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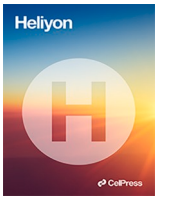

Research article

Performances of leading Islamic finance markets prior to and during the COVID-19 pandemic

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ABSTRACT

The recent COVID-19 pandemic or Global Health Crisis (GFH) has distorted the normal functioning of the global economies and financial markets. Previous research has shown that Islamic equities were relatively more stable than conventional ones during the 2008 Global Financial Crisis (GFC). So, this study aims to assess the effect of the COVID-19 pandemic on the performance and co-movement of the leading Islamic finance markets by employing MGARCH-DCC on daily frequency data spanning from January 01, 2017 to October 22, 2021. The findings suggest that, as expected, the pandemic outbreak has increased the volatility across the sample markets, but it faded relatively soon, indicating that Islamic equities carry hedging features and offer portfolio diversification benefits to investors. Moreover, the sample countries are less correlated during the sample period than expected. The findings have important implications for policy-makers and diverse investors deciding on portfolio diversification. Global ethical and Islamic investors, including fund managers, could benefit by focusing on more stable markets and building optimal portfolios of *Shari'ah*-complaint equities during turbulent market conditions, such as the COVID-19 pandemic.

1. Introduction

Global financial markets have been shaken by the recent COVID-19 outbreak (also known as the Global Health Crisis), causing panic and raising uncertainty, leading to massive asset selloffs and substantial losses. Governments worldwide have taken extraordinary precautionary measures such as social distancing, movement restrictions, and lockdowns to combat the spread of the coronavirus. However, these actions caused an economic slowdown, inflicting further anxiety and stress among investors. In response, most jurisdictions initiated monetary and financial stimulus programs to help their economies recover. Although this positively impacted asset prices in some respects, their volatility remained high throughout the period. The effects of this crisis are expected to persist for some time in the future. In the wake of the Global Health Crisis (GHC), people have been confronted with unprecedented challenges that have changed the manner they interact and conduct their daily businesses. The radical changes profoundly impacted the performance of economies and economic agents at all levels and brought a 'new normal' into their lives. Due to its global nature and magnitude, the GHC has attracted significant research attention, which continues to grow. Searching for diversification benefits and safe-haven assets remains a concern of portfolio managers. Due to the increasing interconnectedness and interdependence of global

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financial markets, diversification is becoming a more complex undertaking.

Islamic finance is a principles-based approach to investing governed by *Shari'ah* (Islamic law), which promotes justice and prohibits all forms of unethical, speculative, and usurious transactions. These principles are reflected in the two-tier *Shari'ah* screening methodology developed to assess the compliance of equities with *Shari'ah* norms and principles. Qualitative screening ensures that a company is not engaged in prohibited activities, such as producing and selling pork products, alcohol, tobacco, deities, gambling, propagating immorality, and offering conventional interest- and derivatives-based financial services. Meanwhile, quantitative screening concerns financial ratios setting specific thresholds for leverage, liquidity, and illegitimate income. These principles place selected equities into a unique conservative asset class. The financial assets (equities) that meet the qualifying criteria are expected to mitigate risk and promote financial stability. Socially responsible investment (SRI) and Islamic finance principles have implications for society and the environment, and both have the potential to meet the demands of the ethical investment market.

The Islamic financial services industry (IFSI) has experienced significant growth in recent years and now plays an important role in many jurisdictions. Despite the COVID-19 pandemic, the IFSI continues to experience a double-digit growth rate, with an estimated asset size of USD 3.06 trillion in 2021. In general, the industry was able to outperform its conventional counterpart and enhance performance, successfully expanding its market share within the global financial markets [1,2]. Given that the IFSI was also more resilient to the global financial crisis [3,4,5], it is not surprising that it has attracted extensive research ever since. However, the severity of the COVID-19 pandemic, mixed results from the existing literature, and potential gains offered by the *Shari'ah*-screening methodology motivate us to investigate this topic and provide further analysis that would benefit international portfolio investors.

According to the Islamic Financial Services Industry Stability Report 2022, the counties with systemically important Islamic financial sectors include Iran, Sudan, Saudi Arabia, Brunei, Kuwait, Malaysia, Qatar, Bangladesh, Djibouti, UAE, Jordan, Bahrain, Pakistan, Palestine, Oman, as the total Islamic banking assets of these countries comprise more than 15% of their total domestic banking sector assets [6]. These countries are characterized by having more inductive legal and regulatory frameworks for Islamic finance and more effective standardization and harmonization efforts on reporting, governance, products, and dispute resolution. Most of these countries either fully adapt or partially adopt standards published by such international Islamic standard-setting bodies as Islamic Financial Services Board (IFSB), Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI), and International Islamic Financial Market (IIFM).

According to Restoy [7], "*Regulation certainly plays a highly relevant role in facilitating market integration. In particular, the homogeneity of financial regulation across jurisdictions and the consistency of the requirements imposed on internationally active entities may provide powerful incentives for cross-border financial activities and operations*." Hence, this implies that systematically important Islamic finance markets should be more connected as compared to others. If so, there is little scope for hedging or portfolio diversification across these markets. However, these markets are more attractive to international Islamic investors due to the liquidity and maturity of the Islamic finance industry in these jurisdictions.

The decoupling hypothesis suggests that Islamic financial assets are weakly related or uncorrelated with conventional financial assets. If this holds, portfolio managers and investors should benefit from portfolio diversification by investing in *Shari'ah*-compliant equities. A number of studies confirm this hypothesis [8–11], while others do not [12–15]. Some studies analyzed and compared the performance of equities during the Global Financial Crisis (GFC) and concluded that *Shari'ah*-compliant equities are better positioned to withstand financial and economic downturns than their conventional counterparts [8,9,16–18]. Hence, the COVID-19 pandemic represents a unique opportunity to test the stability of Islamic financial markets.

The study analyzes the volatility and comovement of *Shari'ah*-compliant equity indices from the systemically important Islamic finance markets (Bahrain, Bangladesh, Kuwait, Malaysia, Qatar, Saudi Arabia, Türkiye, and the UAE). It assesses the impact of the COVID-19 pandemic on their performances, thus, identifying whether these financial assets provide diversification benefits to ethical and Islamic investors. The MGARCH-DCC technique is applied to MSCI *Shari'ah* stock indices (daily frequency data) from January 1, 2017 to October 22, 2021 to measure volatilities and co-movements between the markets. The results indicate that the sample markets are weakly correlated, including the GCC countries commonly presumed to be inextricably linked owing to their geographical and cultural proximity. While the COVID-19 pandemic heightened volatility and correlations between the markets, its effects were short-lived, indicating the existence of portfolio diversification benefits for ethical and Islamic investors. It is worth noting that, as much as *Shari'ah* compliance is important to Islamic investors, they should also be aware of the country-specific as well as firm-specific factors that drive asset returns under dynamic market conditions.

Given this, our study makes a two-fold contribution to the ongoing debate on the portfolio diversification benefits of Islamic equities and adds to the growing literature on Islamic finance: (i) we specifically focus on *Shari'ah*-compliant equities from systemically important Islamic finance markets, and (ii) test the effect of the COVID-19 on the performance (volatility and integration) of these well-regulated and more mature Islamic finance markets. The findings have meaningful and timely implications for investors and policymakers in their decision-making.

The rest of the paper is organized as follows: Section 2 briefly reviews the existing literature focusing on the COVID-19 pandemic. Section 3 describes the data and methodology employed in the study. The empirical results are presented and discussed in Section 4, and Section 5 concludes the paper and provides policy recommendations.

2. Literature review

Shari'ah-compliant equities have attracted considerable attention from scholars in the last two decades, and their performances and potential for portfolio diversification gains have been scrutinized by many. This section briefly reviews some studies that covered the topic prior to the COVID-19 outbreak. However, our primary focus would be on the studies that provide insight into the impact of the

pandemic on the performance of *Shari'ah*-compliant equities. On the one hand, Bhatt and Sultan [19] report that the *Shari'ah* equity index is equally sensitive to leverage risk as its conventional peer. Using the dynamic multivariate GARCH approach, Saiti et al. [12] find that purely Islamic stock indices offer no significant diversification benefits to US-based investors compared to their conventional counterparts. However, regional diversification benefits exist whereby Muslim-majority countries are on a better footing for their diversification than the Far East countries. Similarly, Shahzad et al. [13] focused on return and volatility spillovers between Islamic and conventional stock markets and found high cointegration between the two. Consequently, the results show that Islamic stock markets offer no safe-haven benefits to investors, thus, rebutting the decoupling hypothesis.

In contrast, several studies have observed the diversification benefits of Islamic indices and their advantage over conventional ones. For instance, Dewandaru et al. [16] show that Islamic indices are more resilient to economic shocks than conventional indices. Also, comparing the impact of the GFC on the financial performance of Islamic and conventional indices (the US, Eurozone, and global) using the CAPM-GARCH model on data spanning from 2000M1–2011M06, Jawadi et al. [20] find that Islamic equities outperformed conventional counterparts during the crisis, as the GFC had a lesser significant impact on Islamic stock returns. Meanwhile, Bahlous and Yusof [8] found that diversification gains existed among MENA, Asia-Pacific, and North American indices but not among European and North American funds, as these two markets eventually cointegrated. Furthermore, analyzing the effects of the global financial crisis on the integration of selected Islamic equity markets (Malaysia, Indonesia, Japan, the US, and the UK) using daily data from 2006M2–2008M12, Abdul Karim et al. [21] find no evidence for co-integration among these markets before and during the crisis. Similarly, Rizvi and Arshad [9] found low correlations between Islamic and conventional stock indices during the GFC. The results evidence the decoupling hypothesis and hedging properties of *Shari'ah*-compliant equity indices. However, limited diversification benefits of Islamic indices are also reported [18], while no long-run cointegration between Islamic and conventional indices is also detected [22,23].

Despite its recent emergence, the COVID-19 pandemic and its impact on the financial markets have garnered considerable attention and interest from several researchers within a short period. For example, Irfan et al. [24] investigated the effects of the pandemic on the performances of the Bombay Stock Exchange *Shari'ah* Index and the Jakarta Islamic indices and found that their response depends on economic factors. Meanwhile, Zaimovic and Hamzić [25] have observed that the GHC affected the volatility of the Dow Jones Islamic Market World Index (DJIM) to a lesser extent as compared to the GFC. Abdullahi [14] investigates dynamic cross-country causality, cointegration, correlations, and volatility of Islamic equities during the COVID-19 crisis using GMM, ARDL, and MGARCH models. The results show herd behavior as the reaction of Islamic indices is not different from conventional ones. Furthermore, it turns out that Islamic indices are vulnerable to financial contagion from other markets and susceptible to volatility transmission. Similarly, the study of Hasan et al. [15] explores the impact of COVID-19 on the co-movement of the DJ Islamic index (Islamic) and the FTSE index (conventional) by employing wavelet techniques on daily frequency data spanning from January to November 2020 and finds that both indices have experienced comparable magnitude of volatility during the crisis. Hence, the strong linkages that exist between the two markets serve as evidence against the decoupling hypothesis. Unlike other papers, this study shows that *Shari'ah*-compliant stocks do not offer hedging properties to existing conventional stocks. Hence, the results imply that in times of economic and financial turmoil, conservative features of the *Shari'ah* screening process may not guarantee protection to their investors. This is not entirely unexpected, given the devastating and indiscriminate nature of the COVID-19 pandemic.

In contrast to the above studies, Alexakis et al. [10] compare conventional and Islamic equities and their convergence dynamics during 1996–2020. While examining different crises over the study period, the results indicate strong convergence between the two markets. However, on average, Islamic investments are less affected, reduce volatility spillovers, and offer a 7% risk diversification benefit. Islamic investments are also more resilient during the current pandemic crisis, although they are becoming more exposed over time. In another paper, Chowdhury et al. [26] comparatively analyze conventional Dow Jones and Islamic sectoral indices between January and August 2020 (during the COVID-19 period). Employing maximum drawdown-based risk measures, they found that the pandemic had a sweeping effect on both markets. However, Islamic markets seemed more resilient to the effect and showed a faster recovery than their conventional counterparts.

Several studies have indicated that Islamic equities act as safe havens and provide diversification benefits to investors. Considering the rigorous *Shari'ah* screening applied to Islamic equity investments, Ashraf et al. [27] tried to assess whether the S&P and DJ Islamic indices offer hedging opportunities during the pandemic crisis. Based on a Value-at-Risk methodology, their results indicated that they provide hedging opportunities. At the same time, the Islamic indices, especially those following those rigorous screening rules, outperformed conventional ones on a nominal and risk-adjusted basis (Sharpe ratio). However, this outperformance bears an additional cost as a higher systematic risk accompanies it.

The safe-haven and resilience characteristics of Islamic equities are confirmed by Mirza et al. [11]. While comparing the risk-adjusted performance of 476 Islamic and 591 conventional equity funds, they found that Islamic ones outperformed the non-Islamic ones during the COVID-19 pandemic. As a result, Islamic equities can provide diversification benefits to global investors. The same results are supported by Yarovaya, Elsayed, and Hammoudeh [28]. They find that *Sukuk* (Islamic certificate/bonds), the major contributors to Islamic capital markets, are resilient to the COVID-19 pandemic and present safe-haven properties for investors. At the same time, the spillovers between conventional and Islamic markets became more robust during the COVID-19 outbreak, and oil and gold prices were strong predictors of that end.

Haddad and Trabelsi [29] evaluated the impact of the COVID-19 outbreak on three regional equity markets. It investigated the

safe-haven properties of six assets, focusing on both conventional and Islamic indices.[1] The results based on the Markov Switching approach revealed that the U.S. treasury bills provide diversification benefits against risks associated with stocks in these regional markets. At the same time, using the DCC-GARCH model, the authors found that bonds could act as safe-haven assets during the pandemic crisis. To a lesser extent, the same is true for *Sukuk*. Furthermore, the results reveal that *Sukuk* could be a safe haven for bond investors, while the DJ Islamic equity index acts as a hedging instrument.

Though most studies compare the performances and gains of investing in Islamic equities/indices to those of conventional ones, they do not tell us much about the diversification benefits offered by investing in the *Shari'ah*-compliant equities from the leading (more liquid and mature) Islamic finance markets. The current study particularly assesses the extent to which these markets are integrated and whether the GHC altered their behavior. Hence, this study fills the gap in the existing literature with a much-needed analysis beneficial for diverse stakeholders such as international portfolio investors as well as policymakers.

3. Research methodology

The section describes the sample data and their sources and explains the empirical method employed in addressing the research question.

3.1. Data

The key objectives of the study are (i) to identify the level of integration or connectedness of leading Islamic finance markets and (ii) to test the effect of COVID-19 on the performance (volatility and comovement) of these markets. Hence, we use MSCI Islamic index data from Thomson Reuters DataStream. The sample data span from January 1, 2017 to October 22, 2021, with a total of 1255 daily observations, and covers periods prior and during pandemic. The series are converted to logarithmic returns before the analysis. Table 1 describes the variables used in the study.

It is worth noting that MSCI offers more than 50 Islamic equity indices across the countries. However, we limit our sample to given eight systemically important Islamic finance markets based on the IFSB criterion of having a 15% share of the total domestic financial assets. Although 15 markets meet this criterion, the availability of data dictates the sample size.

3.2. Empirical methods

Naeem et al. [30] examine the impact of COVID-19 on the time-frequency links among global financial markets and employ the DY12 and BK18 interconnectedness indices developed by Diebold and Yilmaz [31] and Barunik and Křehlik [32], respectively. Also, Ben Amar et al. [33] employed the DY12 spillover index to explore the degree of connectedness among six regional stock markets over the period from 2012M6–2020M6. Similarly, Smolo et al. [34] explore the dynamic linkages and spillovers between emerging economies (BRICS and Turkey) and test the impact of the COVID-19 pandemic using Wavelet Coherence as a multiresolution time-frequency analysis tool in addition to DY12 and BK18 connectedness indices. Indeed, these techniques are useful, interesting, and relatively recent for testing spillovers or contagion effects. However, in the context of the given research, the MGARCH-DCC approach is preferred as it allows us to investigate the volatilities of each market and test dynamic correlations between markets. For instance, Çikiryel et al. [35] used Multivariate Generalized Autoregressive Conditionally Heteroskedastic – Dynamic Conditional Correlation (MGARCH-DCC) and Wavelet analysis to test the impact of Brexit on the performance of Islamic stock markets. Karim et al. [36] also employed the same two approaches to examine the dynamic comovements between oil and BRICS stock market returns. Also, wavelet analysis is more applicable to studies that analyze the time-frequency relationships between time series.

Thus, the study employs the MGARCH-DCC model to estimate the coeval interconnectedness and volatility clustering of Islamic indices from the Middle East and South Asia. The model is more malleable and has more predictive power [more parsimonious] as compared to the conditional correlation GARCH and diagonal VECH MGARCH models. Furthermore, the MGARCH-DCC outperforms other models considering structural breakdowns between factors [37,38,39]. The computed results of dynamic conditional correlations between Islamic indices will help us in assessing the integration of the Islamic equity markets [40,41].

Engle and Sheppard [42] acquainted the MGARCH-DCC method under "Models of conditional variances and correlations." The model advocates decomposing a covariance matrix, H_t, into a correlation matrix, R_t, and conditional standard deviations, D_t. In the GARCH-DCC model, both R_t and D_t have time-varying nature. This model can be separated into two methods: i) Gaussian or multivariate normal distribution, having a possible ineffective attitude towards heavy-tailed distribution; and ii) GARCH-DCC model with multivariate *t*-distribution, efficient for heavy-tailed data [43]. The research applies multivariate normal distribution and *t*-distribution by following previous studies [44–46] to select the best fit method for the study.

According to Rahim and Masih [45], the estimation of DCC can be classified into two stages that simplify the time-varying correlation estimation [42]. GARCH models are used in the first stage to estimate the volatility limit of each factor in a dataset independently [42]. Therefore, two GARCH equations are used for two variables [47]. For example:

$$h_t = C_0 + a_1 \varepsilon^2_{t-1} + b_1 h_{t-1} + b_2 h_{t-2} + m_1 \varepsilon^2_{t-1} I_{\varepsilon>0} \quad \text{Equation 1}$$

[1] The three regional markets are S&P500 in the USA, S&P Europe, and S&P Asia-Pacific. At the same time, the six assets are the S&P Technology Index, S&P GSCI Commodity Index, Bitcoin, the Dow Jones Islamic Equity Index, the Dow Jones Global Sukuk Index, and US Treasury bonds.

Table 1
Data description.

Variable	Description	DS Code	Source
BAH	MSCI Islamic Bahrain - Price Index	MSBAHR$	Thomson Reuters DataStream (DS)
BAN	MSCI Islamic Bangladesh - Price Index	MSBANG$	
KUW	MSCI Islamic Kuwait - Price Index	MSKUWA$	
MAL	MSCI Islamic Malaysia - Price Index	MSMALA$	
QAT	MSCI Islamic Qatar - Price Index	MSQATA$	
SAU	MSCI Islamic Saudi Arabia - Price Index	MSSAUD$	
TUR	MSCI Islamic Türkiye - Price Index	MSTURK$	
UAE	MSCI Islamic UAE - Price Index	MUAE$	

Notes: Price indices are USD denominated. *Period*: January 01, 2017–October 22, 2021, 1255 daily observations.

where, I is defined as an indicator or characteristic function; when the series' standardized errors (ε_t) are positive, the value of $I = 1$, $I = 0$. When the value of 'm' is negative, it can be interpreted that variance periods compared to positive error periods instantly follow negative ones.

The standardized errors from the first stage are used as inputs in the second stage for a time-varying correlation estimation [42]. Now, based on Engle [37], the equation of the conditional covariance matrix, H_t, is as follows:

$$H_t = D_t R_t D_t \qquad \text{Equation 2}$$

where, according to Orskaug [48], "$H_t = n \times n$ matrix of conditional variances of a_t at time t, $D_t = n \times n$, diagonal matrix of conditional standard deviations of a_t at time t, $R_t = n \times n$ conditional correlation matrix of a_t at time t, and $a_t = n \times 1$ vector of mean-corrected returns of n assets at time t."

4. Discussion of findings

4.1. Preliminary analysis

Table 2 presents descriptive statistics. Kuwait offers the highest mean returns (0.057), followed by Saudi Arabia (0.048) and Türkiye (0.011), while negative mean returns are observed in Bahrain (−0.019), UAE (−0.011), and Malaysia (−0.008). The highest volatilities are found in Türkiye (2.051), Bahrain (1.385), and UAE (1.290). Except for Bangladesh, the returns of all equity markets are skewed to the left, implying the riskiness of investment in these markets. Similarly, kurtosis values show that the variables follow a leptokurtic distribution, indicating that the return on investment is highly volatile, for which investors would require large returns to compensate for the risk.

Table 3 shows the correlations between the sample equity markets. Positive correlations exist between all markets, except for Malaysia vs. Bangladesh, with a correlation value of −2.6%. The relatively closer links are evident between the GCC markets: Saudi Arabia vs. Kuwait (43.7%), followed by Saudi Arabia vs. UAE (40%), Kuwait vs. UAE (39.6%), Bahrain vs. UAE (34.4%), Qatar vs. UAE (35.0%), Qatar vs. Saudi Arabia (34.4%). The weakest co-movements are seen between the equity returns of Qatar vs. Bangladesh (4.1%), Türkiye vs. Bahrain (6.8%), Bangladesh vs. Bahrain (6.8%), Bangladesh vs. Türkiye (8.0%), and UAE vs. Türkiye (8.9%).

4.2. Empirical analysis

The first set of outputs (Table 4) shows the estimated unconditional volatilities and correlations.[2] Diagonal values represent unconditional volatilities, while off-diagonal values indicate correlations between the markets. Türkiye (2.049), Bahrain (1.403), and Kuwait (1.270) have the highest unconditional volatilities, whereas the lowest ones (i.e., more stable) are seen in Malaysia (0.962), followed by Qatar (1.058) and Saudi Arabia (1.079). The highest three unconditional correlations are found among the following GCC markets: Kuwait and Saudi Arabia (44.6%), the UAE and Saudi Arabia (40.5%), and the UAE and Kuwait (40.1%), while the lowest ones are seen among Bangladesh and Malaysia (−2.8%), Bangladesh and Qatar (3.8%), and Bahrain and Türkiye (7.0%).

Additionally, Bahrain has relatively closer links with the UAE (35.0%), Kuwait (29.9%), and Saudi Arabia (26.2%). Bangladesh has the most substantial ties with Kuwait (17.8%), Saudi Arabia (15.3%), and the UAE (10.5%). When correlated with Kuwait, correlations with Saudi Arabia (44.6%), the UAE (40.1%), and Bahrain (29.9%) are the highest. Malaysia is highly correlated with Qatar (21.9%), the UAE (20.6%), and Saudi Arabia (20.6%), while Qatar has solid ties with the UAE (34.8%), Saudi Arabia (37.7%), and Kuwait (24.0%). The highest correlations for Saudi Arabia are with Kuwait (44.6%), the UAE (40.5%), and Qatar (34.7%). Türkiye is observed to be highly linked to Saudi Arabia (12.7%), Malaysia (11.2%), and Kuwait (10.4%), whereas the UAE has strong ties with Saudi Arabia (40.5%), Kuwait (40.1%), and Bahrain (35%).

The next set of results (Table 5) shows the average conditional volatilities of sample markets over five years, from 2017 to 2021.

[2] Conditional volatility is the volatility of a random variable given (i.e., conditioning on) the value of one or more other variables. In the case of the GARCH model, it is conditioned on past values of itself and of model errors.

Table 2
Descriptive statistics.

Statistics	BH	BN	KW	MY	QA	SA	TR	UA
Mean	−0.019	0.007	0.057	−0.008	0.005	0.048	0.011	−0.011
Minimum	−13.094	−7.622	−23.833	−5.825	−12.306	−15.978	−19.176	−18.163
Maximum	14.290	14.001	5.527	6.061	5.695	8.033	8.668	9.291
St.Deviation	1.385	1.251	1.272	0.950	1.052	1.069	2.051	1.290
Coef.Variation	−73.52	191.78	22.39	−112.48	192.12	22.25	194.80	−113.98
Skewness	−0.316	1.958	−6.510	−0.016	−1.429	−2.557	−1.157	−2.417
Kurtosis	23.054	22.391	114.935	5.667	21.338	46.848	11.525	39.934
Observations	1254	1254	1254	1254	1254	1254	1254	1254

Notes: BH represents Bahrain, BN – Bangladesh, KW – Kuwait, MY – Malaysia, QA – Qatar, SA – Saudi Arabia, TR – Türkiye, and UA – UAE. Equity price indices are converted into logarithmic returns.
Source: Authors.

Table 3
Correlation matrix.

Correlation	BH	BN	KW	MY	QA	SA	TR	UA
BH	100%							
BN	7%	100%						
KW	29%	17%	100%					
MY	12%	−3%	16%	100%				
QA	16%	4%	24%	22%	100%			
SA	26%	15%	44%	20%	34%	100%		
TR	7%	8%	10%	11%	9%	13%	100%	
UA	34%	11%	40%	20%	35%	40%	9%	100%

Notes: BH represents Bahrain, BN – Bangladesh, KW – Kuwait, MY – Malaysia, QA – Qatar, SA – Saudi Arabia, TR – Türkiye, and UA – UAE. Equity price indices are converted into logarithmic returns.
Source: Authors.

Table 4
Unconditional volatilities (on-diagonal) and correlations (off-diagonal).

VOL/COR	BH	BN	KW	MY	QA	SA	TR	UA
BH	**1.403**	7.1%	29.9%	12.3%	16.6%	26.2%	7.0%	35.0%
BN	7.1%	**1.269**	17.8%	−2.8%	3.8%	15.3%	8.2%	10.5%
KW	29.9%	17.8%	**1.270**	15.8%	24.0%	44.6%	10.4%	40.1%
MY	12.3%	−2.8%	15.8%	**0.962**	21.9%	20.3%	11.2%	20.6%
QA	16.6%	3.8%	24.0%	21.9%	**1.058**	34.7%	9.5%	34.8%
SA	26.2%	15.3%	44.6%	20.3%	34.7%	**1.079**	12.7%	40.5%
TR	7.0%	8.2%	10.4%	11.2%	9.5%	12.7%	**2.049**	9.4%
UA	35.0%	10.5%	40.1%	20.6%	34.8%	40.5%	9.4%	**1.297**

Notes: BH – Bahrain, BN – Bangladesh, KW – Kuwait, MY – Malaysia, QA – Qatar, SA – Saudi Arabia, TR – Türkiye, and UA – UAE. On-diagonal values represent unconditional volatilities, while off-diagonal values are unconditional correlations. Based on t-distribution.
Source: Authors.

The highest average volatilities are detected in Türkiye (2.45), Malaysia (1.17), and Bahrain (1.14). Meanwhile, Saudi Arabia (0.93), Qatar (0.98), and Kuwait (0.99) were more stable, with the lowest volatilities detected.

In 2017, Bahrain (1.41) had the highest volatility, followed by Türkiye (1.28) and Kuwait (1.04), respectively. The three lowest volatility countries in 2017 were Malaysia (0.38), Saudi Arabia (0.68), and the UAE (0.83). In 2018, Türkiye (2.57) had the highest volatility, then Bahrain (1.24) and Qatar (1.13) followed. The most stable countries for that year were Kuwait (0.71), Bangladesh (0.75), the UAE (0.83), and Saudi Arabia (0.83). In 2019, Türkiye (3.18), Bahrain (1.17), and Bangladesh (0.99) have seen volatility the most, while Saudi Arabia (0.91), Malaysia (0.92), and Kuwait (0.92) experienced better stability. It is evident that in 2020 and 2021, the volatility increased in all countries, and Türkiye had the highest levels of volatility (2.50 and 2.58, respectively); during the same period, Malaysia came second with 1.90 and 1.68 volatilities, respectively. On the other hand, Qatar (1.05 and 0.75) and Bahrain (1.18 and 0.64) were the most stable markets during the GHC (in 2020 and 2021).

Table 6 presents the pairwise conditional correlations: average over sample period, minimum and maximum correlations, as well as yearly average correlations. The UAE vs. Qatar had the highest mean correlation (21.79%), followed by Qatar vs. Saudi Arabia (16.46), UAE vs. Saudi Arabia (15.58), and Saudi Arabia vs. Kuwait (14.26). This suggests that the Islamic indices of the Gulf countries are relatively more integrated. The lowest correlation is observed between Bangladesh and Bahrain (−0.63). These are followed by Malaysia vs. Bangladesh (0.59) and UAE vs. Bangladesh (1.10). It implies that the dynamics of the Bangladeshi market are independent of others. Also, Türkiye is weakly correlated with Bahrain (1.34) and Kuwait (1.83).

Table 5
Summary of conditional volatilities (annual averages).

Market	Overall Statistics			Yearly Average Volatilities				
	Mean	Min	Max	2017	2018	2019	2020	2021
BH	1.14	0.28	8.51	1.41	1.24	1.17	1.18	0.64
BN	1.02	0.32	5.62	0.70	0.75	0.99	1.44	1.18
KW	0.99	0.44	10.46	1.04	0.71	0.92	1.51	0.72
MY	1.17	0.28	2.43	0.38	0.93	0.92	1.90	1.68
QA	0.98	0.50	5.00	1.01	1.13	0.94	1.05	0.75
SA	0.93	0.43	4.23	0.68	0.83	0.91	1.23	0.96
TR	2.45	1.11	3.98	1.28	2.57	3.18	2.50	2.58
UA	1.06	0.63	6.05	0.83	0.83	0.95	1.54	1.14

Notes: BH – Bahrain, BN – Bangladesh, KW – Kuwait, MY – Malaysia, QA – Qatar, SA – Saudi Arabia, TR – Türkiye, and UA – UAE. Based on t-distribution.
Source: Authors.

Table 6
Summary of conditional correlations (annual averages).

Pairs	Overall Statistics			Yearly Average Correlations				
	Mean	Min	Max	2017	2018	2019	2020	2021
BN vs. BH	−0.63%	−4.75%	5.33%	−1.5%	−2.6%	−1.5%	0.9%	1.8%
KW vs. BH	9.63%	−3.45%	22.74%	−0.9%	4.7%	9.2%	18.4%	16.2%
KW vs. BN	3.01%	−2.82%	6.84%	2.1%	4.6%	2.8%	4.7%	0.2%
MY vs. BH	4.94%	−3.77%	14.08%	0.1%	1.0%	7.0%	11.6%	3.9%
MY vs. BN	0.59%	−6.73%	6.86%	−4.2%	−0.6%	2.4%	3.2%	1.5%
MY vs. KW	6.24%	−1.02%	14.25%	1.0%	6.5%	5.9%	10.5%	6.5%
QA vs. BH	7.68%	−2.33%	20.83%	1.2%	3.6%	9.4%	16.2%	6.7%
QA vs. BN	2.16%	−6.66%	8.27%	−3.9%	1.5%	5.2%	3.0%	4.4%
QA vs. KW	7.97%	−0.30%	16.54%	3.7%	2.7%	7.2%	13.0%	13.6%
QA vs. MY	12.42%	−2.43%	21.59%	−0.1%	10.7%	14.1%	17.8%	18.6%
SA vs. BH	5.66%	−7.06%	18.90%	−3.0%	−2.0%	6.6%	15.4%	10.9%
SA vs. BN	9.65%	−0.02%	16.69%	5.8%	6.7%	12.1%	14.4%	8.3%
SA vs. KW	14.26%	−0.17%	28.27%	5.6%	8.7%	11.5%	23.8%	21.7%
SA vs. MY	13.19%	−1.26%	23.48%	2.2%	12.6%	15.8%	19.4%	14.4%
SA vs. QA	16.46%	−6.96%	35.81%	−1.6%	4.7%	18.4%	31.8%	28.2%
TR vs. BH	1.34%	−5.32%	10.29%	−2.6%	−2.2%	0.9%	6.5%	3.9%
TR vs. BN	2.50%	−2.26%	6.97%	−0.2%	2.9%	3.0%	2.6%	4.0%
TR vs. KW	1.83%	−6.17%	9.18%	2.6%	−1.0%	−3.7%	5.9%	6.2%
TR vs. MY	9.72%	−0.29%	18.69%	5.8%	6.1%	9.6%	15.1%	11.7%
TR vs. QA	6.80%	−2.28%	13.07%	3.3%	3.6%	6.4%	10.4%	10.4%
TR vs. SA	7.40%	−0.45%	15.80%	4.1%	4.3%	5.8%	12.7%	10.0%
UA vs. BH	13.65%	−0.57%	30.54%	3.3%	6.1%	18.5%	25.1%	13.5%
UA vs. BN	1.10%	−5.12%	6.78%	0.0%	−2.6%	3.3%	2.9%	1.9%
UA vs. KW	11.12%	−1.06%	22.35%	3.6%	10.5%	8.2%	18.1%	14.7%
UA vs. MY	11.90%	−1.94%	20.69%	−0.6%	10.4%	16.9%	17.6%	13.4%
UA vs. QA	21.79%	−0.02%	35.18%	6.1%	18.8%	22.2%	31.8%	28.8%
UA vs. SA	15.58%	−1.26%	30.38%	2.5%	11.1%	15.5%	24.2%	24.0%
UA vs. TR	3.97%	−2.50%	10.72%	1.1%	1.7%	3.0%	7.0%	7.2%

Notes: BH – Bahrain, BN – Bangladesh, KW – Kuwait, MY – Malaysia, QA – Qatar, SA – Saudi Arabia, TR – Türkiye, and UA – UAE. Based on t-distribution.
Source: Authors.

The highest correlation in 2017 was observed between the UAE and Qatar (6.1), followed by Türkiye and Malaysia (5.8) and Saudi Arabia and Bangladesh (5.8). The three weakest links in 2017 were found in Malaysia vs Bangladesh (−4.2), Qatar vs Bangladesh (−3.9), Bahrain vs. Saudi Arabia (−3.0), and Bahrain vs Türkiye (−2.6).

In 2018, the UAE vs. Qatar (18.8) remained correlated, followed by Saudi Arabia vs. Malaysia (12.6) and the UAE vs. Saudi Arabia (11.1). On the other hand, the following pairs were least correlated: the UAE vs. Bangladesh (−2.6), Bangladesh vs. Bahrain (−2.6), Türkiye vs. Bahrain (−2.2), and Saudi Arabia vs. Bahrain (−2.0).

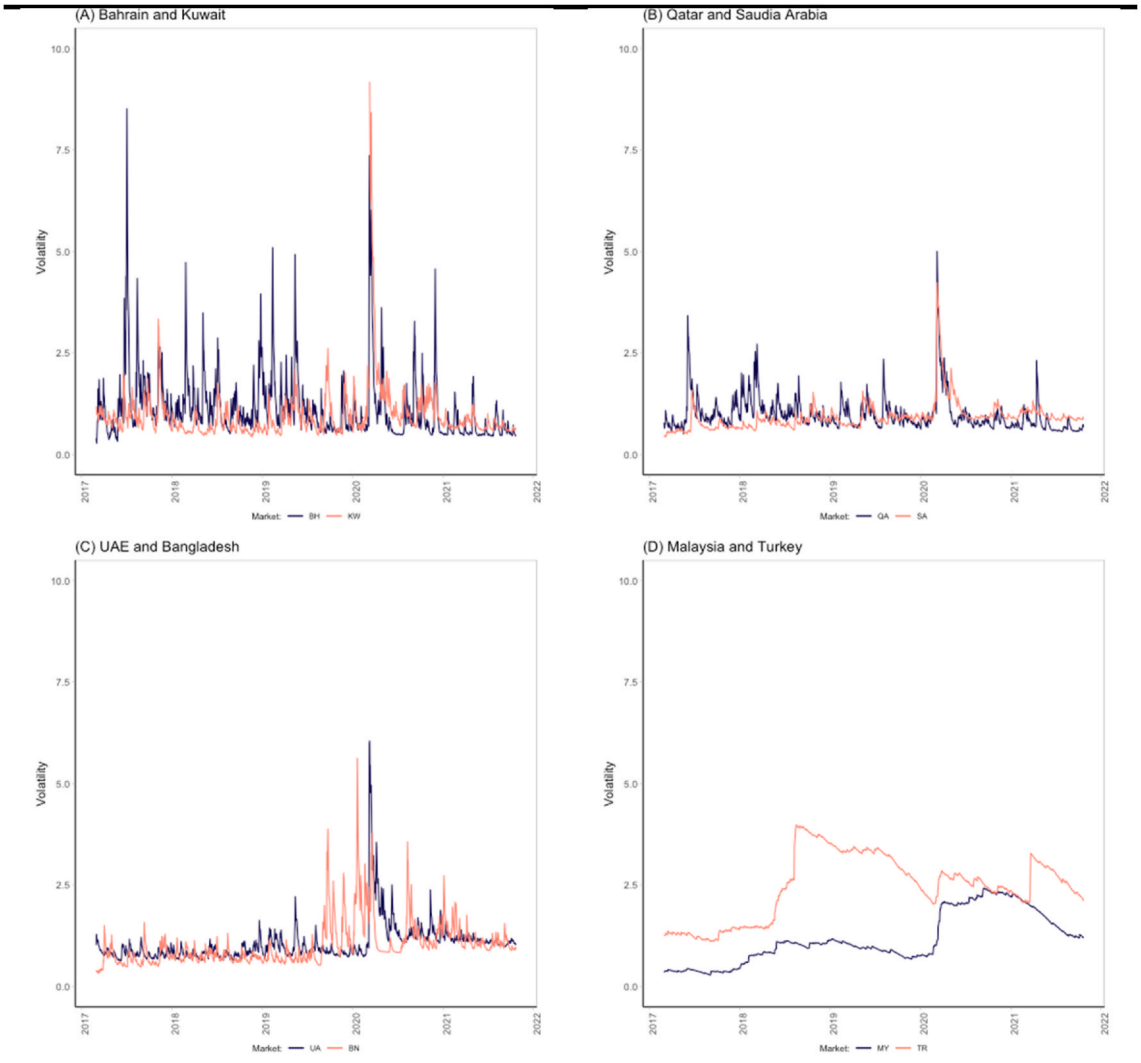
In 2019, the UAE vs. Qatar (22.2), the UAE vs. Bahrain (18.5), and Saudi Arabia and Qatar (18.4) had the most substantial ties. Conversely, Türkiye and Kuwait (−3.7) were least related, followed by Bangladesh vs. Bahrain (−1.5) and Türkiye vs. Bahrain (0.90).

After the emergence of the COVID-19 pandemic (2020–2021), the links across the pairs strengthened, especially between UAE vs. Qatar (31.8 and 28.8, respectively) and Saudi Arabia vs. Qatar (31.8 and 28.2, respectively). The UAE and Saudi Arabia also remained moderately correlated at 24.2% and 24.0% in 2020 and 2021, respectively. Although it increased, the correlation between Bahrain and Bangladesh (0.90) was the lowest in 2020. Meanwhile, after the onset of the pandemic, the correlation between the Kuwaiti and

Bangladeshi markets weakened in 2021 with a value of 0.2%.

The following set of graphs (Fig. 1) shows the conditional volatilities over the sample period. Bahraini and Kuwaiti equity markets, on the top left panel (Fig. 1A), are the most volatile, with volatility levels reaching as high as 8.5 in the first quarter of 2020. Except for Malaysia and Türkiye (Fig. 1D), all countries experience high volatility levels. Malaysia and Türkiye are more stable as compared to others. All countries share a sharp increase in volatility after the first quarter of 2020 (the COVID-19 outbreak). This indicates a significant shock effect from the pandemic. The highest increase is observed in Bahrain, followed by Kuwait, the UAE, Bangladesh, Qatar, and Saudi Arabia. Malaysia and Türkiye came last with a seemingly smoother transition to increased volatility due to the GHC. Notably, all countries quickly reverted to normal volatility levels after the sharp increase, which cannot be said for Malaysia and Türkiye. While experiencing volatility during the pandemic, the two countries slowly returned to normal levels.

Fig. 2 presents the conditional correlations between equity markets over 2017–2021 period. The correlations comovement of Türkiye are all close in magnitude, despite the correlation with Saudi Arabia and Qatar being more assertive on average throughout the period. After the COVID-19 outbreak, all correlations increased for Türkiye at similar magnitudes. One notable observation is that the correlation with Kuwait seems to have grown at higher than pre-pandemic levels. At the same time, the correlations are gradually heading back to the pre-COVID-19 levels. In other words, the link between Türkiye and GCC countries strengthened for a while during the outbreak, but this relationship is weakening. Malaysia is relatively more correlated with Saudi Arabia, Qatar, and the UAE. The correlations with Bahrain and Kuwait are of somewhat lower intensity. All correlations peak after the pandemic. Interestingly,



Notes: BH – Bahrain, BN – Bangladesh, KW – Kuwait, MY – Malaysia, QA – Qatar, SA – Saudi Arabia, TR – Türkiye, and UA – UAE. *Source*: Authors

Fig. 1. Conditional volatilities. Notes: BH – Bahrain, BN – Bangladesh, KW – Kuwait, MY – Malaysia, QA – Qatar, SA – Saudi Arabia, TR – Türkiye, and UA – UAE. Source: Authors.

Notes: BH – Bahrain, BN – Bangladesh, KW – Kuwait, MY – Malaysia, QA – Qatar, SA – Saudi Arabia, TR – Türkiye, and UA – UAE. *Source*: Authors

Fig. 2. Conditional correlations.

correlations with Saudi Arabia and the UAE begin to go down, but the correlations with Qatar continue to soar.

Bangladesh has the lowest correlations on average and mainly correlates with Saudi Arabia. Interestingly, a slight difference is evident for Bangladesh when comparing the pre- and during pandemic time series. However, Bahrain experienced sharp increases in correlations after the COVID-19 outbreak. Correlations are the highest with the UAE market. A similar case applies to Kuwait, mainly correlated with the Saudi Arabian market. Qatar is highly associated with Saudi Arabia and the UAE but less with Kuwait and Bahrain. Correlations significantly increase after the COVID-19 pandemic, but at a gradual rate. Saudi Arabia is highly correlated with all these countries, and its correlation with Qatar is relatively higher. After the COVID-19 outbreak, all correlations are picking up. Similar to Saudi Arabia, the UAE market strongly correlates with the remaining countries, and the correlation with Qatar is the highest. In brief, all correlations tend to soar after the COVID-19 outbreak. According to figures, the increase in correlations after the COVID-19 outbreak appears to be a persisting pattern. This may be due to increased cooperation between these markets during the crisis or to the unknown but familiar nature of the COVID-19 shock. It could also indicate the effect of Islamic finance regulations across countries.

All in all, the results show that markets are not closely integrated, although their links heightened for a while in the first quarter of 2020 due to instability caused by the COVID-19 pandemic. During this period, the correlations increased and faded away after some

time, in line with Chowdhury et al. [26]. In a sense, after the initial hit by COVID-19, the markets started to behave and respond differently depending on the resilience characteristics of these countries. Individual stories of the countries seem to overweight the standard narrative of the COVID-19 outbreak. These results are in line with those reported by Irfan et al. [24]. Remarkably, GCC markets are not as integrated as expected, despite their geographical proximity and sharing common culture. Thus, investors can still diversify their portfolios by investing in these markets. These findings agree with previous studies [8–11,16,21,26,27], but not in line with others [12,13,15].

A weak connectedness of Islamic equities is favorable to investors for diversification purposes. Hence, our results also indicate that the characteristics of the *Shari'ah*-compliant equity indices are not the only differentiating factor. Islamic investors should carefully consider country-specific factors in their investment decisions. This result is relatively favorable for developing global Islamic equity investment by seeking diversification opportunities within the Islamic equity markets. Hence, our results hint that individual country-specific characteristics still matter for international Islamic equity investors even confronting external shocks like the COVID-19 pandemic.

The results of this paper must attract the attention of Islamic investors more tightly. Existing articles often compare the performances of Islamic and conventional equities. This current approach is more targeted at explaining why investors – without prior preferences – may need to consider Islamic equities in their portfolios. However, this approach is unrealistic, considering that investors without Islamic preferences already have more extensive and unrestricted investment opportunity sets, including Islamic equities. The more practical issue lies in the concerns of Islamic equity investors. For them, the decision tree resembles a lexicographic preference. Once an investor adheres to Islamic investment principles, the natural follow-up question is how to diversify within the Islamic equity universe. Hence, by highlighting that Islamic equity markets are not integrated even after a significant external shock emanating from the COVID-19 pandemic, our results indicate that there are sufficient market diversification opportunities for international ethical and Islamic equity investors.

5. Conclusion

The conservative nature of *Shari'ah* principles makes Islamic financial assets natural hedging instruments against crises. The existing literature focuses on conventional equities, and an increasing amount of literature compares their performance with Islamic equities. In contrast, this study tests the performance and degree of connectedness of the leading Islamic finance markets and assesses the effect of COVID-19 on their dynamics. Using the MGARCH-DCC technique on daily frequency data spanning from 2017M1–2021M10, we examine the impact of the COVID-19 pandemic on eight systemically important Islamic finance markets to test if they are integrated and whether they offer diversification benefits for ethical and Islamic investors. Our results show a weak correlation among these markets. While the impact of the COVID-19 pandemic was initially strong increasing volatility and comovement of equity markets in the first quarter of 2020, it faded away within a relatively short period heading towards the pre-pandemic normal. This implies that these markets can offer investors portfolio diversification benefits. Meanwhile, we need to be cautious about these results as all equities under investigation are priced in USD. As a result, some variations could be driven by the exchange rate, as in the recent case of Türkiye.

These findings are significant for several reasons. For instance, they provide a clear view of what an investor or fund manager should do and which stocks they should include in their portfolio to optimize their total utility when investing in Islamic equities. Generally, the results show that markets are not integrated. However, their links strengthened during the first quarter of 2020 due to the pandemic but gradually faded away. This scenario provides an important signal—i.e., investors can still diversify their portfolios by investing in these markets.

Considering the connectedness of the markets, the investors and portfolio managers should focus on weakly correlated or negatively related assets. The negative or weaker correlation during turbulent market conditions suggest that the asset can serve as a safe-haven. Noticeably, after the COVID-19 crisis, all countries reverted to the expected volatility levels after the sharp surge, except Malaysia and Türkiye—they appear to be slowly reverting to normal levels. Therefore, in terms of building a short-term portfolio, investors and fund managers should reconsider adding these two Islamic equities; however, the addition may lead to a high return exposure for the long-term portfolio.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have influenced the work reported in this study.

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