Risk and Return of Islamic and Conventional Indices

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Abstract This study examines the risk and the return characteristics of the Islamic market indices versus their conventional counterpart indices. For this purpose, a large international data of 35 indices combining developed, emerging and GCC markets over the period of Jun 2002 to April 2012 is used. The t test has been employed to investigate the mean returns difference between both types of indices. The results show that there is no significant difference in mean between Islamic and conventional indices except for Italy and Australia. The EGARCH estimation results reveal the presence of a leverage effect risk in all studied indices. The study of the risk adjusted performances of Islamic stock market indices versus their conventional counterpart indices using differences-in-Sharpe ratio test and the CAPM model show that in the entire period as well as in the crisis period there is no difference between performance the types of indices in risk adjusted return basis. Consequently, Muslim investors can pursue passive stock investments in conformity to their religious beliefs without sacrificing financial performance.

Keywords Islamic finance · Return · Volatility · CAPM · Sharpe ratio

Introduction

Islamic capital markets have witnessed unprecedented expansion over the last decades. This expansion may be caused to the large growth of the capital value of the Muslim investors and their demand to invest their capital in financial products that in accordance to the Shariah. The most prominent feature that can distinguish Islamic capital market from its conventional counterpart is that the former's

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activities are carried out in ways which does not conflict with the principles of Islam.

Islamic investing is based on five main principles, which include the prohibition of interest (*riba*), excessive uncertainty (*gharar*), speculation (*maysir*), risk and return sharing, and the prohibition of investing in ‘unethical’ industries (Shanmugam and Zahari 2009).

These principles imply that Muslims investors are not permitted to invest in futures, options and other speculation based derivatives and that Muslims do not have access to conventional credit.

The specific characteristics of Islamic finance and there consequences in terms of risk, set Islamic institutions apart from conventional counterpart and, particularly, their behaviour during periods of financial instability should not be similar, since they are not subject to the same types of risks. Specifically, in the period of global economic crises resulted from subprime mortgage case, which collapse most US and European huge investment companies, Islamic financial instruments have attracted more investors to put their funds in these interest-free instruments. Besides that, availability of numbers of Islamic capital market instruments, such as Islamic stock, sukuk, and Islamic mutual funds, has created a flourishing Islamic capital market.

Despite the increasing of Islamic stocks, the empirical studies on Islamic market are still thin compared to the conventional stocks. Particularly, volatility, risk premium and leverage effect of Islamic stock market indices vis-à-vis conventional stock market indices. This is interesting to investors since volatility is strongly related to risk and risk is one of the main characteristic to formulate a good investment portfolio. This paper contributes to the literature on Islamic finance in numerous ways. First, we analyze the return and volatility characteristics of a large set of international data including 35 Islamic stock market indices and their conventional counterparts of developed markets, emerging markets, Arab and GCC markets over the period of Jun 2002 to April 2012. Second, we investigate thorough empirical study the risk adjusted return of the two types of indices. Third, we examine the impact of the recent financial crisis of 2008/09 on the systematic risk of Islamic indices.

The rest of the paper is organized as follows. “[Literature Review](#)” presents the literature review. “[Data and Methodology](#)” describes data and methodology. “[Empirical Results and Discussion](#)” presents the empirical results. “[Conclusion](#)” concludes the paper.

Literature Review

The majority of studies on stock market performance have been interested in the financial performance of conventional indices. However, there is little existing empirical literature on the performance of Islamic stock market indices. Two groups of studies can be considered. One group investigated the performance of Islamic funds and compared the performance with the conventional funds. The other group examined the performance of Islamic indices as proxy versus the conventional indices. Some of these studies are reviewed as follows.

Ahmad and Ibrahim (2002) examined the performance of KLSI with that of KLCI over the period from 1999 to 2002. They used several risk adjusted

performance measures such as a Sharpe ratio (SR), the Treynor Index (TI), the adjusted Jensen Alpha, and the t test for comparing the means. They compared raw returns and risks for entire period and bear period. Results showed that for the entire period, the KLSI has lower return, while for the growing period the KLSI slightly outperformed the KLCI. In terms of risk, the KLCI was riskier than the KLSI over the entire period. When comparing the means, the results were statistically insignificant. In addition, the KLSI reported lower risk-adjusted returns than the KLCI, except during the growing period of 1999–2000.

Using cointegration technique, Hakim and Rashidian (2002) examined the relationship between DJIMI, Wilshire 5000 index, and the risk-free rate for 10/12/1999–9/4/2002 period. They found that a risk-return basis, there is no loss from the screening process used for DJIMI stocks, and Muslim investors are not worse off by investing in an Islamic index as a subset of a much larger market portfolio.

Hussein (2004) compared the performance of the FTSE Global Islamic index and the FTSE All World index. The CAPM estimation results suggested that the performance of Islamic index is larger than its conventional counterpart. Moreover, the Islamic index performs better during the economic growth period than during bear period.

Hussein and Omran (2005) analyzed the performance of the Dow Jones Islamic Market Index (DJIMI) that accounts for the effects of industry, size, and economic conditions reveals that Islamic indexes. The authors found that Islamic indexes outperform their conventional counterparts in bull markets, but underperform in bear markets.

Raphie and Roman (2011) investigated the risk and return characteristics of a sample of 145 Islamic equity funds over the period 2000–2009. Using Jensen's (1968) version of the capital asset pricing model (CAPM), they estimated the risk-adjusted performance (alpha) and systematic risk (beta) for each Islamic equity fund. The results indicated that IEFs on average have underperformed their Islamic and conventional benchmarks over the sample period of 2000–2009. By analysing the effect of the recent financial crisis, they showed that this underperformance seems to have increased during the crisis period. Albaity and Ahmad (2008) analysed the risk and return performance of the Kuala Lumpur Syariah Index (KLSI) and the Kuala Lumpur Composite Index (KLCI) during 1999–2005. Results revealed that Islamic indices do not significantly underperform conventional indices. Using cointegration tests, they showed that both series are cointegrated in a long-term. Moreover, the Granger bivariate test indicates the presence of short-run bidirectional causality between the indices.

Data and Methodology

Data

This study uses 35 Islamic country indices (19 from developed markets and 16 from emerging market). The monthly price data for the Islamic indices and conventional benchmarks are obtained from Morgan Stanley Capital International (MSCI). The sample period is from Jun 2002 to April 2012. Price data is denominated in U.S. dollars. The risk-free rate (usually Treasury-bill rate) is drawn from IFS, IMF and OECD. For each index, return is defined as the continuously compounded returns on stock price index.

Methodology

To evaluate the performance of Islamic indices versus their conventional counterparts, this study examines the return and volatility characteristics of each index along with the risk adjusted return.

We begin by conduct a Difference in Mean test to investigate whether there is a difference between the mean raw returns of the two types of indices in each market.

Then we use a GARCH model, developed by Bollerslev (1986), to estimate volatility of the two type of index. The idea of the GARCH model is simply to include the lagged value of the variance in the variance equation. The GARCH model is as follow:

$$h_{it} = \omega_i \sum_{j=1}^p \alpha_{ij} \varepsilon_{i,t-j}^2 + \sum_{i=1}^q \beta_{ij} h_{i,t-j} \quad i = 1, 2, \dots, k \quad (1)$$

where, h_{it} is the conditional volatility with information available to date $t - j$, $I_{t-j} = (\{\varepsilon_{t-1}, \varepsilon_{t-2}, \dots\})$ of the innovation.

The first term in the right hand side is the ARCH term, while the second term is the GARCH term that measure lagged variance. This model is referred to as GARCH (p, q) where (q) is the lagged ARCH term and (p) is the GARCH lagged term. The above model indicates that ω is the long-term average variance, is the information about the volatility in the previous period, and the beta is the coefficient of the lagged conditional variance.

One of the problems in GARCH is that it treats any shocks to the volatility as symmetrical. However, it was argued by previous studies such as Black (1976), Christie (1982), Engle and Ng (1993) that volatility responds asymmetrically to news, especially bad news. To study leverage effect of asymmetrical volatility we employ the EGARCH model of Nelson (1991).

$$\ln h_{it} = \omega_i + f_1 \left(\frac{|\eta_{it-1}| + \kappa \eta_{it-1}}{\sqrt{h_{it-1}}} \right) + f_2 h_{it-1} \quad (2)$$

The volatility parameter, k , represents asymmetric effect in EGARCH model. If $k < 0$, then conditional volatility tend to augment (to reduce) when the standardized residual is negative (positive). To let for the possibility of non-normality of the returns distribution, this study supposes that the conditional errors of EGARCH model pursue a Generalized Error Distribution.

To estimate the risk adjusted return of Islamic indices in comparison to conventional benchmarks we conduct a differences-in-Sharpe ratio tests. The Sharpe ratio was derived by Sharpe (1966) as an absolute risk-adjusted return measure. The formula of Sharpe ratio calculated for each market is as follow:

$$SR = \frac{R - R_f}{\sigma} \quad (3)$$

Where SR is the Sharpe ratio calculated for Islamic and conventional indices of each market, R is the return on the Islamic index (conventional index), R_f is the risk free rate measured as Treasury bill rate and σ is the standard deviation of the Islamic

market index (conventional index). The Sharpe ratio difference (ΔSR) in each market is given by:

$$\Delta SR = SR_i - SR_m, \quad (4)$$

where SR_i and SR_m are respectively Sharpe ratio on Islamic index and conventional index of each market.

We use the classic method of Jobson and Korkie (1981) to test the null hypothesis of equal Sharpe ratios of any two indices. The test statistic can be formulated as:

$$Z = \frac{\mu_i \sigma_m - \sigma_i \mu_m}{\sqrt{\theta}} \quad (5)$$

where, μ_i and μ_m are respectively the mean returns on Islamic index and conventional index, σ_i and σ_m are estimates of the standard deviation of the two indices and θ is calculated as follows:

$$\theta = \frac{1}{T} \left[2\sigma_i^2 \sigma_m^2 - 2\sigma_i \sigma_m \sigma_{im} + \frac{1}{2} \mu_i^2 \sigma_m^2 + \frac{1}{2} \mu_m^2 \sigma_i^2 - \frac{\mu_i \mu_m}{2\sigma_i \sigma_m} \sigma_{im}^2 \right] \quad (6)$$

where T is the number of observations and σ_{im} is the covariance's of the excess returns of the two indices over the sample period. Jobson and Korkie (1981) showing that the test statistic Z is approximately normally distributed with a zero mean and a unit standard deviation for large samples. A significant Z statistic would reject the null hypothesis of equal risk-adjusted performance and would suggest that Islamic index outperforms conventional index.

To provide further insights into the performance of Islamic indices, we use the Capital Asset Pricing Model (CAPM) of Sharpe (1964) and Lintner (1965). The empirical representation of the CAPM is as follows:

$$R_{it} - R_f = \alpha + \beta R_{MKT} + e_i \quad (7)$$

where, R_{it} is the return on Islamic index i , R_{MKT} is the market excess return (the return on the conventional market index in excess of the risk-free rate), CAPM beta measures the sensitivity of Islamic index to market movements. An index with a beta greater than one is more sensitive to movements in the market and hence riskier than an index with a beta lower than one (Mills 1999). The CAPM alpha is the risk adjusted return of Islamic index versus conventional index.

To investigate the impact of the recent global financial crisis on the performance of Islamic indices; we re-estimate the CAPM model in the crisis period.

Empirical Results and Discussion

Non Risk-Adjusted Returns Characteristics

Figure 1 plots the monthly prices of Islamic and conventional indices for developed markets (panel A) and emerging markets (panel B) over the sample period. For most developed (emerging) markets conventional (Islamic) index price is larger than Islamic (conventional) index except for Italy, Hong Kong and Australia (Brazil,

Chile, Mexico, Bahrain and UAE). Generally, we show that both indices (Islamic and conventional) moved together in the mentioned period.

Table 1 shows some descriptive statistics of Islamic and conventional index returns, panel A concern the developed markets and panel B is relative to emerging markets. The table reports the mean return, standard deviation, skewness, kurtosis and Jarque–Bera statistic for each series. All markets have a positive mean return for Islamic as well as conventional indices except for GCC markets. In these markets conventional index has a negative mean return excluding Qatar. The GCC Islamic indices show a return increasing as compared to conventional index. The skewness statistic is negative for Islamic as conventional indices of all developed markets and emerging markets except of Turkey and most Arabic markets suggesting that the distribution is said to be left-tailed. For turkey and most Arabic markets skewness statistic is positive indicating that the right tail of the distribution is longer.

The values for kurtosis are more than three in all markets suggesting that the distributions are leptokurtic. The Jarque–Bera test rejects the normality at the 1 % level for all distributions.

Figure 2 presents the year-by-year returns of Islamic and conventional indices. The growth of the two index variants is largely similar in developed and emerging markets. In 2007–2008 period a large decreasing in both indices is noted reflecting the effect of the recent global financial crisis (Boujelbène 2012). To verify the hypothesis of no difference in raw returns in both indices, we use a difference in mean tests.

Table 2 present the results of *t* test used to investigate whether there is a difference between returns of Islamic index and conventional index. The results show that there is no significant difference in mean between the indices except for Italy and Australia. The differences are equal to 0.0054 and 0.0037 respectively for Italy and Australia and they are significant at 10 % level. This finding is consistent with the results of Ahmad and Ibrahim (2002), Statman (1987), and Hussein and Omran (2005) suggesting that the returns of Islamic investments are not significantly different from those of conventional investment.

Volatility Characteristics

Figure 3 (Panel A) and (Panel B) illustrates the volatilities of Islamic and conventional indices during the June 2002–April 2012 period respectively for developed markets and emerging markets. The figures indicate that the current financial crisis dramatically influenced the market volatility which has been high during mid 2007–2009, particularly during the 2008 period. Both Islamic and conventional index volatilities flow the same trend for most developed and emerging markets with a few exceptions. For example, in the subprime crisis period, volatility of conventional (Islamic) index is larger (smaller) than Islamic index for Italy, Belgium, Denmark, Norway, Hong Kong, United States, Russia and Kuwait (Indonesia, Malaysia, Qatar and UAE).

To test the evidence of asymmetric responses to news, suggesting the leverage effect and differential financial risk depending on the direction of price change movements, we employ the EGARCH model. Table 3 presents results of the EGARCH model estimation for developed (Panel A) and emerging markets (Panel

Fig. 1 Price index of Islamic and conventional indices. **a** Developed markets, **b** emerging markets

Panel B: Emerging markets

Fig. 1 continued

Table 1 Summary statistics of Islamic and conventional indices

Market	Abrev	Islamic indices				Conventional indices					
		Mean	Std	SK	KR	JB	Mean	Std	SK	KR	JB
Panel A: developed markets											
France	FRA	0.0039	0.0627	-0.6181	3.5074	8.85473	0.0033	0.0681	-0.517	3.6173	7.1951
Germany	GER	0.0090	0.0769	-0.7049	4.4015	19.597	0.0064	0.0783	-0.525	4.0318	10.746
Italy	ITA	0.0054	0.06710	-0.0873	4.0928	6.07338	0.0054	0.0671	-0.0873	4.0928	6.0733
United Kingdom	UK	0.00538	0.05297	-0.2968	3.8049	4.9606	0.0031	0.0531	-0.4013	4.3078	11.676
Spain	SPA	0.0082	0.0705	-0.5555	4.4689	16.820	0.0043	0.0768	-0.4616	3.9979	9.1657
Belgium	BELG	0.0058	0.0601	-0.4396	3.8957	7.811	0.0028	0.0747	-1.4686	7.9619	164.853
Denmark	DEN	0.0136	0.0669	-0.978	4.7101	33.4909	0.0115	0.0654	-0.9349	5.5278	49.0224
Austria	AUS	0.0107	0.0964	-0.7575	5.2798	37.1545	0.0068	0.0890	-0.9852	6.3712	75.607
Netherlands	NETH	0.0046	0.0761	-0.3866	3.9784	7.7117	0.0025	0.0688	-0.7574	4.40675	21.192
Norway	NOR	0.0138	0.0891	-0.638	4.4012	17.817	0.0122	0.0902	-0.8055	4.8845	30.477
Sweden	SWE	0.0112	0.079	-0.236	4.7856	16.916	0.0105	0.0779	-0.3106	4.3211	10.5692
Switzerland	SWIT	0.0069	0.0466	-0.6729	3.8442	12.515	0.0054	0.0494	-0.5431	3.4010	6.6488
Newzealand	NEW	0.0068	0.0705	-0.5233	4.13259	11.7931	0.0060	0.0611	-0.8352	4.3885	23.396
Hong K ong	HON	0.0067	0.0560	-0.6237	4.46723	18.391	0.0073	0.0637	-0.2949	4.40406	11.500
Japan	JAP	0.001	0.0482	-0.4511	3.7075	6.5185	0.0019	0.0487	-0.1821	3.4381	1.8153
Singapore	SING	0.0102	0.0640	-1.065	7.8286	138.133	0.0096	0.0673	-0.6120	6.4700	67.1341
Canada	CAN	0.012	0.0743	-0.7745	5.333	38.890	0.0098	0.0637	-0.7156	5.7192	46.821
United states of American	USA	0.0043	0.0431	-0.6950	4.2709	17.5904	0.0034	0.0462	-0.6958	4.2935	17.900
Australia	AUST	0.0135	0.0754	-0.7536	5.1896	35.0394	0.0097	0.0680	-0.6228	4.7175	22.3206
Panel B: Emerging markets											
India	IND	0.0139	0.0905	-0.1480	4.3285	9.186	0.0171	0.0933	-0.0510	4.4013	9.788
Indonesia	INDO	0.0203	0.1027	-0.4857	5.154	27.68	0.0217	0.0972	-0.448	5.4436	33.598

Table 1 continued

Market	Abrev	Islamic indices				Conventional indices					
		Mean	Std	SK	KR	JB	Mean	Std	SK	KR	JB
Malaysia	MAL	0.0109	0.0565	-0.2905	4.8475	18.598	0.0094	0.0519	-0.2782	4.1146	7.6962
Brazil	BRA	0.0199	0.1183	-0.6811	4.0767	8.436	0.0200	0.1086	-0.4610	3.9552	8.7402
Chile	CHI	0.0162	0.0705	-0.6750	5.8645	49.725	0.0158	0.0668	-0.575	5.2915	32.602
Mexico	MEX	0.0152	0.0789	-0.6108	4.8793	24.913	0.0133	0.0696	-0.9159	5.8785	57.724
Russia	RUSS	0.0142	0.1027	-0.359	3.7217	5.1433	0.0138	0.1026	-0.358	3.87460	6.3439
Turkey	TUR	0.0186	0.1309	0.1497	5.0920	22.146	0.0197	0.1299	-0.043	3.4909	1.2333
Egypt	EGY	0.0280	0.114	0.6518	6.5193		0.023	0.105	0.1721	4.670	14.417
Jordan	JOR	0.002	0.0687	-0.348	6.237	47.978	0.006	0.0662	-0.302	4.8562	16.671
Morocco	MOR	0.007	0.061	0.311	3.8284	5.332	0.0106	0.0619	0.1046	4.3693	9.5150
Bahrain	BAH	-0.0198	0.0837	-0.093	4.0385	3.8517	-0.0181	0.077	-0.642	5.1080	21.081
Kuwait	KUW	-0.003	0.0786	0.0256	3.423	0.630	0.0001	0.0748	-0.168	3.3398	0.7916
Oman	OMA	-0.0004	0.0784	0.5980	7.3475	70.315	-0.0018	0.0658	-1.1287	6.7919	67.350
Qatar	QAT	0.0043	0.1018	0.3438	4.8826	13.893	0.004	0.0950	-0.101	3.892	2.898
United Arab Emirates	UAE	-0.0100	0.1416	0.8158	6.8898	61.535	-0.007	0.1153	0.2827	4.1321	5.5388

Fig. 2 Annually returns of Islamic and conventional indices. **a** Developed markets, **b** emerging markets

Panel B: Emerging markets

Fig. 2 continued

Table 2 *t* test of mean differences between returns of Islamic index and conventional index

	FRA	GER	ITA	UK	SPAI	BELG	DEN	AUS
Panel A: Developed markets								
Mean-diff	0.0006	0.0025	0.0054	0.0022	0.0039	0.0029	0.0020	0.0039
<i>t</i> -stat	0.4906	1.6983	1.8130	1.5329	1.0615	0.7899	0.8065	0.9923
<i>p</i> value	0.6246	0.0921	0.0724	0.1280	0.2906	0.4311	0.4216	0.3230
	NETH	NOR	SWE	SWIT	NEW	HON	JAP	SING
Panel A: Developed markets								
Mean-diff	0.0020	0.0015	0.0006	0.0015	0.0008	−0.0005	−0.0003	0.0006
<i>t</i> -stat	0.6826	0.8705	0.2872	0.8874	0.2670	−0.3818	−0.2710	0.3565
<i>p</i> value	0.4926	0.3857	0.7744	0.3766	0.7899	0.7030	0.7868	0.7220
	CAN	USA	AUST					
Panel A: Developed markets								
Mean-diff	0.0023	0.0008	0.0037					
<i>t</i> -stat	1.1605	0.8987	1.8032					
<i>p</i> value	0.2482	0.3706	0.0739					
	IND	INDO	MAL	BRA	CHIL	MEX	TUR	RUSS
Panel B: Emerging markets								
Mean-diff	−0.0032	−0.0014	0.0015	−4.51e05	0.0003	0.0019	−0.0011	0.0004
<i>t</i> -stat	−1.5852	−0.5078	0.8720	−0.0189	0.1661	0.6408	−0.1975	0.3179
<i>p</i> value	0.1156	0.6125	0.3849	0.9849	0.8683	0.5228	0.8437	0.7511
	EGY	JOR	MOR	BAH	KUW	OMA	QAT	UAE
Panel B: Emerging markets								
Mean-diff	0.0039	−0.0041	−0.0034	−0.0016	0.0039	0.0014	−0.0004	−0.0028
<i>t</i> -stat	0.3251	−0.5574	−1.4790	−0.5405	−1.1688	0.3181	−0.1152	−0.5699
<i>p</i> value	0.7456	0.5784	0.1418	0.5903	0.2458	0.7512	0.9086	0.5703

B). An asymmetric relationship between returns and volatility is noted for conventional indices as well as for Islamic indices in all studied markets. Indeed, negative return shocks of a given magnitude have larger impact on volatility than positive return shocks of the same magnitude. The GARCH estimator parameter f_2 is significantly positive for Islamic and conventional indices in developed and emerging markets except for Chile. Consequently, the current returns variance is strongly related to that of previous period (Fig. 3).

Risk Adjusted Return

Sharpe Ratio Tests

Table 4 reports the Sharpe ratios for the Islamic and the conventional indices over the sample period along with the Sharpe ratio differences (ΔSR) and the Z-statistic.

Table 3 Volatility asymmetry of Islamic and conventional index

Markets	Islamic indices				Conventional indices			
	ω	f_1	k	f_2	ω	f_1	k	f_2
Panel A: Developed markets								
France	-0.7715	0.0426	-0.3252	0.8673	-0.6306	-0.0120	-0.3769	0.8820
<i>t</i> -stat	-2.2315	0.2726	-3.0435	19.6450	-3.3755	-0.0895	-3.4829	35.8628
Germany	-0.8431	-0.0832	-0.3288	0.8226	-0.6997	-0.0537	-0.3092	0.8564
<i>t</i> -stat	-2.6059	-0.5461	-4.4217	17.995	-2.7419	-0.4389	-3.9432	23.973
Italy	-1.0317	0.0508	-0.3144	0.8174	-0.1354	-0.1804	-0.3359	0.9482
<i>t</i> -stat	-1.6368	0.3610	-3.1906	7.9604	-1.0087	-1.2595	-3.5154	57.6200
UK	-0.8548	0.0778	-0.3122	0.8628	-0.6839	0.0215	-0.3081	0.8870
<i>t</i> -stat	-2.2793	0.4418	-2.7143	15.4900	-3.1294	0.1375	-3.2236	28.7968
Spain	-0.9191	-0.0411	-0.4029	0.81755	-0.5927	0.0325	-0.2975	0.8889
<i>t</i> -stat	-2.0841	-0.2546	-3.9418	12.5718	-3.2033	0.2725	-3.2975	33.4944
Belgium	-0.0626	-0.1628	-0.1090	0.9603	-0.3540	-0.2388	-0.3316	0.8978
<i>t</i> -stat	-60.229	-489.50	-36.077	318458	-3.6146	-4.2050	-10.430	75.827
Denmark	-2.3484	-0.3484	-0.3375	0.5089	-0.6874	-0.1348	-0.3404	0.8473
<i>t</i> -stat	-2.4877	-1.6710	-2.9816	2.7340	-3.0426	-0.8558	-4.1585	27.537
Austria	-1.2142	0.2185	-0.2553	0.7770	-1.1581	0.2319	-0.2972	0.80182
<i>t</i> -stat	-2.4960	1.0287	-2.6138	8.9467	-2.6049	1.3147	-3.1241	10.5051
Netherland	-1.4578	-0.1617	-0.4545	0.6671	-0.2914	-0.2314	-0.3341	0.91005
<i>t</i> -stat	-2.2617	-0.8447	-4.2606	5.2815	-13.096	-35.880	-7.0533	284.959
Norway	-1.4578	-0.1617	-0.4545	0.6671	-0.7829	-0.1342	-0.3944	0.8093
<i>t</i> -stat	-2.2617	-0.8447	-4.2606	5.28158	-2.4032	-0.9506	-4.2282	14.167
Sweden	-0.5049	-0.2373	-0.3716	0.85955	-0.3215	-0.3439	-0.4316	0.88059
<i>t</i> -stat	-3.3519	-3.1549	-4.4999	26.7316	-107908	-432.24	-9.0474	730.719
Switzerland	-0.8075	0.1069	-0.2702	0.8789	-0.6546	0.0086	-0.2622	0.8901
<i>t</i> -stat	-2.7714	0.7805	-2.3241	16.909	-2.8887	0.0717	-2.6871	24.1912

Table 3 continued

Markets	Islamic indices				Conventional indices			
	ω	f_1	k	f_2	ω	f_1	k	f_2
Newzealand	-0.3715	-0.0255	-0.1681	0.92415	-0.1213	-0.2659	-0.1468	0.93846
<i>t</i> -stat	-187.48	-0.4365	-4.1864	99.817	-26.717	-181.69	-7.0127	12401.6
Hong Kong	-8.2041	0.4837	-0.1003	-0.3419	-0.0234	-0.2321	-0.0387	0.96431
<i>t</i> -stat	-6.0665	2.7584	-0.9034	-1.4814	-194.37	-871.50	-3.0539	5.57E + 0
Japan	-0.9628	0.3294	-0.0503	0.8880	-1.2539	0.35973	0.0150	0.8421
<i>t</i> -stat	-1.0974	1.6607	-0.5789	6.8330	-1.5748	2.2765	0.18351	6.7363
Singapore	-0.8270	0.2994	-0.1875	0.8898	-0.8399	0.2821	-0.2529	0.88248
<i>t</i> -stat	-2.1921	1.4001	-2.2384	17.183	-2.6924	2.0278	-2.9472	20.6039
Canada	-4.0529	0.49819	-0.1903	0.3001	-3.4002	0.6086	-0.2144	0.4774
<i>t</i> -stat	-2.6505	2.3032	-1.4727	1.0048	-2.0718	3.4798	-1.7808	1.7049
USA	-1.2433	0.2016	-0.3432	0.8305	-0.7836	0.1800	-0.3032	0.8990
<i>t</i> -stat	-2.3008	0.9540	-3.1351	10.8722	-2.0828	1.0109	-3.8743	19.056
Australia	-1.3769	0.0916	-0.3094	0.7417	-0.6237	0.0877	-0.1991	0.8929
<i>t</i> -stat	-1.5907	0.4746	-2.9575	5.1264	-1.6689	0.6104	-2.9017	16.6981
Panel B: Emerging markets								
India	-4.3383	0.4548	-0.0781	0.1741	-0.4771	0.0604	-0.1415	0.9030
<i>t</i> -stat	-1.4405	2.1817	-0.6007	0.2864	-1.3564	0.3905	-1.6898	14.569
Indonesia	-0.5668	0.2732	-0.1575	0.9196	-0.2700	-0.1144	-0.2722	0.91146
<i>t</i> -stat	-2.0020	1.6606	-2.1294	17.4624	-305.02	-2.6891	-4.2641	102.94
Malaysia	-2.5633	0.3556	-0.2371	0.5975	-1.0501	0.0057	-0.1381	0.81874
<i>t</i> -stat	-1.8722	1.8710	-1.7515	2.6729	-1.5372	0.0471	-2.0499	6.9480
Brazil	-1.2926	0.1922	-0.2509	0.7331	-1.0795	0.1000	-0.2065	0.7739
<i>t</i> -stat	-2.0431	0.8158	-1.7777	6.0527	-1.9772	0.4752	-1.8280	7.3251
Chile	-8.8339	0.3723	-0.0879	-0.6041	-0.2198	-0.3315	-0.1774	0.9070
<i>t</i> -stat	-7.0862	1.6783	-0.7804	-2.3695	-1.3786	-8.2090	-16.015	34.5926

Table 3 continued

Markets	Islamic indices				Conventional indices			
	ω	f_1	k	f_2	ω	f_1	k	f_2
Mexico	-0.9784	0.0129	-0.1786	0.8035	-1.1037	0.1096	-0.2273	0.8047
<i>t</i> -stat	-1.5174	0.0891	-2.0441	6.5307	-1.7313	0.6225	-3.0608	7.5670
Russia	-4.8264	0.5832	-0.1677	0.0586	-1.8277	0.5299	-0.1186	0.6979
<i>t</i> -stat	-2.8413	2.5264	-1.0336	0.1593	-1.8963	2.4374	-0.9651	3.5892
Turkey	-3.0331	0.6299	-0.3059	0.3841	0.0394	-0.1890	-0.0399	0.9706
<i>t</i> -stat	-2.4700	3.1703	-2.9058	1.3355	9.7191	-11.375	-0.7848	226.145
Morocco	-6.7190	0.1569	0.1817	-0.1740	-0.0703	-0.1617	0.0322	0.9642
<i>t</i> -stat	-1.7769	0.8557	1.8389	-0.2551	-4.8033	-69.145	0.7895	287.230
Egypt	-1.2185	0.4561	0.0697	0.8027	-5.4531	0.9020	0.0740	-0.0261
<i>t</i> -stat	-1.8983	2.4270	0.9344	6.82586	-4.9527	4.0588	0.4027	-0.1061
Jordan	-6.8096	0.1420	-0.3903	-0.2286	-1.6503	0.5062	0.0339	0.7733
<i>t</i> -stat	-2.6861	1.0311	-3.6003	-0.4946	-1.6988	3.0112	0.3628	4.7316
Bahrain	-1.6992	0.0670	-0.2783	0.6879	-2.0726	-0.0309	-0.4654	0.6285
<i>t</i> -stat	-2.2327	0.3964	-2.0218	4.9007	-3.1884	-0.1727	-3.2797	5.71251
Kuwait	-1.8499	0.4112	-0.1387	0.7088	-1.3877	0.3249	-0.1959	0.7893
<i>t</i> -stat	-1.1588	1.3239	-1.1410	2.5241	-1.1586	1.0639	-1.7340	3.7442
Oman	-0.7464	0.3905	0.0943	0.9165	-2.3329	0.4061	-0.1020	0.6419
<i>t</i> -stat	-1.5025	1.8137	1.2672	12.227	-1.1073	1.4706	-0.6309	1.8329
Qatar	-1.0431	0.7386	-0.0993	0.9079	-0.8250	0.6360	-0.1047	0.9392
<i>t</i> -stat	-2.2656	3.7428	-0.9129	12.5224	-1.8045	3.0012	-1.1281	11.5775
UAE	-1.1685	0.14057	-0.2126	0.7622	-0.0139	-0.3754	-0.3187	0.9494
<i>t</i> -stat	-2.0346	0.8940	-2.2234	6.1904	-432701	-5541.3	-3.6254	280.820

Fig. 3 Volatility of Islamic and conventional indices. **a** Developed markets, **b** Emerging markets

Panel B: Emerging markets

Fig. 3 continued

Table 4 Sharpe ratio for Islamic and conventional indices

Market	FRA	GER	ITA	UK	SPAI	BELG	DEN	AUS
Panel A: Developed markets								
SR Isla	0.0318	0.0904	0.0496	0.0452	0.0864	0.0639	0.1720	0.0785
SR Conv	0.0193	0.0564	−0.0287	0.0033	0.0277	0.0113	0.1443	0.0407
ΔSR	0.0125	0.034	0.0783	0.0419	0.0587	0.0526	0.0277	0.0378
Z-Stat	0.5393	1.4457	1.7922	1.4059	1.1373	0.9691	0.6463	0.8567
Market	NETH	NOR	SWE	SWIT	NEW	HON	JAP	SING
Panel A: Developed markets								
SR Isla	0.0339	0.1223	0.1172	0.1318	0.0363	0.1021	0.0306	0.1450
SR Conv	0.0073	0.1033	0.1119	0.0930	0.0284	0.0988	0.0370	0.1284
ΔSR	0.0266	0.019	0.0053	0.0388	0.0079	0.0033	−0.0064	0.0166
Z-Stat	0.624	0.7438	0.1649	0.9903	0.1700	0.8439	−0.24763	0.518
Market	CAN	USA	AUST					
Panel A: Developed markets								
SR Isla	0.1160	0.0643	0.1193					
SR Conv	0.0992	0.0411	0.0771					
ΔSR	0.0168	0.0232	0.0422					
Z-Stat	0.5692	0.95352	1.1289					
Market	IND	INDO	MAL	BRA	CHIL	MEX	TUR	RUSS
Panel B: Emerging markets								
SR Isla	−0.5194	0.1266	0.1514	0.0653	0.1850	0.1177	0.0761	0.0438
SR Conv	0.1298	0.1483	0.1353	0.0715	0.1898	0.1061	0.0855	0.0398
ΔSR	−0.6492	−0.0217	0.0161	−0.0062	−0.0048	0.0116	−0.0094	0.004
Z-Stat	−15.1452	−0.6701	0.4464	−0.2648	−0.1238	0.2811	−0.2027	0.2267
Market	EGY	JOR	MOR	BAH	KUW	OMA	QAT	UAE
Panel B: Emerging markets								
SR Isla	−0.0050	−0.2655	0.0766	0.1649	−0.0523	−0.0073	0.0127	−0.1026
SR Conv	0.0574	−0.2667	0.1316	0.1364	−0.0024	−0.0302	0.0176	−0.1013
ΔSR	−0.0624	0.0012	−0.055	0.0285	−0.0499	0.0229	−0.0049	−0.0013
Z-Stat	0.2527	−0.6009	−1.1396	0.025	−1.069	0.3762	−0.1336	−0.0349

For developed markets (panel A) and most emerging markets, the Sharpe ratio difference is no significant.

A notable exception is the Indian market, where we find a significantly negative Sharpe ratio difference of −0, 6492 (−15, 1452).

Table 5 CAPM estimation for Islamic and conventional indices

Entire period				Crisis period		
	α	β	R^2	α	β	R^2
Panel A: developed markets						
France	0.0008	0.9000	0.95	0.0012	0.9115	0.96
<i>t</i> -stat	0.6547	49.5383		0.6180	38.6680	
Germany	0.0027	0.9606	0.96	0.0016	0.9749	0.95
<i>t</i> -stat	1.8173	50.9782		0.6327	33.8119	
Italy	0.0050	0.8233	0.80	0.0075	0.8366	0.82
<i>t</i> -stat	1.8308	21.7314		1.4860	15.3417	
UK	0.0022	0.9526	0.91	0.0023	0.9595	0.92
<i>t</i> -stat	1.5521	35.2360		0.9094	24.3336	
Spain	0.0044	0.7817	0.72	0.0072	0.8201	0.75
<i>t</i> -stat	1.2967	17.5743		1.1235	12.2993	
Belgium	0.0032	0.6714	0.69	0.0010	0.7225	0.91
<i>t</i> -stat	1.0709	16.4179		0.1913	12.0053	
Denmark	0.0027	0.9300	0.83	8.53°05	0.8522	0.84
<i>t</i> -stat	1.0631	23.9583		0.0201	16.6327	
Austria	0.0027	0.9300	0.79	−0.0020	0.9323	0.81
<i>t</i> -stat	1.0189	21.5355		−0.2617	14.5460	
Netherland	0.0020	0.9958	0.81	0.0025	0.8795	0.93
<i>t</i> -stat	0.6804	22.3566		0.9506	27.1387	
Norway	0.0019	1.0657	0.95	−3.66°05	0.9564	0.96
<i>t</i> -stat	0.9631	48.5177		−0.0126	37.0537	
Sweden	0.0008	0.9753	0.90	0.0009	0.9176	0.92
<i>t</i> -stat	0.3795	33.5141		0.2597	24.1824	
Switzerland	0.0021	0.8710	0.85	0.0041	0.8812	0.90
<i>t</i> -stat	1.2925	26.0905		1.6735	21.8779	
Newzealand	0.0001	1.0104	0.77	−0.0016	1.0695	0.80
<i>t</i> -stat	0.2599	19.8414		−0.2898	14.3902	
Hong K ong	0.0003	0.8518	0.94	0.0004	0.8351	0.93
<i>t</i> -stat	0.2783	41.918		0.1843	26.3461	
Japan	−0.0002	0.9526	0.92	0.0017	0.9989	0.93
<i>t</i> -stat	−0.2028	38.412		0.8768	27.6267	
Singapore	0.0014	0.9092	0.91	0.0008	0.9188	0.95
<i>t</i> -stat	0.8195	35.1807		0.3331	31.4279	
Canada	0.0015	1.1233	0.92	−0.0006	1.0814	0.93
<i>t</i> -stat	0.8155	38.4148		−0.2037	36.2120	
USA	0.0010	0.9074	0.94	0.0014	0.8667	0.95
<i>t</i> -stat	1.1743	46.8325		0.8876	31.1882	
Australia	0.0034	1.0582	0.91	0.0019	1.0624	0.92
<i>t</i> -stat	1.6699	0.0302		0.5024	24.2335	

Table 5 continued

	Entire period			Crisis period		
	α	β	R^2	α	β	R^2
Panel B : Emerging markets						
India	-0.0585	0.9469	0.93	-0.0580	0.9188	0.96
<i>t</i> -stat	<i>-28.168</i>	<i>42.7321</i>		<i>-20.151</i>	<i>36.6365</i>	
Indonesia	-0.0015	1.0082	0.91	-0.0068	0.9878	0.91
<i>t</i> -stat	<i>-0.5422</i>	<i>34.9494</i>		<i>-1.4319</i>	<i>23.4961</i>	
Malaysia	0.0013	1.0239	0.88	-0.0017	0.9854	0.91
<i>t</i> -stat	<i>0.7674</i>	<i>30.2074</i>		<i>-0.7040</i>	<i>23.5821</i>	
Brazil	-0.0005	1.0643	0.95	-0.0033	1.0095	0.95
<i>t</i> -stat	<i>-0.2367</i>	<i>50.0232</i>		<i>-0.9944</i>	<i>32.6436</i>	
Chile	0.0005	0.9894	0.87	-0.0033	1.0256	0.91
<i>t</i> -stat	<i>0.2205</i>	<i>29.2240</i>		<i>-0.9292</i>	<i>22.8190</i>	
Mexico	1.0016	1.0333	0.83	0.0047	1.0204	0.84
<i>t</i> -stat	<i>0.5539</i>	<i>24.0697</i>		<i>0.9058</i>	<i>16.5354</i>	
Russia	0.0004	0.9889	0.98	-0.0013	0.9648	0.98
<i>t</i> -stat	<i>0.3531</i>	<i>79.9945</i>		<i>-0.6758</i>	<i>60.4520</i>	
Turkey	0.0000	0.8908	0.78	-0.0031	0.9684	0.72
<i>t</i> -stat	<i>0.0129</i>	<i>20.4140</i>		<i>-0.3465</i>	<i>11.2361</i>	
Egypt	0.0184	0.2777	0.05	-0.0145	0.1847	0.04
<i>t</i> -stat	<i>1.4520</i>	<i>2.8799</i>		<i>-1.0379</i>	<i>1.4893</i>	
Jordan	-0.0017	0.3718	0.13	-0.0091	-0.2149	0.07
<i>t</i> -stat	<i>-0.2833</i>	<i>3.9637</i>		<i>-1.1252</i>	<i>-1.7079</i>	
Morocco	-0.0027	0.9139	0.84	-0.0026	0.8324	0.85
<i>t</i> -stat	<i>-1.1825</i>	<i>24.8342</i>		<i>-0.8293</i>	<i>15.6710</i>	
Bahrain	-0.0011	1.0245	0.89	-0.0040	0.9756	0.88
<i>t</i> -stat	<i>-0.3589</i>	<i>26.0666</i>		<i>-0.9028</i>	<i>19.8420</i>	
Kuwait	-0.0040	0.9685	0.84	-0.0074	0.9015	0.80
<i>t</i> -stat	<i>-1.1902</i>	<i>21.3797</i>		<i>-1.4508</i>	<i>14.2440</i>	
Oman	0.0014	1.0217	0.73	0.0012	0.9077	0.79
<i>t</i> -stat	<i>0.3259</i>	<i>14.9938</i>		<i>0.2634</i>	<i>13.7997</i>	
Qatar	-0.0004	1.0237	0.91	0.0004	1.0667	0.91
<i>t</i> -stat	<i>-0.1268</i>	<i>29.1944</i>		<i>0.1013</i>	<i>23.1858</i>	
UAE	-0.0007	1.1759	0.91	-0.0081	1.1094	0.91
<i>t</i> -stat	<i>-0.1750</i>	<i>29.9464</i>		<i>-1.4575</i>	<i>23.6528</i>	

Italic values indicate the *t*-statistics

Time Regression Models

Table 5 presents the results of CAPM and try estimation for Islamic and conventional indices over the sample period and the crisis period for developed markets (Panel A) and emerging markets (Panel B). The beta of Islamic index is less than one for most

markets inferring that the Islamic index is less risky and less sensitive to the movement of market. Egyptian and Jordanian markets have the lowest beta respectively 0.2777 and 0.3718. However, the beta is greater than one for several markets such as Norway, Canada, Australia, Brazil, Mexico and UAE. This result implies that Islamic indices in those markets are riskier than conventional index.

The CAPM alphas are not significantly positive and close to zero for most developed markets except for Japan. For emerging markets, CAPM alphas are not significantly negative for Indonesia, Brazil, Jordan, Morocco and the GCC markets. This finding confirms the results of the Sharpe ratio test suggesting that Islamic indices do not exhibit a significantly different risk-adjusted performance compared to their conventional counterparts. However, Indian market continues to reveal a significant negative risk adjusted return suggesting that conventional index return exceed Islamic index return.

In the crisis period the CAPM alphas show an enhanced decrease in most markets except for France, Italy, UK, Spain, Netherland, Hong Kong, Japan and USA. The increasing of alpha in those markets can be explained by the fact that Islamic index excludes bank and financial services stocks, which have been more affected in the crisis period. Moreover, it becomes negative for all emerging markets except for Qatar and Oman. However the no significance of all alphas parameters suggests that in the entire period as well as in the crisis period Islamic indices do not outperform significantly conventional indices in risk adjusted return basis. R-squared statistics in the crisis period are higher than entire sample period confirming the above result.

Conclusion

This study examines the risk and the return characteristics of the Islamic market indices versus the conventional market indices. Particularly, we investigate the performance of Islamic indices after controlling for the systematic risk. For this purpose, we employed a large international data set of 35 indices from developed and emerging markets in the period of Jun 2002 to April 2012.

The analysis of the return pattern during the sample period reveals that both Islamic indices and conventional indices flow the same trend for most developed and emerging markets. During recent global financial crisis period, a large decreasing in return of both indices is noted. First, we use the *t* test to investigate the mean returns difference between both types of indices. The results show that there is no significant difference in mean between the Islamic and conventional indices except for Italy and Australia.

Second, we study whether there is a leverage effect in all studied indices. We found an asymmetric relationship between returns and volatility for conventional indices as well as for Islamic indices. This means the presence of leverage effect risk in all markets.

Third, we investigate whether there is a significant difference between performances of Islamic stock market indices and their conventional counterpart indices. We employ a differences-in-Sharpe ratio test and the CAPM model. Sharpe

ratio test reveals that there is no significant difference between Islamic index returns and their conventional counterparts.

The beta of Islamic index is less than one for most markets inferring that the Islamic index is less risky and less sensitive to the movement of market except Norway, Canada, Australia, Brazil, Mexico and UAE. The CAPM alphas are not significant for all Islamic market indices. This finding suggests that the risk adjusted return of Islamic indices and their counterpart conventional indices were almost similar.

The same results are noted in the crisis period suggesting that in the entire period as well as in the crisis period there is no difference between performance of Islamic indices and conventional indices in risk adjusted return basis.

Hence, the study infers that Islamic stocks are the viable and ethical investment avenue to the Muslim investors as they can invest their capital in accordance with their religious beliefs without sacrificing financial performance.

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