Do Islamic equity indexes outperform their conventional counterparts during normal times and global financial crises?

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Abstract.

This paper compares the performance of Islamic and conventional Dow Jones stock markets for twenty sectors during the recent pre- and post-crises periods, namely the global financial crisis (GFC) and the European sovereign debt crisis (ESDC). We apply different performance measures such as the Sharpe, Roy, Treynor, Omega, Information ratios, and the Jensen Alpha based on C, and the Alpha Jensen based on the CAPM-EGARCH model. Results using the Information ratio (Alpha Jensen), conventional (Islamic) equity returns dominate Islamic (conventional) equity returns during the full sample period. However, the pre-crises periods are dominated by higher conventional equity returns, irrespective of the employed return measures. During the post-crises periods, Islamic equity returns outperform their conventional counterparts in most cases. During the GFC and ESDC, Islamic equity returns dominate their conventional counterparts. These results are important for global investors to benefit from diversified investment opportunities.

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Keywords: Islamic stock markets; Conventional stock markets; Sectors; Performance indexes

1. Introduction

The last decade was marked by two severe crises: the 2008–2009 global financial crises (GFC) and the 2010–2012 European sovereign debt crises (ESDC). During both periods, Islamic stock markets registered spectacular growth. For investors, the importance of portfolio diversification increases during periods of financial and economic turbulence. However, optimal returns through effective diversification need a complete understanding of the risk and return characteristics of different securities in a portfolio. In such a context, contemporary investment strategies, such as financialization of securities, advent of alternative investments, and restructuring of financial markets are some of the most practiced ones. Among alternative financial strategies, Islamic finance is emerging as a key area and is being debated by researchers and practiced by investors across the global financial markets. The principles of Islamic finance are based on Islamic rules and regulations (called *Sharia*) marked by socially responsible investments, an ethically oriented trade system, and sustainable banking and finance. It is also founded on asset-based investments in compliance with Islamic laws. Mainly, in terms of returns, these are low-risk investments with modest returns or short- and medium-term secured commodity finance and investments.

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Current literature, including both theoretical and empirical studies, shows that the global financial crisis of 2008–2009 triggered a major shift in investment philosophy, diversification strategies, and rebalancing of equity portfolios of the global investment community. Existing studies address two major aspects of the financially turbulent periods: i) causes of the crisis that triggered the subprime crisis, Lehman Brothers bankruptcy, the Federal Reserve’s aggressive monetary policy, a range of new financial products; and ii) consequences of the crisis period, namely financial market losses, cutting down of investments, public debt crises, and the impact of many economic downturns on income, consumption, employment, and spending levels. The resultant outcomes embark on the required solution for policy makers, practitioners, and academicians to minimize not only the aforementioned consequences but also to deal with any future periods of financial and economic distress. For similar reasons, the last decade witnessed new directions in global investment patterns such as the inclusion of precious metals (Baomohl and Lyocsa, 2017), alternative investments (Jiang et al., 2016), and asset-based Islamic financial products (Hammoudeh et al., 2014)

In a similar context, among the aforementioned alternative financing strategies, Islamic finance has become a topic of inquiry in current literature (see Abdullah et al., 2007; Milly and Sultan, 2012). The last decade has witnessed rapid growth in Islamic equity financing, especially after the 2008–2009 crisis. In 2012, Islamic financial assets under management were valued at \$1.6 trillion and are projected at around \$6.5 trillion in 2020. An overall composition of these Islamic assets is approximately 46.9 percent in equities, 22.2 percent in money market instruments, 9 percent in real estate, and 11.8

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percent in mixed assets.¹ The rationale behind these growing numbers is the perspective of the investment community that considers Islamic assets as an alternative to conventional equity markets, which is based on the Islamic philosophy of investment. As a comparative viewpoint, Islamic investing differs from conventional investments

because it is governed by *Sharia* laws that mainly forbid receiving and paying interest, avoiding speculative investments in business, and dealing in goods and services that are prohibited by Islam including commodities such as pork and alcohol. Among the other Islamic financing instruments, most of the investment is made in Islamic equity funds that serve as an alternative to conventional financial markets and mutual funds.

This paper aims to operationally investigate the comparative performance analysis of aggregate and disaggregate Islamic and conventional stock markets during periods of pre- and post-financial and economic turbulence (i.e., GFC and ESDC). To achieve this, we employ relevant risk-based equity performance measures comprising of Sharpe, Roy, Treynor, Omega, and Information ratios. We test the robustness of our results by applying the Jensen's Alpha measure based on the CAPM-EGARCH model. All these measures are capable of measuring different types of risks such as specific, total, or systematic threats along with the presence of various restrictions like time-varying risks and normal distribution.

Our results highlight that pre-crisis periods have mixed results for Islamic and conventional market returns. However, Islamic equity returns dominate their

¹ These statistics are sourced from various databases mainly comprising of Kuwait Finance House Research and Bloomberg.

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conventional counterparts during the GFC and ESDC periods. In addition, during the post-crisis periods we report a slight dominance of Islamic equity returns. This performance inclination –of Islamic equity returns as compared to their conventional counterparts has implications for investors and practitioners. Furthermore, the diversification ability of Islamic equities, as witnessed by our results, during crises

periods have implications for investors willing to include Islamic-based equities in their existing portfolios to realize optimal diversification benefits.

The remainder of this study is organized as follows. Section 2 discusses the methodology. Section 3 describes the data and conducts some preliminary analysis. Section 4 discusses the empirical results and draws implications for risk management. Section 5 provides the concluding remarks.

2. Empirical method

To evaluate a stock index performance, three popular performance measures namely the Sharpe ratio, the Treynor ratio, and the Jensen's Alpha have been developed. These measures consider the expected return-risk nexus associated with risky financial assets. It is worth noting that each measure depends on the type of risk measure under consideration.

Let us assume that $R_{i,t}$ is the return of a stock index i computed as the logarithmic difference of two consecutive closing prices, and $\sigma(R_{i,t})$ their corresponding standard

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deviation (as a proxy for the total risk for asset i). Further, $R_{f,t}$ denotes the risk-free rate of return.

To assess the stock performance, we consider average stock returns and standard deviation measures. The first performance measure is the Sharpe (1966) ratio (SR) that measures the average risk-premium per unit of total risk. The specification of SR statistics is defined as follows

$$SR = \frac{(R_{i,t} - R_{f,t})}{\sigma(R_{i,t})}$$

(1)

A higher SR of a stock index i indicates greater financial performance of the stock index. If SR is negative, the stock index i underperforms the referential given by the risk-free asset, while the index outperforms if SR is positive. Excess return is due to a higher risk if SR is bounded between 0 and 1, while it requires lower risk if SR is higher than 1.

Similar to the Sharpe ratio, Roy (1952) developed a more general ratio known as the Reserve ratio (RR) which is defined as follows:

$$RR = \frac{(R_{i,t} - R_{l,t})}{\sigma(R_{i,t})}$$

(2)

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where $R_{l,t}$ is the investor's threshold return level that provides minimum returns, provided the investor is willing to accept this.

The Treynor ratio (TR) of Treynor (1965) is the average risk premium per unit of systematic risk. This ratio is based on the capital asset pricing model (CAPM) The interpretation of TR is similar to SR except that it substitutes total risk (standard deviation) by systematic risk (beta). The TR is formulated as follows:

$$TPR = \frac{(R_{i,t} - R_{l,t})}{\beta_i}, \quad \beta_i = \frac{cov(R_{i,t}, R_{M,t})}{\sigma^2(R_{M,t})} \quad (3)$$

where β_i denotes the beta of a stock index. The higher the TR of an index i , the better is its performance. However, the shortcoming of this ratio is the time-invariant market beta, which is away from reality.

Keating and Shadwick (2002) developed a performance ratio, noted Ω , based on the exposure of potential gains toward possible losses. In contrast to the above ratios, this ratio, has the advantage of not requiring the normality hypothesis and can be defined as follows:

$$\Omega_i = \frac{\sum_{t=1}^T \max(0, R_{i,t} - R_l)}{\sum_{t=1}^T \max(0, R_l - R_{i,t})} \quad (4)$$

The Omega ratio corresponds to the weighted gain/loss ratio relative to a threshold or target return level (R_l). It can also be considered as a ratio of call-put values of an

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exercise price RL. In contrast to the previous performance ratios, this ratio has the advantage of using all the information in a return series instead of simple calculations of mean and variance.

The threshold retained in our study for the Roy ratio (RR) is equal to zero. Of course, the reserve rate can be another value. However, investors who may be seeking to choose between conventional and Islamic investments do not necessarily have the same profile. Accordingly, their serve rate may differ, making the comparison relatively complicated. However, it is obvious that investors would prefer profitable investments with positive

returns, and this justifies the use of a zero-return threshold. As for the Omega ratio, we define the reserve rate as a risk-free rate.

Accordingly, our measures appear to be appropriate and robust to reserve rate changes.

Jensen's (1968) Alpha of an index i by σ , assessed through the following CAPM and developed by Sharpe (1964) and Lintner (1965) is

$$R_{i,t} - R_{f,t} = \sigma + \beta(R_{M,t} - R_{f,t}) + \varepsilon_t$$

(5)

where α refers to the Jensen Alpha, $\varepsilon_{i,t}$ is an error term, which is identically and independently distributed (*iid*) with zero mean, and constant variance noted as $\sigma_{\varepsilon,t}^2$.

Further, $(R_{M,t} - R_{f,t})$ and $(R_{i,t} - R_{f,t})$ denote the excess returns on an Islamic index i and conventional index toward a risk-free return, respectively.

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To consider the presence of stylized facts in the financial time series, we apply the generalized auto regressive conditional heteroscedasticity (GARCH) models (Bollerslev, 1986). The GARCH (1, 1) model is specified as follows:²

$$\varepsilon_t = z_t \sqrt{h_t} \quad , \quad \text{with} \quad h_t = \theta_0 + \theta_1 + \varepsilon_{t-1}^2 + \phi_1 h_{t-1} \quad (6)$$

where $\theta_1 > 0, \phi_1 > 0, \theta_1 + \phi_1 > 1$. Z_t is a white noise process ($E(Z_t) = 0$ and $V(Z_t) = \sigma_z^2$). Thus, a robust estimator for the Jensen Alpha is defined on the basis of the following CAPM- GARCH (1, 1) model:

$$R_{i,t} - R_{f,t} = \alpha + \beta(R_{M,t} - R_{f,t}) + \varepsilon_t \quad (7)$$

where $\varepsilon_t = Z_t \sqrt{h_t}$. It may be noted that both bad and good news affects the conditional volatility of stock returns differently. To consider the asymmetric effects, we apply the exponential GARCH (EGARCH) model of Nelson (1991). The latter enables the variance to react differently after a negative or positive shock. It also allows asymmetry to be captured in the variance reaction following shocks of different sizes.

The logarithm function of the conditional volatility equation ensures the positivity of the conditional volatility. The CAPM-EGARCH (1, 1) is specified as follows:

² We use information criteria like Akaike and Schwartz to check the number of lags for the GARCH model.

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$$R_{i,t} - R_{f,t} = \alpha + \beta(R_{M,t} - R_{f,t}) + \varepsilon_t$$

(8)

where $\varepsilon_t = Z_t \sqrt{h_t}$

$$\log(\text{Var}[\varepsilon_t | \varepsilon_{t-1}]) = \log(\sigma_\varepsilon^2) = \log(h_t) = \omega + \gamma Z_{t-1} + \theta_1(|Z_{t-1}| - E|Z_{t-1}|) + \phi_1 \log(h_{t-1})$$

(9)

where $Z_{t-1} = \varepsilon_{t-1} / \sigma_{t-1}$, $E(\cdot)$ depends on the hypothesis retained for the distribution of Z_t and γ accounts for the asymmetry effects.

Various extensions for conditional alpha have been developed, such as Treynor and Black's (1973) performance measure (TBR). This measure (alpha-beta ratio of a portfolio) is expressed as follows:

$$TBR_i = \frac{\alpha_i}{\beta_i}$$

(10)

where α_i and β_i denote alpha and beta for a portfolio i , respectively. Besides these performance ratio bases for total risk or systematic risk, other performance measures have also been developed for specific risk including the Appraisal ratio or Information ratio, noted as IR, that assess the magnitude of return-risk spreads of a portfolio toward a benchmark index. The IR of a given portfolio i is defined as follows:

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$$IR_i = \frac{\overline{ER}_i}{\sigma(ER_i)}$$

(11)

where $\overline{ER}_i = \frac{1}{T} \sum_{t=1}^T (R_{i,t} - R_{b,t})$, $\sigma(ER_i) = \sqrt{\frac{1}{T-1} \sum_{t=1}^T (R_{i,t} - \overline{ER}_i)^2}$ and $R_{b,t}$ denotes the benchmark return. This ratio benefits/costs and is the “tracking error.” This ratio assesses the active management performance to monitor the degree of regularity achieved by a manager. Passive (good) management practice would give a null ratio ($IR = 0.5$).

3. Data and preliminary analysis

3.1. Data

We use the daily closing spot price data for the Dow Jones World Index (W1DOW) and the Dow Jones Islamic Market Index (DJIM), and twenty sectoral Islamic and

conventional indexes. The latter includes the Dow Jones Global Basic Materials (W1BSC) Index, the Dow Jones Global Consumer Services (W1CYC) Index, the Dow Jones Global Consumer Goods (W1NCY) Index, the Dow Jones Global Energy (W1ENE) Index, the Dow Jones Global Financials (W1FIN) Index, the Dow Jones Global Health Care (W1HCR) Index, the Dow Jones Global Industrials Index (W1IDU), the Dow Jones Global Technology Index (W1TEC), the Dow Jones Global Telecommunications (W1TLS) Index, and the Dow Jones Global Utilities (W1UTI)

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Index. Islamic equities include the DJIM Basic Materials (DJIBSC) Index, the DJIM Consumer Services (DJICYC) Index, the DJIM Consumer Goods (DJINCY) Index, the DJIM Energy (DJIENE) Index, the DJIM Financials (DJIFIN) Index, the DJIM Health Care (DJIHCR) Index, the DJIM Industrials (DJIIDU) Index, the DJIM Technology (DJITEC) Index, the DJIM Telecommunications (DJITLS) Index, and the DJIM Utilities (DJIUTI) Index. We also consider the aggregate index for the conventional and Islamic indexes. The study period runs from November 9, 1998 to March 05, 2015. It covers several episodes of widespread instabilities and crises (e.g., the Gulf wars, the 2001 New York terrorist attack, the 2008–2009 GFC, and the 2010–2012 ESDC), and the gradual recovery of the global stock markets. Data for all the index series are extracted from Bloomberg.

Figure 1 displays the dynamics of the aggregate and the twenty disaggregate Islamic and conventional stock sector indexes. It shows a few periods of significant price fluctuations and the patterns of price development are somewhat similar for the sectoral

types. The Islamic and conventional (aggregate and sectors) trajectories follow similar trends. All sectoral pairs show significant variations between 2008 and 2009 followed by a significant increase. This suggests that among all the above mentioned periods of financial and economic turbulence, the global financial crisis of 2008–09 had the most significant impact on the prices of Islamic and conventional equity indexes.

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Fig. 1 Regime classification of sector market prices

3.2. Preliminary analysis

We calculate the continuously compounded daily returns by considering the difference in the logarithms of two consecutive prices. Table 1 provides the descriptive statistics, the unit root tests, the Ljung-Box test, and the ARCH-LM test of the daily returns. The average daily returns are positive for all the return series. Likewise, the average return of the aggregate Dow Jones Islamic Index is equal to the corresponding conventional index. Additionally, the average returns of the Islamic Basic Services Index, the Islamic Industrials Index, the Islamic Utility Index, and the Islamic Telecommunications Index

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are higher than their corresponding conventional indexes, but for the rest of sectors we obtain the opposite result. The skewness coefficients are negative for the majority of return series. The kurtosis coefficients are above 3 for all the return series. These findings indicate that the probability distributions of Islamic and conventional sectoral index returns are skewed and leptokurtic and, thus, reject the assumption of normality, and this is also confirmed by the Jarque-Bera statistics (JB). Applying the conventional unit root tests pioneered by Dickey and Fuller (1979), Philips and Perron (1989) statistics, and examining the stationarity property under the null hypothesis using the Kwiatkowski et al. (1992) tests, the results indicate that all the return series are stationary. We further examine the existence of ARCH effects where all the series exhibit ARCH behavior and, therefore, the estimation of a GARCH model is appropriate for modeling some stylized facts such as fat tails, and clustering and persistence of volatility for both Islamic and conventional stock sector returns.

The unconditional correlation (see Table 2) is positive and high for all the pairs. More precisely, the highest correlation is observed for the Healthcare pair followed by the Energy pair, while the lowest correlation is observed for the Financial pair followed by Consumer goods and utilities, implying the presence of portfolio diversification benefits.

	M e a n	M a x .	M i n .	S t d e v .	S k e w n e s s	K u r t o s i s	J - B	$Q(30)$	$Q^2(30)$	A D F	P P	K P S S	A R C H- L M (1 0)
W I D O W	0	0	-	0	-	1	3	5	7	-	-	0	19
	.	.	0	.	0	4	1	8	1	4	6	.	0.7
	0	0	.	0	.	.	0	.	1	1	8	0	1*
	0	8	0	0	4	1	7	6	0	.	.	7	**
	0	6	7	8	1	5	3	0	.	5	2	7	
	1	6	1	6	8	*	*	*	*	2	9	5	
			6		9	*	*	*	*	*	*	*	
D J I M	0	0	-	0	-	1	2	4	6	-	-	0	18
	.	.	0	.	0	3	8	7	3	4	7	.	2.8
	0	0	.	0	.	.	7	.	4	1	0	0	4*
	0	9	0	0	3	7	5	8	5	.	.	9	**
	0	7	8	9	4	3	6	3	.	9	2	0	
	1	7	1	0	2	*	.	*	*	1	1	0	
			8		1	*	*	*	*	*	*	*	
W I B S C	0	0	-	0	-	1	5	2	6	-	-	0	14
	.	.	0	.	0	7	3	5	3	4	6	.	9.1
	0	0	.	0	.	.	8	5	8	0	4	0	6*
	0	9	1	1	7	6	1	.	6	.	.	9	**
	0	3	2	1	8	3	0	6	.	9	9	5	
	1	4	6	3	8	*	.	*	*	2	4	3	
			2		2	*	*	*	*	*	*	*	
D J I B S C	0	0	-	0	-	1	4	2	8	-	-	0	20
	.	.	0	.	0	5	0	6	7	4	6	.	7.9
	0	0	.	0	.	.	3	4	1	1	4	0	2*
	0	9	1	1	5	6	7	.	1	.	.	8	**
	0	8	1	1	7	9	0	7	.	0	6	3	
	1	6	1	7	1	*	*	*	*	2	2	1	
			4		4	*	*	*	*	*	*	*	
W I C Y	0	0	-	0	-	1	1	1	7	-	-	0	23
	.	.	0	.	0	0	5	2	2	4	7	.	8.4
	0	0	.	0	.	.	6	1	9	4	1	1	7*
	0	7	0	0	0	9	3	0	1	.	.	4	**

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C	0 1 4	3 6	6 2 7	9 6	7 2 6 * * *	3 * * *	4 . * * *	. * * *	. * * *	4 7 * * *	6 2 * * *	8 3	
	0	0	-	0	-	9	1	2	2	-	-	0	71.
	.	.	0	.	0	.	0	0	9	4	7	.	67
D	0	0	.	0	.	5	6	0	5	3	3	1	8*
J	0	8	0	0	0	4	4	.	0	.	.	1	**
I	0	7	7	9	8	5	8	5	.	5	3	0	
C	1	6	4	8	7	*	.	*	*	7	6	6	
Y	8		6		3	*	*	*	*	*	*		
C					*	*	*	*	*	*	*		
	0	0	-	0	-	1	3	6	1	-	-	0	53
	.	.	0	.	0	5	7	1	2	4	7	.	9.9
	0	0	.	0	.	.	7	8	9	8	2	0	8*
W	0	8	0	0	2	3	5	9	2	.	.	9	**
I	0	9	6	9	3	1	1	.	7	2	7	1	
N	1	3	7	1	8	*	.	*	.	7	3	3	
C	5		1		4	*	*	*	*	*	*		
Y					*	*	*	*	*	*	*		
	0	0	-	0	-	1	2	3	4	-	-	0	13
	.	.	0	.	0	3	6	5	6	4	7	.	6.8
D	0	0	.	0	.	.	7	2	1	3	1	1	4*
J	0	7	0	0	2	3	6	.	0	.	.	2	**
I	0	8	6	7	7	6	1	5	.	8	5	4	
N	1	5	1	3	0	*	.	*	*	9	7	2	
C	3		3		0	*	*	*	*	*	*		
Y					*	*	*	*	*	*	*		
	0	0	-	0	-	1	5	1	6	-	-	0	17
	.	.	0	.	0	8	6	2	4	4	7	.	8.5
	0	1	.	0	.	.	7	6	0	2	2	0	4*
W	0	3	1	1	6	0	5	.	8	.	.	9	**
I	0	3	3	2	1	6	7	2	.	7	9	0	
E	1	2	5	3	8	*	.	*	*	8	6	6	
N	4		8		4	*	*	*	*	*	*		
E					*	*	*	*	*	*	*		
	0	0	-	0	-	1	4	1	7	-	-	0	20
	.	.	0	.	0	5	8	2	2	4	7	.	1.9
D	0	1	.	0	.	.	1	2	2	2	3	0	5*
J	0	3	1	1	6	8	1	.	7	.	.	8	**
I	0	6	3	2	1	6	4	6	.	9	1	1	
E	1	1	9	4	6	*	.	*	*	3	4	4	
N	3		0		9	*	*	*	*	*	*		
E					*	*	*	*	*	*	*		
	0	0	-	0	-	1	5	2	5	-	-	0	13
W	.	.	0	.	0	7	3	0	7	4	1	.	9.6
I	0	1	.	0	.	.	6	2	0	1	9	0	8*
F													

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I N	0 0 0 1	0 6 8	0 9 4 8	1 0 8	2 1 1 0 *	6 8 *	0 2 *	. 8 *	7 *	. 8 2 *	6 9 *	6 9 9	**
D J I F I N	0 . 0 0 0 1	0 . 1 7 2 7	- 0 . 1 1 6 9 8	0 . 0 1 3 0	0 . 1 1 5 8 *	2 8 . 1 0 *	1 5 6 3 7 *	1 9 9 0 *	6 5 3 3 *	- 4 3 . 8 6 *	- 1 8 4 *	0 . 0 4 5 0	15 4.1 2* **
W I H C R	0 . 0 0 0 1 6	0 . 0 9 8 5	- 0 . 0 0 6 2 4	0 . 0 0 8 0	- 0 . 1 9 7 2 *	1 3 . 8 8 *	2 9 4 8 7 *	1 3 1 . 8 *	3 0 3 9 *	- 4 4 . 0 4 *	- 6 9 . 8 9 *	0 . 2 0 5 5	97. 36 ** *
D J I H C R	0 . 0 0 0 1 4	0 . 0 9 7 8	- 0 . 0 0 6 1 9	0 . 0 1 8 1 1	- 0 . 1 9 5 7 *	1 3 . 3 *	2 6 5 3 *	1 3 9 . 6 *	3 0 1 0 *	- 4 4 . 1 2 *	- 6 9 . 8 0 *	0 . 2 1 4	94. 99 ** *
W I D U	0 . 0 0 0 1 0	0 . 0 6 8 7	- 0 . 0 0 7 5 7	0 . 0 0 9 2	- 0 . 4 7 9 1 *	1 1 . 9 *	2 0 3 4 5 *	2 4 . 1 *	4 4 5 2 *	- 4 1 . 6 5 *	- 7 1 . 0 9 *	0 . 1 2 5 8	15 4.2 9* **
D J I I D U	0 . 0 0 0 1 4	0 . 0 8 3 9	- 0 . 0 0 8 3 9	0 . 0 3 9 7	- 0 . 3 8 0 9 *	1 1 . 7 0 *	1 8 9 6 4 *	1 9 . 2 *	6 1 3 6 *	- 4 0 . 6 4 *	- 6 6 . 9 4 *	0 . 8 7 6	15 3.9 ** *
W I	0 . 0 0 0 1 0	0 . 0 8 3 9	- 0 . 0 0 8 3 9	0 . 0 3 9 7	0 . 3 8 0 9 *	1 1 . 7 0 *	1 8 9 6 4 *	1 9 . 2 *	6 1 3 6 *	- 4 0 . 6 4 *	- 6 6 . 9 4 *	0 . 8 7 6	79. 95

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T E C	0 0 0 1	1 0 6 6	. 0 9 4 2	0 1 3 1	0 9 0 2 * * * *	. 9 8 * * * *	8 3 9 . * * * *	. 6 7 * * * *	1 8 . * * * *	2 .3 9 * * * *	2 .3 0 * * * *	1 5 7 5	5* **
D J I T E C	0 .0 0 0 0 1	0 .1 1 7 1 1	- 0 .0 8 2 9	0 .0 1 3 9 *	0 .1 8 7 4 * * *	1 0 .7 6 * * *	1 5 0 0 .0 * * *	6 0 .7 4 * * *	4 4 3 8 .1 * * *	- 4 3 .1 9 * * *	- 7 3 .8 4 * * *	0 .1 3 1 6	87. 41 ** *
W I T L S	0 .0 0 0 0 2	0 .0 9 8 9	- 0 .0 9 3 0	0 .0 0 9 7 8 3 * * *	- 0 .1 0 8 3 * * *	1 3 .4 1 * * *	2 6 9 7 1 1 .0 * * *	1 1 5 .5 * * *	3 1 3 4 .1 * * *	- 4 4 .1 5 * * *	- 7 0 .6 5 * * *	0 .1 2 0 7	90. 88 ** *
D J I T L S	0 .0 0 0 0 4	0 .0 9 9 5	- 0 .0 8 0 7	0 .0 0 9 9 0 * * *	- 0 .0 4 6 0 * * *	1 1 .0 9 * * *	1 6 2 8 6 .0 * * *	1 0 6 .1 * * *	3 9 4 9 .0 * * *	- 4 3 .5 9 * * *	- 7 0 .3 7 * * *	0 .0 8 2 6	10 6.8 ** *
W I U T I	0 .0 0 0 0 1	0 .1 1 7 6	- 0 .0 7 4 6	0 .0 0 7 5 1 7 * * *	- 0 .2 2 1 7 * * *	2 2 .7 8 * * *	1 2 9 0 4 0 .0 * * *	1 0 8 .0 * * *	4 0 7 0 .0 * * *	- 4 4 .3 0 * * *	- 7 2 .1 8 * * *	0 .1 1 4 5	19 0.0 ** *
W I U T I	0 .0 0 0 0 2	0 .1 4 6 6	- 0 .0 9 3 3	0 .0 0 9 3 2 * * *	0 .0 3 9 2 * * *	2 9 .2 8 * * *	1 7 1 6 0 0 .0 * * *	1 6 .1 0 * * *	4 5 9 .1 * * *	- 4 4 .2 9 * * *	- 7 1 .5 5 * * *	0 .1 2 2 7	20 3.2 ** *

Notes: Std. dev. refers to standard deviation, J-B to the empirical statistics of the Jarque-Bera test for normality, the Ljung-Box $Q(30)$, and $Q^2(30)$ tests for no autocorrelation of residuals and square residuals, respectively. The ADF, PP, and KPSS are the empirical

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statistics of the Augmented Dickey and Fuller (1979), Phillips and Perron (1988) unit root tests, and the Kwiatkowski et al. (1992) stationarity test, respectively. The ARCH-LM (10) test of Engle (1982) checks the presence of ARCH effects. Asterisk *** denotes rejection of the null hypotheses of normality, no autocorrelation, unit root, non-stationarity, and conditional homoscedasticity at 1% significance level.

Table 2. Correlations of sample returns between Islamic and conventional sector stock indexes.

	W 1 D O W	D J I M	W 1 B S C	D J I B S C	W 1 C Y C	D J I C Y C	W 1 N C Y	D J I N C Y	W 1 E N E	D J I E N E	W 1 FI N
W	1										
I	0	1									
D	0	0	1								
O	0	0	0	1							
W	0	0	0	0	1						
D	0	0	0	0	0	1					
J	0	0	0	0	0	0	1				
I	0	0	0	0	0	0	0	1			
M	0	0	0	0	0	0	0	0	1		
W	0	0	0	0	0	0	0	0	0	1	
I	0	0	0	0	0	0	0	0	0	0	1
D	0	0	0	0	0	0	0	0	0	0	0
J	0	0	0	0	0	0	0	0	0	0	0
I	0	0	0	0	0	0	0	0	0	0	0
B	0	0	0	0	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0	0	0	0	0
C	0	0	0	0	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0	0	0	0	0
I	0	0	0	0	0	0	0	0	0	0	0
C	0	0	0	0	0	0	0	0	0	0	0
Y	0	0	0	0	0	0	0	0	0	0	0
C	0	0	0	0	0	0	0	0	0	0	0
D	0	0	0	0	0	0	0	0	0	0	0
J	0	0	0	0	0	0	0	0	0	0	0
I	0	0	0	0	0	0	0	0	0	0	0
B	0	0	0	0	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0	0	0	0	0
C	0	0	0	0	0	0	0	0	0	0	0

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W	0	0	0	0	0	0	1			
1	.	.	.	.	.	.	.			
N	6	5	5	5	2	4	0			
C	4	9	8	6	8	9	0			
Y	4	6	4	9	8	3	0			
	7	9	1	4	7	5	0			
D	0	0	0	0	0	0	0	1		
J	.	.	.	.	.	.	.	.		
I	7	7	6	6	6	6	7	0		
N	8	4	7	6	1	3	4	0		
C	7	8	0	0	4	1	3	0		
Y	4	1	1	5	8	1	7	0		
W	0	0	0	0	0	0	0	0	1	
1	.	.	.	.	.	.	.	.	.	
E	7	7	7	7	5	4	4	5	0	
N	4	4	4	5	4	8	8	9	0	
E	3	1	7	1	2	8	2	1	0	
	6	7	5	3	8	3	7	2	0	
D	0	0	0	0	0	0	0	0	0	1
J	.	.	.	.	.	.	.	.	.	.
I	7	7	7	7	5	4	4	5	9	0
E	4	4	3	4	3	9	7	9	8	0
N	1	3	0	4	0	0	3	1	0	0
E	0	6	0	9	8	1	6	4	9	0
W	0	0	0	0	0	0	0	0	0	0
1	.	.	.	.	.	.	.	.	.	.
F	9	8	7	7	7	6	6	7	6	6
I	1	2	7	5	4	8	0	3	7	5
N	7	8	9	5	1	8	1	3	8	9
	3	7	5	4	5	7	7	4	0	6
D	0	0	0	0	0	0	0	0	0	0
J	.	.	.	.	.	.	.	.	.	.
I	5	5	4	4	5	5	3	4	4	4
F	8	5	4	4	1	2	6	8	1	1
I	0	1	6	0	5	4	7	0	2	9
N	0	5	8	2	6	0	1	8	3	4
W	0	0	0	0	0	0	0	0	0	0
1	.	.	.	.	.	.	.	.	.	.
H	7	7	5	5	6	6	5	6	5	5
C	4	4	5	4	2	2	8	6	6	6
R	5	6	4	6	2	5	3	5	4	5
	7	5	6	5	1	1	3	8	4	0
D	0	0	0	0	0	0	0	0	0	0
J	.	.	.	.	.	.	.	.	.	.
I	7	7	5	5	6	6	5	6	5	5
H	3	4	2	3	1	2	1	7	5	5
C	8	5	9	2	5	1	6	7	4	6
R	8	4	5	0	1	7	0	1	1	0
W	0	0	0	0	0	0	0	0	0	0
1	.	.	.	.	.	.	.	.	.	.
I	9	9	8	8	7	7	6	7	6	6

1.
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D	4	0	3	1	6	1	3	5	8	6	
U	2	0	4	2	5	7	3	7	1	6	
	1	1	9	7	0	5	8	0	3	7	
D	0	0	0	0	0	0	0	0	0	0	
J	.	.	.	.	.	.	.	.	.	.	
I	9	9	7	7	7	7	6	7	6	6	0.
I	4	2	9	7	7	4	0	3	5	4	83
D	2	8	5	8	3	1	1	1	3	8	65
U	9	7	5	8	1	3	9	3	1	3	
	0	0	0	0	0	0	0	0	0	0	
W	.	.	.	.	.	.	.	.	.	.	
I	8	8	5	5	6	6	4	5	4	4	0.
T	0	5	3	1	8	7	2	2	5	3	64
E	0	9	5	9	6	5	0	6	1	9	58
C	7	9	2	3	8	9	8	2	8	1	
D	0	0	0	0	0	0	0	0	0	0	
J	.	.	.	.	.	.	.	.	.	.	
I	7	8	4	4	6	6	3	5	4	4	0.
T	8	5	9	8	6	7	9	0	2	2	61
E	1	1	1	9	7	0	6	2	5	5	07
C	6	1	8	3	7	4	0	0	8	3	
	0	0	0	0	0	0	0	0	0	0	
W	.	.	.	.	.	.	.	.	.	.	
I	8	7	6	6	6	6	5	6	5	5	0.
T	1	9	3	2	7	1	2	1	6	3	73
L	2	1	1	0	6	4	4	0	2	2	79
S	3	0	2	8	6	5	9	7	0	6	
D	0	0	0	0	0	0	0	0	0	0	
J	.	.	.	.	.	.	.	.	.	.	
I	7	7	5	5	6	5	4	5	4	4	0.
T	6	5	9	9	2	7	9	7	9	9	67
L	6	1	6	2	2	5	1	5	3	2	83
S	9	7	7	5	8	9	3	8	1	2	
	0	0	0	0	0	0	0	0	0	0	
W	.	.	.	.	.	.	.	.	.	.	
I	7	7	7	6	6	5	5	6	7	6	0.
U	7	2	0	9	0	3	5	6	2	9	72
T	2	6	5	0	2	4	0	6	8	5	48
I	4	5	6	1	8	1	6	5	0	4	
	0	0	0	0	0	0	0	0	0	0	
W	.	.	.	.	.	.	.	.	.	.	
I	6	6	6	6	4	4	4	5	6	6	0.
U	7	3	6	6	8	2	5	2	4	3	62
T	3	8	0	3	7	5	7	9	4	3	33
I	9	9	9	6	6	0	5	9	6	9	

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Table 2. (continued)

	D J I F I N	W I H C R	D J I H C R	W I I D U	D J I I D U	W I T E C	D J I T E C	W I T L S	D J I T L S	W I U T I	D J I U T I
	0	1									
W	.	.									
I	3	0									
H	9	0									
C	9	0									
R	7	0									
	0	0	1								
D	.	.	.								
J	3	9	0								
I	9	8	0								
H	1	8	0								
C	1	1	0								
R											
	0	0	0	1							
W	.	.	.	.							
I	5	6	6	0							
I	5	5	4	0							
D	8	5	1	0							
U	1	4	0	0							
	0	0	0	0	1						
D	.	.	.	.	.						
J	5	6	6	9	0						
I	8	3	2	5	0						
I	1	1	3	6	0						
D	0	5	2	5	0						
U											
	0	0	0	0	0	1					
W	.	.	.	.	.	.					
I	4	5	5	7	8	0					
T	5	1	1	4	0	0					
E	4	6	1	9	2	0					
C	2	8	1	9	3	0					
	0	0	0	0	0	0	1				
D	.	.	.	.	.	.	.				
J	4	5	5	7	7	9	0				
I	3	0	0	1	7	8	0				
T	4	6	8	4	4	6	0				
E	7	1	2	8	4	1	0				
C											
	0	0	0	0	0	0	0	1			
W	.	.	.	.	.	.	.	.			
I	4	5	5	7	7	6	6	0			
T	4	6	6	3	4	6	2	0			
L	4	6	6	3	4	6	2	0			
S	1	5	9	7	5	3	8	0			

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	2	8	9	7	5	3	6	0		
D	0	0	0	0	0	0	0	0	1	
J	.	.	.	.	.	.	.	.	.	
I	4	5	5	6	7	6	5	9	0	
T	4	1	2	9	1	1	9	2	0	
L	7	9	2	0	0	3	1	1	0	
S	0	9	2	5	6	9	9	3	0	
	0	0	0	0	0	0	0	0	0	1
W	.	.	.	.	.	.	.	.	.	.
I	4	6	6	7	6	4	4	6	5	0
U	1	4	3	0	7	7	4	6	8	0
T	2	9	8	9	4	5	6	9	6	0
I	7	1	6	4	3	7	8	0	1	0
	0	0	0	0	0	0	0	0	0	1
W	.	.	.	.	.	.	.	.	.	.
I	3	5	5	6	6	3	3	5	5	7
U	5	1	0	1	0	8	6	8	5	6
T	8	3	7	3	4	4	5	0	4	5
I	5	9	2	7	2	8	6	7	6	9

Notes: This table reports Pearson correlations.

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4. Empirical results

Before proceeding with empirical testing and estimations, we first report segregation of our sample period into five sub periods (see Table 3): complete sample period, stable regimes period, pre- and post-GFC periods, and ESDC period. The dates are also highlighted in the time evolution of our sampled sectors in Figure 1. To add logical interpretation, we run our analysis for different periods based on financial and economic turbulence along with analyzing the complete sample period. Therefore, our comparative analysis is based not only between the Islamic and conventional indexes for the sample period, but we also compare the performance of these indexes based on time periods characterized by significant economic and financial events.

Table 3. Crisis periods based on regimes of excess volatility.

	Periods
Whole	January 2, 2004–March 5, 2015
Stable regime I	January 2, 2004–July 31, 2007
GFC	August 1, 2007–March 31, 2009
ESDC	November 5, 2009–December 31, 2011
Stable regime II	January 1, 2012–March 5, 2015

Table 4 reports the Sharpe ratio results for both Islamic and conventional equity index pairs. Statistics in different columns range from column I reporting for the entire period, stable period before the GFC, the GFC of 2008–09, followed by the ESDC to the post-crises period. The estimated results of Sharpe ratio for the complete sample period highlight mixed findings as out of the ten Islamic conventional pairs, five pairs show superior risk-adjusted returns for Islamic indexes, whereas the remaining pairs highlight

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higher returns for conventional indexes. For the pre-GFC period, we show superior risk-adjusted returns for all the conventional indexes compared to their Islamic counterpart index except the Dow Jones Global Health Care and Global Telecommunications indexes where returns for the Islamic healthcare and Islamic technology sectors are greater than their conventional counterparts. These findings change significantly during the GFC period as risk-adjusted returns for all the Islamic indexes yield higher returns than their conventional counterparts, with the exception of Telecommunications and Consumer Goods sectors that offer superior returns for conventional equity indexes versus their Islamic counterparts during the GFC period. This result shows that these sectors were not sensitive to the GFC. Regarding the ESDC period, the results are similar to the GFC period where Islamic indexes in the Islamic-conventional pairs exhibit superior returns except for Consumer Services, Energy, and Consumers Utility sectors. In the post- GFC and ESDC periods, results are different compared to the pre-crises stable period 1. Except for Basic Materials, Telecommunications, and Consumers Utility sectors, Islamic risk-adjusted returns outperformed their conventional counterparts for the remainder of the sectors.

To summarize, we find that the daily conventional risk-adjusted returns for Consumer Goods, Energy, and Utility sectors outperformed their Islamic counterparts. However for the remaining sectors, Islamic risk-adjusted returns exhibited superior performance over their conventional indexes.

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Table 4. Sharpe index results.

	Whole period	Stable I	GFC	ESDC	Stabl e II
W1BSC	0.004092	0.057086	-0.068776	0.0039 89	- 0.00 533
DJIBSC	0.004199	0.050508	-0.062433	0.0087 78	- 0.00 700
W1CYC	0.015044	0.001986	-0.094751	0.0355 70	0.08 5994
DJICYC	0.017414	0.001154	-0.071000	0.0327 08	0.08 8743
W1NCY	0.018799	0.027025	-0.098283	0.0337 57	0.06 7176
DJINCY	0.014278	0.008157	-0.103051	0.0396 32	0.06 8285
W1ENE	0.004585	0.052582	-0.048171	0.0065 26	- 0.00 883
DJIENE	0.003259	0.045441	-0.045539	0.0037 63	- 0.00 8450
W1FIN	-0.00735	0.021150	-0.104588	- 0.0221 52	0.05 160
DJIFIN	0.001079	0.002589	-0.050563	- 0.0033 41	0.05 5770
W1HCR	0.020809	-0.013950	-0.067848	0.0300 21	0.10 1930
DJIHCR	0.018320	-0.021704	-0.065839	0.0300 29	0.09 8202
W1IDU	0.010656	0.048391	-0.106957	0.0166 9	0.05 3820
DJIIDU	0.011388	0.029153	-0.09369	0.0218 61	0.05 4731
W1TEC	0.009079	-0.006924	-0.074523	0.0206 92	0.01 5116
DJITEC	0.006199	-0.01313	-0.071519	0.0637 78	0.06 2029
W1TLS	-9.915E- 05	0.018104	-0.074706	0.0116 50	0.03 3461
DJITLS	0.000137	0.016160	-0.068220	0.0201 31	0.02 4896
W1UTI	0.002408	0.05908	-0.071853	- 0.0078 77	0.01 8628
W1UTI	-0.007189	0.052174	-0.068106	- 0.0225 45	- 0.00 5552

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Table 5 employs the Roy ratio for computing risk-adjusted returns for Islamic-conventional index pairs. Note that we replace the risk-free rate by some threshold that any knowledgeable and rational investor assumes as a risk-free return. Thus, we assume the Roy ratio as being more conservative than the Sharpe ratio in case the investor seeks superior returns from the risk-free rate that is higher than the conventional treasury rate or as less conservative if the investor prefers positive returns, even lower than the risk-free rate. Results in Table 5 are slightly different from those reported in Table 4, as discussed earlier. We again witness mixed results for the complete sample period for both the Islamic and conventional equity indexes. More precisely, the conventional equity markets exhibit superior returns over their Islamic counterparts except Consumer Services, Healthcare, and Telecommunications sectors. During the GFC period, the conventional Healthcare sector, Telecommunications, and Consumer Utility exhibit higher returns over their Islamic counterparts. However, the remaining sectors experience higher returns in the Islamic sectors. Following the GFC, during the ESDC period also Islamic indexes showed greater positive returns except Energy, Technology, and the Utilities sectors that persistently exhibit higher returns for conventional equities. In the post-crises period (i.e., both GFC and ESDC), we find that results are somewhat similar to the Sharpe ratio—equally mixed for both the conventional and Islamic indexes. For sectors such as Basic Materials, Financials, Technology, Telecommunications, and Utility, Islamic indexes exhibit higher returns compared to their conventional counterparts. However, Consumer Services, Consumer Goods, Energy, Healthcare, and Industrial sectors exhibit higher performance compared to their conventional

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counterparts. The results in Table 5 highlight the fact that even after considering the decision-making behavior of rational and/or knowledgeable investors and replacing the risk-free rate by some other threshold returns, investors may experience slightly different risk-adjusted returns. However, there is no considerable change in the differences between Islamic and conventional equity indexes.

Table 5. Roy index results.

	Whole period	Stable I	GFC	ESDC	Stabl e II
W1BSC	0.000342	0.004359	-0.003968	0.0002 68	- 0.00 0303
DJIBSC	0.000336	0.003942	-0.003574	0.0005 47	- 0.00 0406
W1CYC	0.000763	0.002488	-0.004148	0.0024 44	0.00 5275
DJICYC	0.000818	0.002106	-0.003148	0.0024 08	0.00 5412
W1NCY	0.000921	0.004118	-0.005587	0.0020 48	0.00 4322
DJINCY	0.000793	0.003254	-0.005104	0.0021 42	0.00 4431
W1ENE	0.000345	0.003824	-0.002154	0.0002 89	- 0.00 0612
DJIENE	0.000311	0.003478	-0.001960	0.0001 64	- 0.00 0599
W1FIN	0.000067	0.003509	-0.006330	- 0.0012 45	0.00 3675
DJIFIN	0.000258	0.001813	-0.003109	- 0.0001 41	0.00 3474
W1HCR	0.000255	0.000224	-0.001575	0.0017 19	0.00 6185
DJIHCR	0.000892	0.001606	-0.003484	0.0018 28	0.00 6229
W1IDU	0.000590	0.004756	-0.006167	0.0010 20	0.00 3728
DJIIDU	0.000607	0.003735	-0.005408	0.0013 30	0.00 3796
W1TEC	0.000545	0.001455	-0.004253	0.0012 65	0.00 4114
DJITEC	0.000464	0.001118	-0.004083	0.0009 33	0.00 4016
W1TLS	0.000110	0.000422	-0.002116	0.0007 05	0.00 1927

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DJITLS	0.000366	0.002681	-0.004011	0.0012 45	0.00 1498
W1UTI	0.000130	0.000646	-0.001953	- 0.0003 79	0.00 1097
W1UTI	0.000043	0.000644	-0.002347	- 0.0011 65	- 0.00 0262

Table 6 presents the Treynor ratio results by replacing total risk in the Sharpe ratio with the systematic risk of securities with respect to market returns. This ratio presents somewhat lenient measures of stock performances by only including systematic risk in the denominator, thereby following the assumption that any rational and knowledgeable investor will be able to effectively diversify among the available options of equities. Furthermore, inclusion of this measure is more justified during the GFC and ESDC periods where systematic risk plays a more important role in determining the returns on any given set of securities. For the full sample period, we show mixed results for the Sharpe and Roy ratios. Of the ten pairs of Islamic and conventional indexes included, five Islamic indexes have superior returns over their conventional counterparts, whereas the other five pairs of conventional indexes show higher returns. This result indicates that Islamic markets are not immune to crises. The pre-crisis period has interesting findings as, except for a couple of sectors (i.e., Telecommunications and Utilities), all other sectors have higher returns for conventional equities as compared to their Islamic counterparts; however, with the onset of the GFC in 2008–09, Islamic indexes exhibited superior returns across all sectors. This suggests that as far as systematic risk adjustment to returns is concerned Islamic indexes prove to be safer and profitable investments during periods of financial turbulence. This also illustrates the indifferent behavior of

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assets that are based on the Islamic asset-based financing philosophy to extraneous event like the GFC of 2008–09. Following the GFC period, we report results for the ESDC period in column IV where we witness mixed findings, similar to the statistics for the complete sample period in column I, except Consumer Services and Healthcare sectors that offer superior returns for conventional equity returns, and Consumer Goods sector that presents Islamic indexes as more profitable investments. In the last column, Table 6 presents the post-crises period that again highlights Islamic assets as feasible investments for six out of the ten pairs including sectors such as Consumer Services, Consumer Goods, Financial, Industries, Technology, and Telecommunications. Comparing returns from the pre-crises to post-crises periods, we see that the pre-crises period has only two sectors in which Islamic equity indexes outperformed their conventional counterparts; however, in the post-crises period, this number increased to six where Islamic indexes outperformed their conventional counterparts.

Table 6: Treynor index results.

	Whole period	Stable I	GFC	ESDC	Stable II
W1BSC	0.004884	0.040008	-0.148592	0.004967	0.0573
DJIBSC	0.005034	0.039224	0.005439	0.011006	0.06981
W1CYC	0.017114	0.001328	-0.192704	0.043335	0.018403
DJICYC	0.021959	0.000939	0.022800	0.041502	0.08671
W1NCY	0.021768	0.018127	-0.203674	0.04149	0.0

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				7	21
					35
					9
					0.0
DJINCY	0.016781	0.006157	0.017059	0.04834	65
				8	42
					8
					0.0
WIENE	0.005652	0.049665	-0.102254	0.00801	01
				3	54
					8
					-
					0.0
DJIENE	0.003850	0.040417	0.003986	0.00450	08
				5	48
					2
					-
					0.0
W1FIN	-0.008323	0.013658	-0.212711	-	10
				0.02669	18
				6	0
					0.0
					65
DJIFIN	0.001798	0.002729	0.001320	-	97
				0.00480	3
				3	0.0
					27
W1HCR	0.026428	-0.011317	-0.149579	0.03834	04
				2	8
					0.0
					94
DJIHCR	0.023008	-0.018290	0.023957	0.03785	96
				3	5
					0.0
					11
W1IDU	0.011746	0.031055	-0.210477	0.01997	60
				8	3
					0.0
					51
DJIDU	0.012645	0.020557	0.011878	0.02588	05
				7	8
					0.0
					15
W1TEC	0.011110	-0.005406	-0.158008	0.02656	54
				9	2
					0.0
					58
DJITEC	0.007412	-0.010458	0.004728	0.01871	95
				5	7
					-
					0.0
					00
W1TLS	-0.000119	0.013225	-0.156358	0.01471	42
				9	8
					0.0
					31
DJITLS	0.000185	0.014749	-0.001765	0.02776	43
				1	1
					-
W1UTI	0.002980	0.045239	-0.155652	-	-

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				0.00994 2	0.0 00 64 8 -
WIUTI	-0.009709	0.055210	-0.007696	- 0.03054 7	0.0 06 81 5

Table 7 presents results for the Omega ratio, which is more effective in minimizing the probability of extreme losses. This measure is important as it incorporates the entire return distribution including higher moments that provide more useful information in case of non-normal investments. We present the results of this measure for the complete sample in column I of Table 9. Among our sampled sectors, four out of the ten pairs highlight conventional indexes returns as better in terms of higher returns than their Islamic counterparts. These sectors include Basic Materials, Consumer Goods, Energy, and Technology. The pre-crises period has similar findings as reported earlier for Sharpe, Roy, and Treynor ratios. Following the pre-crises period, we present some interesting findings in column III for the GFC period where Islamic equity returns outperform their conventional counterparts across all sectors. These findings are similar to the Treynor ratio results as we see no change even after using more sophisticated measures for handling the non-normal distribution of returns. Column IV presents results for the ESDC crisis period where we again report somewhat mixed results as four out of the ten index pairs considered show superior returns for conventional equity returns. Results for the post-crises period are reported in the last column in which no single form, that is, either Islamic or conventional returns, dominate the market.

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Table 7. Omega ratio results

	Whole period	Stable I	GFC	ESDC	St ab le II
W1BSC	1.040418	1.269395	0.835535	1.012318	0. 9 8 3 6 2 1 0.
DJIBSC	1.040041	1.244135	0.850946	1.025256	9 7 7 5 7 1. 3
W1CYC	1.088770	1.144943	0.841810	1.121933	0 3 0 7 1 1. 3
DJICYC	1.091749	1.119210	0.885825	1.119788	0 6 9 4 1 1. 2
W1NCY	1.107943	1.244784	0.771666	1.099771	5 1 4 4 2 1. 2
DJINCY	1.093658	1.191662	0.787089	1.104812	5 2 7 6 2 0. 9
W1ENE	1.041142	1.223559	0.899612	1.013660	6 5 2 7 2

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DJIENE	1.036953	1.202767	0.908133	1.007740	0.966010
W1FIN	1.008268	1.209280	0.752481	0.942443	0.806111
DJIFIN	1.033442	1.109150	0.875962	0.993442	0.926871
W1HCR	0.116386	0.000886	0.094473	0.827563	0.888133
DJIHCR	1.104637	1.091244	0.827447	1.090144	0.999811
W1IDU	1.069844	1.287264	0.756461	1.048691	1.172111
DJIDU	1.071444	1.219122	0.784360	1.063740	1.255111
W1TEC	1.061717	1.083702	0.830156	1.060702	1.558111
DJITEC	1.052133	1.063603	0.836529	1.044478	1.223

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					0
					9
					9
					5
					0.
					8
					7
W1TLS	0.121411	0.003563	0.121885	0.800672	9
					9
					6
					1
					1.
					0
					8
DJITLS	1.040927	1.162159	0.847350	1.058323	0
					1
					4
					2
					0.
					8
					3
W1UTI	0.114396	0.000599	0.111105	0.760326	6
					8
					9
					3
					0.
					7
					8
W1UTI	0.128344	0.002149	0.153463	0.726044	6
					8
					1
					8

To further compare Islamic and conventional equity returns for selected sectors, we present results for Information ratio in Table 8, which uses portfolio excess returns adjusted by the standard deviation of their spreads. The purpose of using various measurements to compare the return characteristics of the Islamic market indexes versus their conventional counterparts is for a better understanding of the dynamics of similarity and differences, irrespective of any limitations on such measuring techniques. We start again by examining the complete sample period results that highlight the superior returns offered by conventional equity returns except the financial sector in which the Islamic index outperformed its counterpart conventional index. For all the

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remaining sectors, the results are contradictory. This complete sample picture incorporating all the periods of financial and economic turbulence reveals comparative higher returns for conventional equity assets. However, results of the pre-crises period in column II highlight mixed outcomes for Islamic and conventional index pairs. These results are consistent with the results of the previous measuring ratios. Information ratio presents different results for both the crises periods, namely, the GFC and ESDC, if we compare these with our previous findings. During both crises periods, conventional equity financing offers comparatively superior returns over Islamic indexes and, therefore, remains an optimal option for equity investments even during periods of financial distress. Finally, the post-crises periods show similar results like the pre-crises periods with mixed results for both the Islamic and conventional equity indexes. These findings are consistent for both the pre-crises and post-crises periods for all the sectors except Utility and Consumer services where the results reverted after the crises periods, thereby highlighting the effect any crisis period has on the risk-return relationship whether based on Islamic philosophy or on conventional asset financing wisdom.

Table 8. Information ratio results

	Whole period	Stable I	GFC	ESDC	Stable II
W1BSC	-0.000360	0.071421	-0.005210	-0.011879	- 0.1 092 72
DJIBSC	-0.003996	0.065089	-0.022953	-0.013997	- 0.1 007 05
W1CYC	0.021755	-0.066432	0.032699	0.087773	0.0 952 81
DJICYC	0.013295	-0.023421	0.017497	0.032999	0.0 823

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					33
					0.0
W1NCY	0.022621	-0.008906	0.045869	0.063241	172
					75
					0.0
DJ1NCY	0.005209	-0.020754	-0.007494	0.044687	221
					07
					0.0
W1ENE	0.005652	0.049665	-0.102254	0.008013	015
					48
					-
DJ1ENE	0.003850	0.040417	0.003986	0.004505	0.0
					084
					82
					0.0
W1FIN	-0.032186	-0.019595	-0.091565	-0.112941	374
					02
					0.0
DJ1FIN	-0.006398	-0.012378	-0.012154	-0.027559	017
					37
					0.0
W1HCR	0.020218	-0.061679	0.081563	0.039098	920
					58
					0.0
DJ1HCR	0.010845	-0.056622	0.049369	0.018757	878
					09
					0.0
W1IDU	0.020566	0.073464	-0.064148	0.043089	321
					78
					0.0
DJ1IDU	0.010101	0.029703	-0.080525	0.027206	406
					64
					0.0
W1TEC	0.007407	-0.042791	0.035427	0.028164	400
					01
					0.0
DJ1TEC	-0.004092	-0.042406	-0.002235	-0.004594	461
					67
					-
W1TLS	-0.013295	-0.012742	0.055652	0.005927	0.0
					514
					61
					-
DJ1TLS	-0.014225	0.003548	0.018805	-0.000109	0.0
					436
					67
					-
W1UTI	-0.007693	0.049297	0.061224	-0.032290	0.0
					697
					89
					-
W1UTI	-0.024540	0.042342	-0.011864	-0.065912	0.0
					862
					57

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Table 9 presents results for the CAPM-EGARCH (1, 1) model for our sampled sectors in the pre-crises (both GFC and ESDC periods), crises, and post-crises periods. Column I presents results for the complete sample period in which we see that Islamic indexes outperform their conventional counterparts across different sectors, including Consumer Services, Consumer Goods, Financial, Healthcare, Industrial, and Technology. The pre-crises period in column II reports results for our model where Islamic equities provide superior returns than conventional equity markets only in Basic Materials, Energy, Industrial, and Utility sectors. However, in the remaining sectors, conventional equity returns retain their dominant position as a more rational option for investors. Column III presents results for the GFC period that are similar to findings of the pre-crisis period except for the Technology sector in which Islamic equity returns outperform conventional stock returns, though the conventional equity market remains dominant during the crisis period. Findings for the ESDC crisis period are reported in column IV where Islamic equity returns perform better than conventional equity returns in most sectors, including Consumer Services, Consumer Goods, Healthcare, Industrial, Technology, and Telecommunications. These results indicate the capacity of Islamic indexes to perform better during periods of financial and economic distress; however, the results are slightly different during the GFC period. The last column in Table 11 reports findings for the post-crises period and results are similar to the ESDC period except that the financial sector in which the Islamic equity index performs better than its conventional counterpart. Our results for the CAPM-EGARCH (1, 1) model are

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consistent with the previously reported results for different ratios, although slight variations exist depending on the risk measure used.

Table 9. Jensen Alpha estimates from the A CAPM-EGARCH (1, 1)

	Whole period	Stable I	GFC	ESDC	Stable II
W1BSC	-0.0021 (0.0092)	0.0449** * (0.0156)	0.0803 (0.051)	-0.0016 (0.0217)	- 0.0576** * (0.0151)
DJIBSC	-0.0114 (0.0106)	0.0526** * (0.0191)	0.0557 (0.0503)	-0.0124 (0.0251)	- 0.0609** * (0.0177)
W1CYC	0.0063 (0.0049)	-0.0205** (0.0079)	-0.0425 (0.0226)	0.0310** * (0.0119)	0.0283** * (0.0085)
DJICYC	0.0088 (0.0079)	-0.0224 (0.0142)	-0.0369 (0.0471)	0.0222 (0.0181)	0.0292** (0.0118)
W1NCY	0.0101** (0.0049)	-0.0015 (0.0076)	-0.0114 (0.0202)	0.0254** (0.0115)	0.0113 (0.0084)
DJINCY	0.0072 (0.0055)	-0.0045 (0.0099)	-0.0336 (0.0265)	0.0193 (0.0123)	0.0159 (0.0098)
W1ENE	-0.0198** (0.0101)	0.0488 (0.0281)	0.0898 (0.0548)	-0.0044 (0.0184)	- 0.0549** * (0.0139)
DJ1ENE	-0.0217** (0.0099)	0.0354** (0.0146)	0.0588 (0.0449)	-0.0239 (0.0177)	- 0.0565** * (0.0151)
W1FIN	-0.0091** (0.0067)	-0.0041 (0.0069)	-0.0769** (0.0362)	- 0.0485** * (0.0147)	0.0012 (0.0071)
DJIFIN	0.0129 (0.0125)	0.0339 (0.0216)	0.0077 (0.1001)	-0.0134 (0.0268)	0.0151 (0.0183)
W1HCR	0.0103 (0.0069)	0.0323** * (0.0118)	-0.0166 (0.0299)	0.0174 (0.0154)	0.0451** * (0.0126)
DJ1HCR	0.0036 (0.0072)	0.0381** * (0.0120)	-0.0417 (0.0288)	0.0075 (0.0154)	0.0401** * (0.0127)
W1IDU	0.0079** (0.0039)	0.0150** (0.0068)	-0.0214 (0.0174)	0.0126 (0.0098)	0.0053 (0.0065)
DJ1IDU	0.0056 (0.0051)	0.0127 (0.0096)	-0.0329 (0.0200)	0.0095 (0.0116)	0.0061 (0.0082)
W1TEC	0.0097 (0.0091)	-0.0279 (0.0170)	0.0308 (0.0393)	0.0172 (0.0206)	0.0237 (0.0145)
DJ1TEC	0.0016	-0.0306	-0.0122	-0.0024	0.0181

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	(0.0089)	(0.0183)	(0.0404)	(0.0187)	(0.0139)
WITLS	-0.0082 (0.0074)	-0.0048 (0.0127)	0.0274 (0.0344)	0.0059 (0.0149)	-0.0195 (0.0128)
DJITLS	-0.0114 (0.0104)	0.0154 (0.0198)	-0.0151 (0.0429)	-0.0058 (0.0199)	-0.0102 (0.0178)
W1UTI	-0.0029 (0.0074)	0.0261** (0.0131)	0.0134 (0.0336)	-0.0173 (0.0156)	-0.0170 (0.0138)
W1UTI	-0.0134 (0.0099)	0.0300 (0.0190)	0.0039 (0.0458)	-0.0360 (0.0284)	-0.0209 (0.0178)

5. Conclusions

Islamic finance, particularly the Islamic stock market indexes, experienced spectacular growth during the last decade. Since the recent turmoil periods from 2008 to 2012, investors are adopting hedging strategies to safeguard their positions against extreme stock market movements. Investments in Islamic equities are attracting not only Muslim investors but also non-Muslims. More importantly, Islamic stocks may be an alternative for investors to diversify their portfolios and manage their risk effectively. This study performs a comparative analysis between Islamic (Dow Jones Islamic Indexes) and conventional (Dow Jones World Indexes) equity returns for twenty selected indexes from ten sectors (i.e., one Islamic and one conventional index from each sector). Thus, we employ the Sharpe, Roy, Treynor, Omega, and Information ratios based on different measures of risk adjustments followed by the Jensen Alpha ratio by modeling CAPM E-GARCH as a robustness check. For in-depth analysis, we divide our full sample period into sub periods—stable periods, before, during, and after the two recent financial and economic crises, namely the GFC and ESDC. Results for all the ratios remain consistent in most cases; however, in the full sample period, we obtain mixed results as both

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conventional and Islamic equity returns share an overall equal-return position. Using the Information ratio, conventional equity returns dominate Islamic equity returns in the full sample period, whereas Jensen Alpha results report dominance by Islamic equity returns over their conventional counterparts. The pre-crises periods are dominated by higher conventional equity returns, based on all the employed return measures; however, during the post-crises periods, Islamic equity returns perform better in most cases as compared to their conventional counterparts. Our results for the GFC and ESDC periods are consistent with the findings for Islamic equity returns that dominate their conventional counterparts across all the measurement ratios except Information ratio where we witness comparatively higher conventional equity returns across the majority of sectors. These results have several important implications for portfolio investors dealing with Islamic and conventional stocks. The performance of Islamic stocks as high-return performers compared to conventional stocks during crises periods can induce investors to increase investments in assets-based financing instruments based on the Islamic philosophy. Furthermore, our analysis of different sectors provides in-depth insights about sectors that have investment potential during both normal and turbulent periods and the form of equity, that is, Islamic or conventional. A future research implication generated by our study is the inclusion of precious metals as a strong hedge alongside Islamic and conventional equity stocks, primarily to investigate their behavior in a portfolio during normal and periods of financial and economic distress.

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Highlights

- We compare the performance of Islamic and conventional sectoral indexes.
- Comparison is made before, during, and post-crises periods, namely the GFC and ESDC.
- We use Roy, Treynor, Omega, Information ratios, and the Jensen-Alpha measure based on the CAPM-EGARCH model.
- Pre-crises periods are dominated by higher conventional equity returns, regardless of the employed return measures,
- Islamic equity returns perform better versus their conventional counterparts during and post both the crises periods.