2738	0.3172
IS Stock & C Govt Bond	0.4689		0.3609		0.2577	0.3039
C Stock & C Corp Bond						
IS Stock & C Corp Bond						
C Stock & C Corp Bond		0.0853		0.2874		
C Stock & IS Corp Bond		0.0698		0.2524		
Panel C: Main Analysis Sample: Years 2007 - 2010						
C Stock & C Govt Bond	0.4806		0.4020		0.2378	0.2734
IS Stock & C Govt Bond	0.4642		0.3446		0.2236	0.2666
C Stock & C Corp Bond						
IS Stock & C Corp Bond						
C Stock & C Corp Bond		0.1324		0.3305		
C Stock & IS Corp Bond		0.0978		0.2795		

Table B.19: Sensitivity of Volatility Linkage Estimates to Alternative Bond and Money Market Indices using Pearson Correlation and the Absolute Return Volatility Proxy for a Sub-Sample of Countries

This table reports the results for the second additional robustness test for which volatility linkages are computed using Pearson correlation across absolute returns. The robustness test involves estimating the volatility linkages using alternative asset market proxies (Panel A) for five countries. For comparison purposes, the previous estimates using the original asset market proxies are presented in Panel B. The volatility linkages involve Islamic (IS) and conventional (C) stock, corporate bond (Corp Bond), government bond (Govt Bond) and money markets, and the sample period is from 31 May 2007 to 8 June 2010.

Country	Australia	Hungary	Indonesia	Malaysia	Pakistan	South Korea
Panel A: New Asset Market Proxies						
C Stock & C Govt Bond	0.5041			0.4055		
IS Stock & C Govt Bond	0.5054			0.3467		
C Stock & Money	0.5168	0.6741				
IS Stock & Money	0.5124	0.5907				
C Stock & C Corp Bond	0.5727		0.1828	0.1693	0.0750	0.2491
IS Stock & C Corp Bond	0.5719		0.0860	0.1907	0.0774	0.2511
Panel B: Main Analysis Sample Market Proxies						
C Stock & C Govt Bond	0.5277			0.4055		
IS Stock & C Govt Bond	0.5223			0.3467		
C Stock & Money	0.5725	0.6370				
IS Stock & Money	0.5727	0.5554				
C Stock & C Corp Bond	0.5520		0.3039	0.3699	0.0581	0.1658
IS Stock & C Corp Bond	0.5516		0.2180	0.3098	0.0442	0.1655

Table B.20: Sensitivity of Volatility Linkage Estimates to Alternative Stock Indices using Pearson Correlation and the Absolute Return Volatility Proxy for a Sub-Sample of Countries

This table summarises the results for the third additional robustness test, where volatility linkages are computed using Pearson correlation across absolute returns. The robustness test involves estimating the volatility linkages between alternative stock market indices and a money market index (Panel A), a conventional corporate bond market index (Panel B), a conventional government bond market index (Panel C) and an Islamic corporate bond market index (Panel D) for ten countries. The various stock market indices refer to conventional (C) and Islamic (IS) indices with various market capitalizations, including large, mid, small, SMID (small and mid) and IMI (small, mid and large). The sample period is from 31 May 2007 to 8 June 2010.

Country	Australia	Canada	Egypt	Hungary	Indonesia	Malaysia	Pakistan	South Korea	UK	USA
Panel A: Stock and Money Market										
C Large Stock	0.5624		0.0406	0.6293	0.5518	0.3983		0.7311		
IS Large Stock	0.5527		0.0572		0.4374	0.3694				
C Mid Stock	0.5821		0.0418	0.5648	0.5059	0.3939		0.7168		
IS Mid Stock	0.5691		0.0548		0.4947	0.3130				
C Small Stock	0.6126		0.0438	0.6342	0.4713	0.4184		0.7331		
C SMID Stock	0.6025		0.0495	0.6008	0.5163	0.4287		0.7299		
C IMI Stock			0.0486	0.6405	0.5555	0.4247		0.7380		
Panel B: Stock and Corporate Bond Market										
C Large Stock	0.5416		0.1682	0.3501	0.3006	0.3377	0.0587	0.1624		0.3170
IS Large Stock	0.5318		0.1377		0.2095	0.2670	0.0517			0.3046
C Mid Stock	0.5640		0.1282	0.2615	0.2965	0.3215	0.0401	0.1681		0.2932
IS Mid Stock	0.5487		0.0778		0.3119	0.2422	0.0503			0.2801
C Small Stock	0.5932		0.2328	0.2735	0.2540	0.3308		0.1771		0.2841
C SMID Stock	0.5836		0.2030	0.2674	0.2871	0.3428		0.1744		0.2823
C IMI Stock			0.1903	0.3302	0.3070	0.3534		0.1630		
Panel C: Stock and Government Bond Mark										
									0.3443	0.2750
C Large Stock	0.5179	0.4799			0.5926	0.3556				
IS Large Stock	0.5024	0.4517			0.4751	0.2853			0.3411	0.2654
C Mid Stock	0.5375	0.4826			0.5628	0.3608			0.3608	0.2581
IS Mid Stock	0.5228	0.4608			0.5288	0.2682			0.3331	0.2496
C Small Stock	0.5678	0.5189			0.5265	0.3590			0.3743	0.2519
C SMID Stock	0.5569	0.5027			0.5737	0.3800			0.3703	0.2567
C IMI Stock					0.6016	0.3813				
Panel D: Stock and Islamic Corporate Bond Market										
C Large Stock			0.3443							
IS Large Stock			0.2747							
C Mid Stock			0.3288							
IS Mid Stock			0.2485							
C Small Stock			0.3402							
C SMID Stock			0.3512							
C IMI Stock			0.3606							

Online Appendix C

Appendix C presents further analysis of mean-variance efficiency among Islamic and conventional assets. Our full-fledged value creation analysis is presented in sections C.1 and C.2. We also provide strong *suggestive* evidence of value creation using two other approaches: Risk to Reward Ratio Analysis in section C.3, and Book level value creation analysis in section C.4. However, these three additional analysis analyses are only *suggestive* and do not map into value creation based on the mean-variance value rule. The purpose of the additional analysis is to encourage further research which is beyond the scope of this paper.

C.1. Statistical tests for mean-variance efficiency

We explore whether the Islamic and conventional equity portfolios are mean-variance efficient and conduct the multivariance F-test based on Gibbons, Ross, and Shanken (1989) [GRS] using the bootstrap method to overcome small sample size issues and the MacKinlay and Richardson (1991) [MR] test in GMM which is robust to departures from normality and allows the market-model residuals to be serially dependent and conditionally heteroscedastic.

The analysis is conducted on asset level for the value-weighted Islamic and conventional portfolios derived from an additional sample with individual equities which is available for world equity indices, as well as the value-weighted Islamic, non-Islamic and conventional (market) portfolios from an additional Malaysian dataset.[iii] All equity returns are expressed in US dollars and excess returns calculated over the one-month US Treasury Bill. We examine whether the portfolios are mean-variance efficient under the null hypothesis (i.e., we test whether we can reject mean-variance efficiency at a certain level of significance) and present results in Table C.1. Across all four specifications in Table C.1 (i.e., Panel A with the GRS test for the World Equity and Malaysian Equity samples and Panel B with the MR test for the World Equity and Malaysian Equity samples) the Islamic portfolio has lower F-Statistics and J-Statistics relative to the conventional portfolio, i.e., we are less likely to reject mean-variance efficiency.[iv] These tests are not designed to compare ex ante

mean-variance efficiency across different test portfolios, but our findings provide suggestive evidence that Islamic portfolios are relatively similar to conventional portfolios in terms of mean-variance efficiency, and even tend to be somewhat closer to the global minimum-variance portfolio as can be seen in the graphical illustrations and the KZ step-down tests of mean-variance spanning.

Table C.1: Gibbons et al. (1989, GRS) and MacKinlay and Richardson (1991, MR) tests for Mean-Variance Efficiency with Islamic Assets

Table C.1 presents mean-Variance efficiency test results using Gibbons, Ross and Shanken (1989 (GRS)) test in Panel A and the MacKinlay and Richardson (1991 (MR)) test within GMM framework in Panel B for world equity market sample (value-weighted Islamic and conventional world equity portfolios) and our Malaysian equity sample (value-weighted market (conventional), Islamic and non-Islamic portfolios). A portfolio is mean-variance efficient under the null hypothesis.

	World Equity Market Sample		***Malaysian Equity Market Sample***		
	Islamic	Conventional	Market (Conventional)	Islamic	Non-Islamic
Panel A: GRS test					
Sharpe-Lintner CAPM framework					
Wilks' Lambda	0.4867	0.4625	0.9361	0.9364	0.9323
F-statistic	2.6362	2.9056	5.3754	5.4338	5.4053
P-value	0.0240	0.0148	0.0556	0.0571	0.0394
Bootstrapped P-value	0.9453	0.9396	0.8782	0.8786	0.8347
Panel B: MR - GMM test					
Sharpe-Lintner CAPM framework					
J-Statistic (test for overidentifying restrictions)	98.1206	197.6338	19.9957	19.2018	20.2714
P-value	0.0000	0.0000	0.0293	0.0378	0.0268

C.2. Graphical illustrations of mean-variance efficiency

We complement the statistical analysis from Section C.1 with graphical illustrations of the Islamic and the conventional equity portfolios on the ex-post mean–variance efficient frontier, as well as a comparison between theoretical correlations calculated for mean–variance efficient portfolios and the actual Pearson correlations between the Islamic and conventional portfolios. Derivations of these methods are described below.

Graphical Illustration of mean-variance efficient frontier - We use Huang and Litzenberger (1988) to draw our mean-variance efficient frontier for graphical demonstration. The equation of the mean-variance frontier is derived from equation (1) which is the equation for the variance of a frontier

portfolio p. This equation hinges on one of the results in Huang and Litzenberger (1988) who derive it from the Markowitz (1952) framework.

$$\sigma_p^2 = \frac{C}{D}\left[E\left[R_p\right] - \frac{A}{C}\right]^2 + \frac{1}{C} \quad (1)$$

Following Huang and Litzenberger (1988), $E\left(R_p\right)$ = expected return on portfolio p, σ = standard deviation of portfolio p, and the scalars A, B, C and D as

$$A \equiv e'V^{-1}\underline{1}$$

$$B \equiv e'V^{-1}e$$

$$C \equiv \underline{1}'V^{-1}\underline{1}$$

$$D \equiv BC - A^2$$

where e is an $N \times 1$ vector of expected returns on assets $i = 1, \ldots, N$, $\underline{1}$ is an $N \times 1$ vector of ones, and V is an $N \times N$ variance-covariance matrix. Equation (1) denotes that the mean-variance frontier is a hyperbola with centre $(0, \frac{A}{C})$ and asymptotes $E\left[R_p\right] = \frac{A}{C} \pm \sqrt{\frac{D}{C}}\sigma_p$. In order to sketch the hyperbola we solve equation (1) for expected returns to map out the equation of the mean-variance frontier presented in equation (2), where solutions exist for $\sigma_p^2 \geq \frac{1}{C}$:

$$E\left(R_p\right) = \frac{A}{C} \pm \sqrt{\frac{D}{C}\sigma_p^2 - \frac{D}{C^2}} \quad (2)$$

We plot the market portfolio, the non-Islamic stock portfolio and the Islamic portfolio on the parabola of the mean-variance frontier.

Theoretical versus actual correlations - According to Huang and Litzenberger (1988), the covariance between two arbitrary frontier portfolios, x_p and x_q, is given by

$$cov\left(R_p, R_q\right) = \frac{C}{D}\left[E\left[R_p\right] - \frac{A}{C}\right]\left[E\left[R_q\right] - \frac{A}{C}\right] + \frac{1}{C} \quad (3)$$

As such, if the market portfolio, non-Islamic and the Islamic portfolios are on the mean-variance frontier then the correlation between any combination (i.e. Islamic and market, non-Islamic and market or Islamic and non-Islamic) can be labelled in equation (4) which combines equations (1) and (3):

$$\rho_{p,q} = \frac{cov(R_p,R_q)}{\sigma_p \times \sigma_q} = \frac{\frac{C}{D}\left[E\left[R_p\right]-\frac{A}{C}\right]\left[E\left[R_q\right]-\frac{A}{C}\right]+\frac{1}{C}}{\sqrt{\frac{C}{D}\left[E\left[R_p\right]-\frac{A}{C}\right]^2+\frac{1}{C}} \times \sqrt{\frac{C}{D}\left[E\left[R_q\right]-\frac{A}{C}\right]^2+\frac{1}{C}}} \quad (4)$$

Note, if portfolios p and q were frontier portfolios then the correlations in equation (4) are the "theoretical" correlations. We also calculate the actual Pearson correlations between the three combinations of portfolios and then draw a comparison of the estimates to the theoretical correlations. If the market, Islamic and non-Islamic portfolios (three portfolios) are close to the efficient frontier, we expect their theoretical and actual correlations to be close.

The visual graphical analysis matches the statistical tests and shows how far the three portfolios fall from the mean-variance efficient frontier. Figure C.1a shows the mean-variance frontier that we derive from the combination of all Islamic (IS) and conventional (C) stocks from our two world indices. We can see that the value-weighted Islamic portfolio is closer to the efficient frontier as it has higher returns and a lower standard deviation compared to the value-weighted conventional stock portfolio. Likewise, Figure C.1b illustrates the mean-variance frontier with three portfolios: the Islamic portfolio (IS), the non-Islamic portfolio (NIS) and the market (M). Note, market is the conventional index and includes all assets, whereas non-Islamic stocks are those that are explicitly not conforming to Islamic principles. In Malaysia, the non-Islamic portfolio has slightly higher returns and a higher standard deviation compared to the Islamic and market portfolios. The Islamic portfolio has the lowest standard deviation among the portfolios and is the closest to the minimum variance portfolio.

Figure C.1a: Mean-variance frontier – World Equity Portfolios

Figure C.1a shows mean variance efficient frontier for the world. The mean-variance frontier is derived from constituents of the world equity indices. The two portfolios refer to the value-weighted Islamic (IS) and conventional (C) world equity portfolios. The sample period is 2007 to 2010.

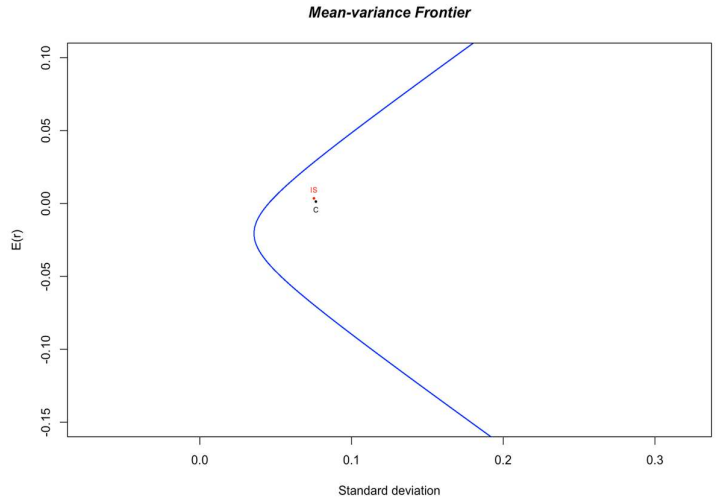
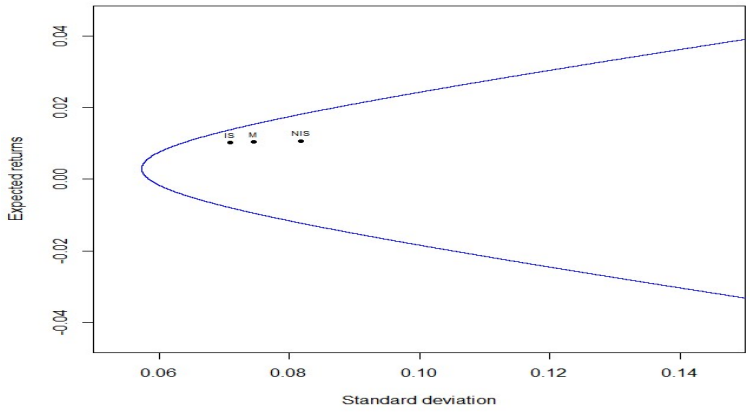


Figure C.1b: Mean-variance frontier – Equity Portfolios in Malaysia

Figure C.1b presents the mean-variance frontier derived from Malaysian equities that are available on DataStream. The three portfolios refer to the value-weighted Islamic (IS), non-Islamic (NIS) and market / conventional (M) equity portfolios. The sample period is 1989 to 2012.



We further calculate theoretical and actual Pearson correlations for the Islamic (IS) and Conventional World (C) portfolios, as well as the Islamic (IS), non-Islamic (NIS) and market (M) portfolios in Malaysia. If the Islamic and conventional market portfolios are close to the efficient frontier, we expect their theoretical and actual correlations to be close. Panel A of Table C.2 shows the theoretical correlation of the two world equity portfolios which is close to 100%, whereas the

actual Pearson correlation is slightly lower at 93.76%. Likewise, according to Panel B, the theoretical correlations of the three Malaysian portfolios and the theoretical correlations are all close to 100%, whereas the actual Pearson correlations are slightly lower and range 93.64% and 99.32%.

Table C.2: Theoretical and Actual Correlations of World Equity and Malaysian Equity Portfolios

In Table C.2, theoretical and actual correlations are presented for the two world equity portfolios (value-weighted Islamic and conventional world equity portfolios) in Panel A and for the three Malaysian equity portfolio combinations (value weighted market (conventional), Islamic and non-Islamic portfolios) in Panel B.

	Theoretical correlations	*Actual Pearson correlations*
Panel A: World Equities		
Correl (Conventional, Islamic)	99.8879	93.7614
Panel B: Malaysian Equities		
Correl (Market, Islamic)	99.7120	96.7691
Correl (Market, Non-Islamic)	99.8494	99.3173
Correl (Islamic, Non-Islamic)	99.1459	93.6399

C.3. Risk to Reward Ratio Analysis

We searched for additional data for all Islamic assets across all our sample countries and were successful in obtaining Dow Jones Islamic and conventional equity indices for USA, UK, Japan and the world for the period of 1996 to 2020. We then calculate the coefficient of variation (CV) for each pair (Islamic versus conventional) indices across three countries and the world as shown in Figure C.2 below. In Finance, the coefficient of variation plays an important role in investment selection. From a financial perspective, the financial metric represents the risk-to-reward ratio where the volatility shows the risk of an investment and the mean indicates the reward of an investment. An investor identifies the risk-to-reward ratio of each security and develops an investment decision (Note, the low coefficient is not favourable when the average expected return is below zero). Generally, an investor seeks a security with a lower coefficient (of variation) because it provides the most optimal risk-to-reward ratio with low volatility but high returns. Figure C.2 clearly shows that Islamic equity indices outperform conventional indices over a period of 25 years, demonstrating how Islamic assets create more value for the investors than conventional assets. In Figure C.3, we further demonstrate that our

result that Islamic assets create value for investors remains robust if we break down the equity indices into large-cap, mid-cap and small-caps across Islamic and conventional equity indices. This evidence is only suggestive indication of value creation.

Figures C.2 and C.3

Figure C.2 presents a comparison of coefficients of variation – alternatively known as risk-to-reward ratio (calculated as standard deviation divided by average values of monthly returns) for Islamic equity index (IS) versus conventional equity index (C) across UK, USA, Japan and a World index. Figure C.3 presents coefficient of variation (risk to reward ratio) for large cap, mid cap and small cap index for the USA across Islamic and Conventional equity index. Data were only available for these countries and indices.

Figure 2

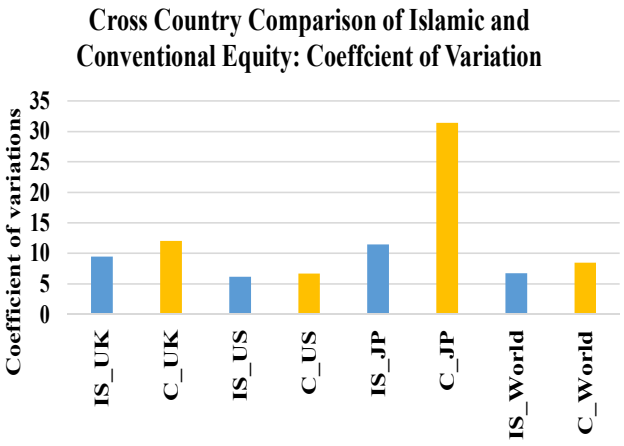
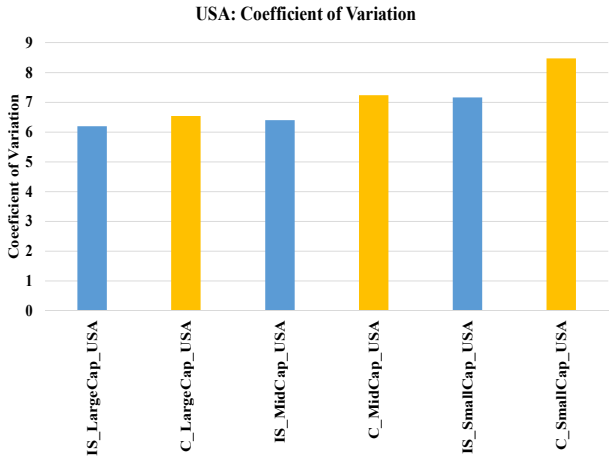


Figure 3



C.4. Value Creation by Islamic Asset (Book Value Analysis)

Islamic principles present themselves as distinctly different to their counterpart conventional firms (i.e., firms that do not follow Islamic principles in their business activities). Given in the last decade we have experienced two severe financial crises (the 2008-2010 global financial crisis (GFC) and the 2010-2012 European sovereign debt crisis), both crises have increased the co-movements between financial markets and induced a financial contagion with increased portfolio risk. However, Islamic stock markets showed robust resistance and commendable growth. For investors, the importance of portfolio diversification increases during periods of financial and economic turbulence. However, maximizing returns through effective diversification need a complete understanding of value creation at firm level which is then reflected in the stock return and risk. Firstly, Figure C.4 presents median values of 687 Islamic firms (constituents of Dow Jones Islamic Index) and 687 conventional firms. These 687 conventional firms have been randomly selected from the 7240

constituents of world indices given they form a matched pair with the Islamic firms based on similar industry and sector membership and are a good representative of the global financial equity market across countries. The sample period covers 1986 to 2020. This sample period is chosen to show that value creation not only occurs during crisis periods but also in non-crisis periods. For visual demonstration purposes, we present four different firm level characteristics that shed light on value creation by Islamic equities for the investors/shareholders perspective. These firm level characteristics are often used by financial analysts around the world, including market value (Fig C.4a), Enterprise Value (Fig C.4b), Dividend Yield (Fig C.4c) and income available for shareholder distribution (Fig C.4d). We also present two items of liquidity measures (Fig C.4e and C.4f) such as trade volume and trade value to draw the distinctive feature of Islamic equities compared to conventional equities. It is shown that Islamic equities are more valuable than conventional equities across all four measures of value creation for the shareholders and Islamic assets are more liquid than conventional equities which also contributes to value creation for investors.

We then conduct a univariate test to determine whether Islamic firm characteristics are significantly different from their counterpart conventional firms. Table C.3– Panel A shows that Islamic firms have significantly higher market value (t = 3.9229), in fact twice as much as non-Islamic/conventional firms, significantly higher enterprise value (t = 3.5296), dividend yield (t = 2.1481) and income for distibution to shareholders (t = 5.3448). Panel B demonstrates that Islamic firms are more focused on social wellbeing (t = 2.883) and have significantly higher corporate governance matrix scores (t = 7. 9249) than their conventional firm counterparts. This result is consistent with the findings of Table C.3 – Panel B to the extent that Islamic equities are well aligned with the attributes that impact on society. Islamic firms also hold significantly higher social pillar scores (t = 2.8830) and corporate governance pillar scores (t = 7.9249). These ESG scores range between 0 to 100 (0 indicates poor social wellbeing consideration while 100 excellent and positive social wellbeing consideration in business operations relative to their peers). Islamic firms yield return on assets that are significantly higher than conventional firms and this is consistent with Islamic finance principles. Islamic firms also invest more

in capital expenditure (investment) which helps them to grow organically and they are generally older (t = 6.5698) than conventional firms by 10 years within our matched pair sample.

Following similar terminology as Kim and Lyn (1985) with slight modification, in a multivariate setting (Table C.3 – Panel C) we also provide evidence on Islamic firm attributes (dummy; noted as Islamic firm =1, conventional firms= 0) and how well each attribute explains the excess market value (calculated as the difference of industry median market value of all stocks and individual firm's market value (as a dependent variable). Our results show that firms being Islamic explains the excess market value significantly (t = 14.80) more than their counterparts. We also control for firm specific characteristics, social pillar (SOSCORE) and governance pillar scores (CGSCORE) and our results remain strong, indicating Islamic equities have a hidden layer of social impact power that gives them an edge over conventional equity for better investment returns and higher excess market value. We further include a financial crisis indicator variable (years 2007 to 2009 = 1, 0 otherwise) and interact it with our Islamic firm dummy. Our result shows that during crisis periods Islamic assets provide relatively more value. In addition, their general all year round performance tends to be higher than conventional firms.

Figures C.4a to C.4f

Figures C.4a-C.4f show a graphical depiction of the median value difference between Islamic (IS) and conventional (C) firms. Market value (MV – share price multiplied with the number of shares outstanding), enterprise value (EV –market capitalization plus preferred stock plus minority interest plus total debt minus cash), dividend yields (DY – dividend per share as a percentage of the share price), income available for shareholder distribution (Inc_SH_Dist – net income used to calculate earnings per share), and two measures of Liquidity which are Liquidity Value by Trave (VA) and Trade Volume (VO).

Figure C.4a: Value Creation (MV)

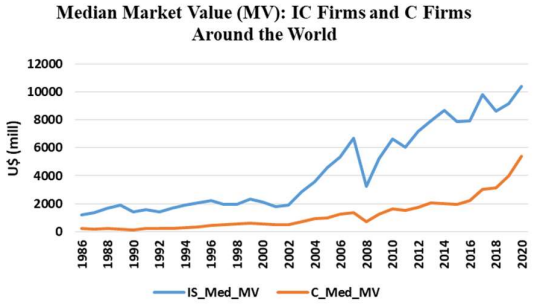


Figure C.4b: Value Creation (EV)

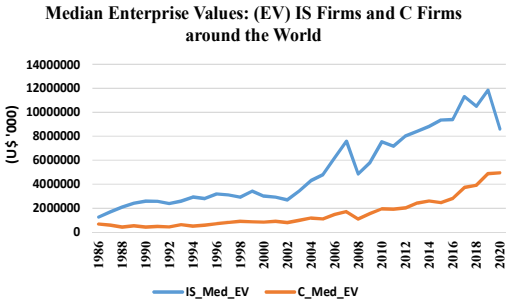


Figure C.4c: Value Creation (DY)

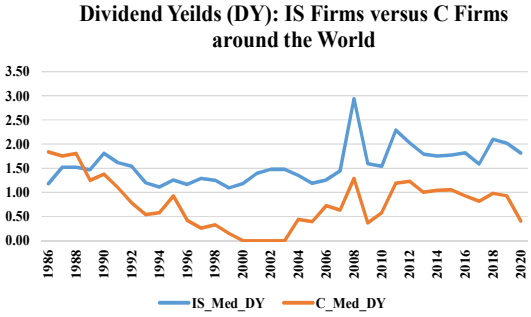


Figure C.4d: Value Creation (Inc S/H)

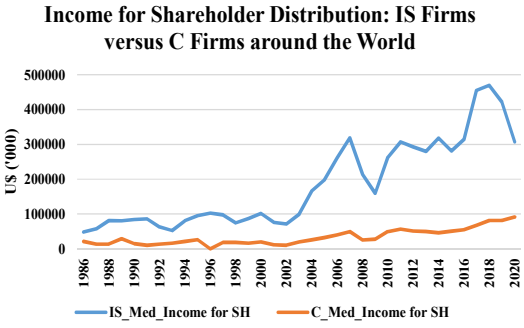


Figure C.4e: Liquidity (VA)

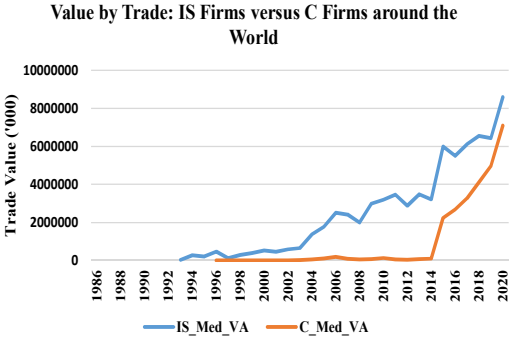


Figure C.4f: Liquidity (VO)

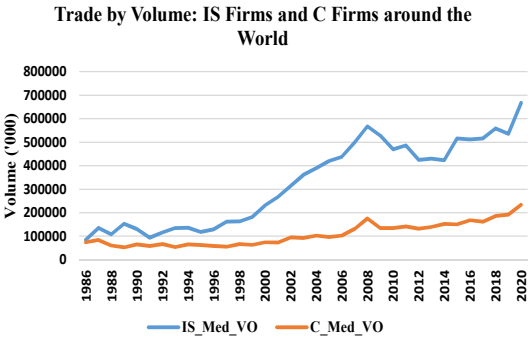


Table C.3 – Value Creation with Islamic versus Conventional Firms

Table C.3 presents several value creation aspects for Islamic assets compared to conventional assets. This table has three panels: Panel A provides two sample mean tests between average values of Islamic Equities (IS) and matched pair conventional equities (C). Conventional equities are chosen from the same industry and sector membership corresponding to Islamic equities. Value creation relevance variables used in Panel A are average values across equities for IS and C categories of equities, respectively, which were used to create Figure 4: market value (MV –share price multiply with number of shares outstanding), enterprise value (EV –market capitalization plus preferred stock plus minority interest plus total debt minus cash), dividend yields (DY – dividend per share as a percentage of the share price), income available for shareholder distribution (Inc_SH_Dist – net income used to calculate earnings per share). Panel B presents univariate test results for independent variables that are used in the regression analysis presented in Panel C. The variables in Panel B are: Social Pillar Score (SOSCORE - it is the weighted average relative rating of a company based on the reported social information and the resulting four social category scores: 0 means poor and 100 means excellent), CGSCORE (it is the weighted average relative rating of a company based on the reported governance information and the resulting three governance category scores), Return on asset (ROA - Annual data (Net Income plus ((interest expense on debt-interest capitalized) * (1-tax rate))) / average of previous year's and current year's total assets * 100, Capital expenditure (Investment or Capex - represent the funds used to acquire fixed assets other than those associated with acquisitions divided by total assets, firm age (since the year of incorporation), cash and cash equivalent (Cash – cash and cash equivalent divided by total assets), long term debt (Debt - represents all interest bearing financial obligations, excluding amounts due within one year divided by total asset). Panel C presents a multivariate regression analysis showing the difference between excess market value of IS firms and C firms as the dependent variable. Excess market value is calculated as the difference between an individual firm's market value by the end of the financial year minus the industry median of market value. Dummy represents 1 if the firm is IS, otherwise 0 if the firm is conventional. The rest of the independent continuous variables are the same as in Panel B. Crisis represents the global financial crisis period of 2008-2010 when it takes a value of 1, and is zero otherwise. Dummy_Crisis is an interaction variable with Islamic firms and the crisis period. The dollar unit is in parentheses. Statistical significance levels are indicated by a, b and c for 1%, 5% and 10%, respectively.

Panel A – Univariate T-test for Value Creation Related Variables used in Figure D.4

	IS_MV	*C_MV*	*IS_EV*	*C_EV*	*IS_Avg_DY*	*C_Avg_DY*	*IS_Avg_Inc SH Dist*	*C_Avg_Inc SH Dist*
Mean	12093.32	6252.20	14867408	8520973	2.82	1.77	708964.64	250240.05
T-Statistics	3.9229[a]		3.5296[a]		2.1481[b]		5.3448[a]	

Panel B – Univariate T-test for Continuous Independent Variables used in Regression Analysis

	IS_SOSCORE	*C_SOSCORE*	*IS_CGSCORE*	*C_CGSCORE*	*IS_ROA*	*C_ROA*	*IS_Capex ('000)*	*C_Capex ('000)*
Mean	47.37	40.28	52.96	48.06	7.47	2.93	968122.96	222304.61
T-Statistics	2.8830[b]		7.9249[c]		2.3666[b]		9.4461[a]	
	IS_Age (Years)	*C_Age (Years)*	*IS_Cash ('000)*	*C_Cash ('000)*	*IS_LTD ('000)*	*C_LTD ('000)*		
Mean	25.40	14.59	1445904.48	735144.86	2225995.54	1085784.32		
T-Statistics	6.5698[a]		4.2899[a]		4.9215[a]			

Panel C - Multivariate Regression: Difference Between Excess Market Value of Islamic and Conventional Firms

	(1)	(2)	(3)	(4)	(5)	(6)
	MV Difference	MV Difference	MV Difference	MV Difference	MV Difference	MV Difference
Dummy	0.6408[a]	0.2942[a]	0.2534[a]	0.2850[a]	0.2740[a]	0.2217[b]
	[14.80]	[3.77]	[3.26]	[3.39]	[3.26]	[2.48]
SOSCORE		0.0488[a]	0.0410[a]	0.0412[a]	0.0415[a]	0.0416[a]
		[31.08]	[23.84]	[23.86]	[24.02]	[24.04]
CGSCORE			0.0194[a]	0.0202[a]	0.0203[a]	0.0205[a]
			[10.79]	[11.18]	[11.19]	[11.19]
ROA				0.0397[a]	0.0396[a]	0.0395[a]
				[10.12]	[10.11]	[10.09]
Investment				0.3517[a]	0.3377[a]	0.3362[a]
				[4.68]	[4.49]	[4.47]
Age				0.0294[b]	0.0289[b]	0.02866[b]

				[2.57]	[2.53]	[2.51]
Cash				0.2531[a]	0.2556[c]	0.25387[c]
				[9.11]	[9.20]	[9.13]
Debt				-0.4933[c]	-0.04878[c]	-0.0508[c]
				[-1.90]	[-1.88]	[-1.95]
Crisis					0.3823[a]	0.1120
					[3.45]	[0.59]
Dummy_Crisis						0.4069[c]
						[1.74]
Constant	0.1473[a]	-0.1321[a]	-0.1936[a]	-0.2888[a]	-0.2941[a]	-0.2903[a]
	[4.57]	[-14.55]	[-18.13]	[-18.59]	[-18.85]	[-18.43]
Adjusted R-Squared	0.01	0.08	0.09	0.11	0.11	0.11

References for online Appendix C

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Endnotes

[i] When the analysis is conducted using differences between volatility linkages that were estimated using the stochastic volatility model in *GMM* the number of observations is low within the sub-samples. We report results for series with a number of observations equal to five or more but acknowledge that any inferences from tests for equal means between the series are limited. We do not report coefficients and statistical tests when there is only one observation (these are difference series involving government bonds and money market in Islamic countries).

[ii] When the analysis is conducted using differences between volatility linkages that were estimated using the stochastic volatility model in *GMM* the number of observations is low within the sub-samples. We report results for series with a number of observations equal to five or more but acknowledge that any inferences from tests for equal means between the series are limited. We do not report coefficients and statistical tests when there is only one observation (these are difference series involving government bonds and money market in Islamic countries).

[iii] We do not have access to the constituent data of the indices that we use in our main analysis. As an alternative, we source additional data of individual stocks within the Dow Jones Islamic World Index which we refer to as the Islamic stock portfolio. We compare it to a conventional stock portfolio which we obtain from the constituent list of the DataStream World Index. These are available for all of our sample period in the main analysis (2007 to 2010). Further, we conduct a clean experimental analysis on a sample of unique Malaysian data within our sample set. Malaysia is chosen for this experiment to show mean-variance efficiency between Islamic, non-Islamic and conventional stock markets for three main reasons: First, Malaysia is highly regarded as being as one of the most strongly established Islamic financial markets in the world. Second, relative to the Middle East and African countries, Malaysia has a highly sophisticated market with developed infrastructure and is a leader of Islamic finance innovation due to its more liberal *Shari'ah* interpretation and intense practical application in everyday business operation. Third, the granular level clean data that is needed to meaningfully show the mean-variance efficiency for a whole market requires firm level data (with clear identification of Islamic equity and non-Islamic equities by the *Shari'ah* experts) which we only have for Malaysia (from 1989 to 2012) but not for other countries within our sample. This allows us to create three portfolios: An Islamic portfolio, a non-Islamic portfolio which refers to firms that are explicitly not *Shari'ah*-compliant and a market portfolio which includes Islamic and non-Islamic stocks and is equivalent to the conventional indices in our main analysis (see Akhtar & Jahromi (2017) for a more detailed discussion of this dataset).

[iv] While we find consistent results on how Islamic and conventional portfolios relate to each other within each given method, we find a wide discrepancy across the methods in terms of overall mean-variance efficiency. The conventional GRS test rejects mean-variance efficiency for both world equity market portfolios, and for the Malaysian non-Islamic portfolio, but not for the Malaysian Islamic and market (conventional) portfolios (at a 5% level of significance). The bootstrapped GRS test fails to reject mean-variance efficiency for all five portfolios. On the other hand, the MR test rejects mean-variance efficiency for all five portfolios. We suggest that these differences are likely due to misspecified distributional assumptions due to a small sample size. Both MacKinlay and Richardson (1991) and Faff and Lau (1997) find that F-statistics may fail to reject mean–variance efficiency, while the GMM statistic does reject. We use the bootstrapping method for the GRS test to overcome issues around small sample size.