İSTANBUL UNIVERSITY PRESS

Istanbul Business Research, 47(2): 124–153

DOI: 10.26650/ibr.2018.47.2.0008
http://ibr.istanbul.edu.tr/
http://dergipark.gov.tr/iuisletme

Istanbul Business Research

Submitted: April 19, 2018
Accepted: February 12, 2019

RESEARCH ARTICLE

Risk and Return Characteristics of Islamic Indices: An Empirical Approach

Mevlüt Camgöz[1], K. Ahmet Köse[2], Belkıs Seval[3]

Abstract

The main purpose of this research is to demonstrate the risk and return characteristics of Islamic indices. Islamic indices calculated by DJ and MSCI in the case of Turkey, Malaysia, USA, and the UK are examined in the widest time range. Respective conventional benchmark indices have also been included in the analysis to evaluate the empirical findings in a comparative manner. In the empirical research in which the mean-variance analysis framework is adopted, single and multi-factor asset pricing models are also applied together with ratio analysis. According to the empirical findings, there are noticeable differences between the risk and return characteristics of Islamic indices and their conventional counterparts depending on the country, index type and time period studied. Islamic indices tend to perform better and to have a lower level of systematic risk than their conventional counterparts. However, most of these findings and tests are not statistically significant. Therefore, in technical terms, this study concludes that there is no significant difference between the risk and return characteristics of Islamic indices and conventional counterparts. Some evidence has been found supporting the widely asserted claim that Islamic indices do not have an optimal risk-return profile by opponent researchers. However, when the absolute and risk-adjusted returns and alpha coefficients provided by Islamic indices are taken into account it appears that Islamic indices do not perform poorly than their conventional counterparts. In other words, it can be said that Islamic index investors do not bear extra costs in the examined cases.

Keywords

Islamic finance • Financial performance • Islamic stock market • Asset pricing • International markets • Investment Factor

Risk and Return Characteristics of Islamic Indices: An Empirical Approach

The theoretical framework and practices developed in the 20th century on Islamic economics and finance gave rise to the first fruits of Islamic banking in the 1970s. The importance and necessity of the Islamic capital markets have been understood in order that Islamic finance can be adopted as an alternative financial system. Initiations that began in the 1980s have led to the emergence of Islamic funds and indices, sukuk and other capital market instruments in the following decade. So, these developments have made the 1990s a turning point for the Islamic capital markets.

1 **Corresponding author:** Mevlut Camgoz (Res.Asst.Dr.), Kirklareli University, Faculty of Economics and Administrative Sciences, Department of Business, Kirklareli, Turkey. Email: mevlutcamgoz@gmail.com

2 K. Ahmet Kose (Prof.), Istanbul University, School of Business, Finance Department, Istanbul, Turkey Email: ahmetk@sistanbul.edu.tr

3 Belkıs Seval (Prof.), Istanbul University, School of Business, Finance Department, Istanbul, Turkey Email: sevalb@istanbul.edu.tr

To cite this article: Camgoz, Kose, K. A., & M., Seval B. (2018). Risk and Return Characteristics of Islamic Indices: An Empirical Approach. *Istanbul Business Research, 47*(2), 124-153. https://doi.org/10.26650/ibr.2018.47.2.0008

Perhaps the most important development for the Islamic stock market in this period is that the *Islamic Fiqh Academy's* decision in 1992 has opened the way for the Islamic investors to the stock markets. After this ruling, at the end of the 1990's, international institutions such as Dow Jones and FTSE have begun to calculate Islamic stock indices on a global scale with filtering techniques that they have developed. Thus, Islamic investors have the opportunity to invest in companies that are in Islamic indices which are created in international standards and regularly monitored by the Sharia boards.

There are, however, some theoretical issues relating to the Islamic screening methodologies, designing and monitoring of Islamic indices and constructing of Islamic funds based on these indices. There are also a number of financial topics in the practical aspects, such as the management of Islamic funds and the measurement of financial performance.

The most important question to be asked about Islamic indices in terms of investment theory is the possible negative effect of screening applications on index performance. Many studies view this effect as an "Islamic cost" or "negative Islamic effect" (Girard & Hassan, 2008; Merdad et al., 2015). In the studies that develop a more technical approach, this effect is evaluated in terms of portfolio theory and the following claims are put forward. Possible drawbacks expressed in many studies are: (i) restricted methodologies will diminish investment alternatives, (ii) portfolios created with such techniques will not occur on the optimal risk-return level, (iii) additional monitoring and screening costs will arise, (iv) Islamic screening applications will eliminate large-cap firms, and remaining small-cap firms will lead to more volatile returns, and (v) avoid some attractive investment opportunities. As a result, it is argued that Islamic investors will suffer from screening applications (Ismath Bacha & Mirakhor, 2013, p. 254).

As a result of Islamic screening application, most of the equities (%50-65) in the capital market are screened out because they do not comply with Islamic principles. For example, the S&P 500 Shariah index contains 234 components (as of November 2016), although this index includes all remaining stocks of the reference index (S&P 500) after the filtering application (S&P Global, 2016). It means that 53.2% of the reference index has been eliminated due to the filtering criteria. A liberal filtering policy, even in the SAC Malaysia practice, about 26% of the stocks is eliminated as of 2016 (Securities Commission Malaysia, 2017).

Discussions about the financial performance of restricted portfolios continue for a long time. The main argument in this regard is that these portfolios will perform worse than their counterparts and will incur additional costs to their investors as they increase monitoring costs, reduce the investable asset universe and reduce diversification potential (Bauer et al., 2006; Renneboog et al., 2008; Sauer, 1997).

As we have seen above, it is clear that Islamic filtering practices have significantly reduced the investable asset universe. Therefore, this fact shows that Islamic in-

vestors have a relatively limited investment opportunity vis-à-vis conventional investors. When this situation is evaluated from portfolio theory view, it is conceivable that the application of Islamic filtering has a negative effect on the investment performance.

Some of the arguments put forward by opponents in this respect are that, because the Islamic filtering practices restrict the investable asset universe, the diversification level of Islamic indices will not reach the optimal point, thus providing high volatility and low returns.

It is also predicted that the Islamic filtering practices will screen out large-cap and stable firms. For this reason, it is claimed that small-cap firms will survive and it will increase the monitoring and auditing costs (Ismath Bacha & Mirakhor, 2013, p. 254; Hayat & Kraeussl, 2011, p. 192).

When all these facts and claims are taken into consideration, it is necessary for Islamic investors to establish the risk and return characteristics of Islamic indices. As a matter of fact, the diversification level of Islamic indices, investment styles, performance in bear and bull markets and times of crisis has been the subject of curiosity in the first glance.

The disclosure of these facts will show that whether Islamic investors will bear additional costs. Therefore, the main purpose of this study is to analyze the risk and return characteristics of Islamic indices. In this context, the research questions which are developed considering the relevant literature and the assertions put forward are as follows.

- What are the risk and return characteristics of Islamic indices? How do Islamic indices perform compared to their conventional counterparts?
- Do Islamic index investors bear additional costs?
- How do Islamic indices perform during times of crisis?

Two basic and eleven sub-hypotheses have been developed that are consistent with the above-mentioned research questions. It will be decided to accept or reject these hypotheses according to empirical findings and the interpretation of the findings will be done in the last part.

Basic Hypotheses

Hypotheses 1: There is no difference between Islamic indices and conventional counterparts in terms of risk and return characteristics.

Hypotheses 2: Islamic investors bear additional costs.

Sub-Hypotheses

Hypotheses 1: Islamic indices and their conventional counterparts have equal average returns.

Hypotheses 2: Islamic indices and their conventional counterparts have equal variance.

Hypotheses 3: The difference between Sharpe ratios of Islamic indices and their conventional counterparts equals zero.

Hypotheses 4: The average abnormal return of Islamic indices equals zero.

Hypotheses 5: The systematic risk level

of Islamic indices is similar to the market portfolio.

Hypotheses 6: Islamic indices have a similar risk-return profile to the market portfolio.

Hypotheses 7: Islamic indices have a higher level of non-systematic risk than conventional counterparts.

Hypotheses 8: Islamic indices are growth oriented.

Hypotheses 9: Islamic indices are small-cap oriented.

Hypotheses 10: There is no momentum effect in Islamic indices.

Hypotheses 11: Islamic indices perform better in crisis periods than their conventional counterparts, with respect to risk-adjusted return measures.

Four countries are examined in this research. These are Turkey, Malaysia, USA, and the UK. Turkey and Malaysia are the two Islamic countries with the highest potential in terms of Islamic capital markets. The USA and UK markets are the largest and most efficient capital markets around the world. Appropriate conventional indices as benchmarks in all countries will be analyzed together with Islamic indices and the empirical findings will be evaluated in a comparative manner.

In this study, the classical assumptions of capital market theory; return distributions are normal, quadratic utility function, market portfolio covering all risky assets, have been adopted. Methodologically, mean-variance analysis and CAPM framework have been adopted.

Literature

The risk and return characteristics of Islamic indices have been subject to numerous scientific researches since the late 1990s. There are conflicting findings and claims in the empirical literature on Islamic indices. The reason for these conflicting findings could be related to the time period studied, the econometric methodology and the current market conditions.

Ashraf & Mohammad (2014) examined the global Islamic indices of MSCI, S&P and Dow Jones between June 2000 and May 2012. In the study, the hypothesis that Islamic indices performed better than conventional counterparts during crisis periods is tested using the LSTAR (Logistic Smooth Transition Autoregressive) technique. According to empirical findings, in the long run, Islamic indices performed better than conventional counterparts in terms of both absolute and risk-adjusted returns. In addition, the return volatility of the Islamic indices is lower than conventional indices. There is no significant change in the risk level of Islamic indices with lower systematic risk levels compared to conventional counterparts during the crisis period. According to empirical findings, authors have concluded that there is significant evidence that Islamic indices have a potential to hedge against financial risks in times of crisis, but no evidence that they provide abnormal returns on a global basis.

Jawadi et al. (2014) examined the European, American and global Islamic indices in their work covering the period 2000 - 2011. They also calculated the ratios of

Roy (1952) and Omega (2002) along with classical performance measures. They also made EGARCH-based beta estimations based on ordinary least squares method. The most important result reached in the study is that Islamic indices performed better than their conventional counterparts in times of crisis. It is also stated in the study that the measurement techniques used in the performance evaluation of Islamic indices, the time period studied and the relevant market conditions are important factors.

Ho et al. (2014) analyze the financial performances of the national Islamic indices together with their global versions of their work covering the period of 2000-2011. In the empirical models where monthly closing returns are used, the MSCI All-World Index is defined as the market portfolio. The interest rate on the treasury bills of each country is used as the risk-free rate. In the study, classical performance measures such as Sharpe, Treynor and Jensen Alfa are adopted and beta coefficients are estimated according to standard CAPM. According to empirical findings, Islamic indices have a higher expected return in the long run than the conventional counterparts. However, the differences in average returns are not statistically significant. The great majority of the beta values of the Islamic indices are below their conventional counterparts in the long-term. Moreover, Islamic indices performed better than conventional counterparts in the Dotcom and 2008 financial crisis periods. However, after the 2008 financial crisis, Islamic and conventional indices show similar performance.

Al-Khazali et al. (2014) use the stochastic dominance approach (SDA) to question whether Islamic indices perform better than conventional counterparts. Twelve Islamic and conventional indices have been examined between January 1996 and December 2012. The authors also included classical performance measures such as Sharpe, Treynor and Jensen Alfa in order to evaluate the findings obtained from the SDA. Conventional indices stochastically dominate Islamic indices over the long term. However, this situation is reversed between 2007 and 2012 covering the financial crisis period, and Islamic indices were found to be superior to conventional counterparts. As a result, the authors have come to the conclusion that Islamic filtering techniques will have a negative impact on investment performance.

Dewandaru et al. (2015) examines the risk and return characteristics of Dow Jones Islamic indices over 11 sample countries and 10 global sectors. They use the MODWT (Maximum Overlap Discrete Wavelet Transform) technique in their work covering the period 2008 - 2012. The dataset consisting of daily observations is analyzed by dividing into five sub-time periods ranging from 2 to 4 days to 32 to 64 days, allowing changing systematic risk by time. According to the empirical findings, there is no statistically significant difference between the risk and return characteristics of Islamic indices and their conventional counterparts.

Erragraguy & Revelli (2015) are investigating the impact of socially responsible investment criteria on investment performance along with Islamic filtering criteria. The au-

thors applied a socially responsible investment criterion to the MSCI America Islamic index and obtained a new sub-index and reviewed the data set in monthly observations between January 2008 and December 2011. According to empirical findings, the application of socially responsible investment criteria to the MSCI America Islamic index does not cause a negative effect on financial performance.

Mohammad & Ashraf (2015) examine the risk and return characteristics of Islamic indices. In the study, fifteen DJ and MSCI Islamic indices in regional and national characteristics are compared with conventional counterparts between September 2002 and September 2013. Fama-French (1993) three-factor and Carhart (1997) four-factor models are used in the study, and DCC GARCH (Dynamic Conditional Correlation) model is used together with LSTAR model which enables time-dependent change of beta coefficient. According to empirical findings, Islamic indices are growth-oriented and show momentum effect. According to the DCC GARCH model results, the risk and return characteristics of Islamic indices are different in developed and emerging markets. According to the market timing model, Islamic indices have a negative gamma coefficient. So, Islamic indices have no market timing.

Charfeddine et al. (2016) examine the investment performance of sustainability and Islamic indices and whether Islamic indices offer diversification opportunities in terms of national investors. Dataset used as daily observations and covers March 2004 - March 2011. Multivariate Johansen cointegration test is applied in conjunction with classical performance measures. According to Sharpe ratio and Jensen Alfa criteria, Islamic indices performed better than both conventional counterparts and sustainable indices.

Ashraf (2016) investigates the effect of book value and market value on the performance of Islamic indices in the calculation of financial ratios. The majority of the data set, such as MSCI, DJ, FTSE and S&P Global, is composed of global Islamic indices and conventional counterparts. The data set covering the period from December 2000 to May 2012 are analyzed using the multi-equation SEM (Seemingly Unrelated Regression) developed by Zellner (1962) along with the classical one-equation approach. There is no significant difference between single and multi-equation systems. With a few exceptions, Islamic indices do not provide an abnormal return. However, the use of book value or market value in the calculation of financial ratios has no effect on the performance of Islamic indices.

Sherif (2016) examines the effect of Islamic filtering techniques on investment performance. DJ Islamic index is examined in the study and the performances of 7 regional and 5 sectoral Islamic indices are compared with conventional counterparts. The data set used as monthly observations covers between January 1999 and July 2013. Camphel & Cochrane (2000)'s Habit Formation model is used along with classical performance measures. According to the empirical findings, it is found that the Islamic indices are more volatile than their conventional coun-

terparts and at the same time the expected returns are also higher. Islamic indices that perform better than conventional counterparts are growth-oriented and do not have market timing ability. As a result, the author suggests that the hypothesis that Islamic filtering techniques have a negative effect on investment performance cannot be accepted.

Data Set

In this study, Islamic and conventional indices calculated by international index providers in the Turkey, Malaysia, United States and UK stock market is analyzed. The dataset covers the time range from May 2002 to March 2017 (179 observations, monthly).

Turkey and Malaysia have a high potential for Islamic capital market. In order to compare the empirical findings obtained from these markets with those of the developed countries, samples of the USA and the UK are included in the study.

BIST 100, EMAS, S&P 500 and FTSE ALL indices are representing market portfolio for Turkey, Malaysia, USA, and the UK respectively. The benchmark indices used to compare the performance of Islamic indices is the Dow Jones Total Stock Market and the MSCI country indices calculated by Dow Jones and MSCI for each country.

The three-month Treasury bill rate is one of the most widely used risk-free rate in portfolio theory. However, Turkish and Malaysian Treasury bill rates are not appropriate in terms of empirical analyzes for some data issues. For this reason, it has been decided to use the one-month interbank interest rate as the risk-free rate for all the countries under investigation. However, in this case, Turkish data cannot reach a sufficient number of observations. Therefore, one-month deposit rate in Turkey will be used as the risk-free rate.

Since the interbank and the deposit rate are quoted as the annual compounded return, this data is recalculated on a monthly basis using the formula below.

$$R_{monthly} = (R_{annually} + 1)^{1/12} - 1 \qquad (1)$$

$R_{annually}$ = *compound annual interest rate*

The entire dataset is compiled from Datastream and Thomson Reuters Eikon databases. Only the MSCI US and MSCI UK Islamic Index for the first 5 years of 2007 are obtained from the website of the relevant institution. Index and interest rate data are

Table 1
Codes of DJ and MSCI Indices

Country	Index	Islamic	Conventional
Turkey	DJ	DJIMTR	DJTR
	MSCI	MSCITRIS	MSCITR
Malaysia	DJ	DJIMMY	DJMY
	MSCI	MSCIMYIS	MSCIMY
USA	DJ	DJIMUS	DJUS
	MSCI	MSCIUSAIS	MSCIUSA
UK	DJ	DJIMUK	DJUK
	MSCI	MSCIUKIS	MSCIUK

used in the national currency of the country to which they belong.

All series are calculated as percentage change by taking the logarithmic differences of the end-of-month closing prices adjusted to the reinvested dividends of the related indices, called return index, in the above-mentioned databases.

$$R_{it} = 100 * log\left(\frac{RI_{it}}{RI_{i(t-1)}}\right) \qquad (2)$$

RI_{it} = *value of indice i a at time t*

RI_{it} = *monthly percentage change of indice i a at time t*

Periodization

In portfolio theory, the datasets examined in the studies on asset pricing models and performance measurements are generally divided into sub-periods. Recession and crisis periods are also defined when possible. In the studies on the risk and return characteristics of Islamic indices, such sub-periods and crisis period definitions are frequently encountered. Because Islamic indices are created from a restricted asset universe. For this reason, whether Islamic indices have different risk and return profiles compared to conventional counterparts in bull and bear markets, and their performance during crisis times is a matter of curiosity.

This study, covering the period from May 2002 to March 2017, examines the performance of Islamic indices by separating the dataset into sub-periods, as well as long-term analyzes. The first sub-period covers the November 2002-October 2007 (60 Observations) date range in which the bull market conditions prevail. Similarly, the post-crisis sub-period is defined as July 2010-June 2015 (60 observations). The common feature of both periods is that they are made up of equal numbers of observations and that the markets are on the rising trend.

The National Bureau of Economic Research, one of the prestigious economic research centers established in the early 20th century in America, describes the 2008 global financial crisis period from December 2007 to June 2009 (18 Months) (NBER, 2012).

Considering the price movements in the markets, Turkey, Malaysia, the US and the UK markets have reached its peak in the last months of 2007, and have fallen to their lowest level in the last months of 2008. The markets that started to recover have returned to pre-crisis levels in 2010 and they continued to rise until 2015.

In this study, macroeconomic conditions and market movements are considered together and a common crisis period is defined for all three countries. This period is the time period that corresponds to the remaining 30 months between January 2008 and June 2010 (Walkshausl, 2012b, p. 60; Rifqi, 2016).

Methodology

The methodology to be used to analyze the risk and return characteristics of Islamic indices can be categorized under five headings in this study. These are (i) absolute return analysis, (ii) risk-adjusted return analy-

sis, (iii) alpha analysis, (iv) systematic risk analysis and (v) investment style analysis.

Expected returns and standard deviations of the indices examined in absolute return analysis are calculated and statistical tests related to them are performed. The annualized average return of Islamic and conventional indices is calculated by multiplying the monthly average of the relevant index by twelve.

$$\bar{R}_i = \frac{1}{n}\sum_{i=1}^{n} R_{it} \qquad (3)$$

$$\bar{R}_{i,yearly} = \bar{R}_i * 12$$

$\bar{R}_{i,yearly}$ = *annualized average return*

In order to determine whether return difference of Islamic indices and their conventional counterparts is statistically significant, a linear regression model is used in which the dependent variable is Islamic indices and the independent variable is conventional indices. Then, Wald coefficient test is performed to test whether the slope coefficient is statistically significant.

$$\textit{Islamic Indice Return}_i = c + \beta_1\ \textit{Conventional Indice Return}_m + u_i \qquad (4)$$

$$H_0 : \beta_1 = 1$$

The standard deviation is calculated by the formula shown below and reported on an annual basis.

$$\sigma_i = \sqrt{\frac{\sum_{i=1}^{n} [R_{i,t} - (\bar{R}_i)]^2}{n-1}} \qquad (5)$$

$$\sigma_{i,yearly} = \sigma_i * \sqrt{12}$$

σ_i = *standard deviation*

F test is performed to test whether the difference between the standard deviation of Islamic indices and conventional equivalents are statistically significant. In the F test, the variance of both series of indices is calculated, and the F statistic is found by taking the ratio of large variance σ_L^2 to small variance σ_S^2. In the F statistic, the null hypothesis that the variances are equal is tested. If the probability value of the F statistic is less than 5%, the null hypothesis is rejected. In other words, the difference between the variances is statistically significant.

$$F = \frac{\sigma_L^2}{\sigma_S^2} \qquad (6)$$

$$H_0 : \Delta\sigma^2 = 0$$

The first measure of the risk-adjusted return analysis is the Sharpe ratio. The Sharpe ratio is calculated by dividing the annualized excess return by the standard deviation of index return.

$$S_p = \frac{\bar{R}_p - \bar{R}_f}{\sigma_p} \qquad (7)$$

However, the interpretation of the Sharpe ratio becomes difficult when the return of the asset is below the risk-free return. For this reason, the modified Sharpe ratio is calculated by adding an exponent to the standard deviation.

$$MS_p = \frac{\bar{R}_p - \bar{R}_f}{\sigma_p \; R_p - R_f / Obs(R_p - R_f)} \qquad (8)$$

MS_p = *modified Sharpe ratio*

The hypothesis $H_0 : \Delta SH = 0$ that there is no difference between Sharpe ratios is tested to show whether the difference between the

Sharpe ratio of Islamic indices and their conventional counterparts is statistically significant. The relevant test statistic is calculated using the technique proposed by Jobson & Korkie (1981). If the null hypothesis is rejected, it is understood that the difference between Sharpe ratios of Islamic indices and their conventional counterparts is statistically significant (Jobson & Korkie, 1981).

$$z = \frac{\mu_i\sigma_m - \mu_m\sigma_i}{\sqrt{\theta}} \qquad (9)$$

$$\theta = \frac{1}{T}\left[2\sigma_i^2\sigma_m^2 - 2\sigma_i\,\sigma_m\,\sigma_{im} + \frac{1}{2}\mu_i^2\sigma_m^2 + \frac{1}{2}\mu_m^2\,\sigma_i^2 - \frac{\mu_i\,\mu_m}{2\sigma_i\,\sigma_m}\,\sigma_{im}^2\right] \qquad (10)$$

μ = *excess return*
σ = *standard deviation*
i = *islamic indice*
m = *conventional indice*
T = *number of observations*
σ_{im} = *covariance of Islamic and conventional indice return*

Treynor ratio is calculated by dividing the excess return into the beta coefficient of the relevant index.

$$T_i = \frac{\bar{R}_i - \bar{R}_f}{\beta_i} \qquad (11)$$

T_i = *Treynor ratio*

When the return of the analyzed asset is below the risk-free return, Treynor ratio is difficult to interpret and gives misleading results. For this reason, the distance measure suggested by Proffit & Taylor (1985) is calculated. The closer the return of the examined index to the risk-free point, the better the performance of that index.

$$D_i = \left((\bar{R}_i - \bar{R}_f)^2 + (\beta_i)^2\right)^{1/2} \qquad (12)$$

D_i = *distance of the index return to the* R_f *point*

The calculation of the Sortino ratio is very similar to the Sharpe ratio. The return per unit downside risk is calculated by dividing the excess return by the semi-standard deviation at the Sortino ratio (Sortino & van der Meer, 1991).

$$ST_i = \frac{\bar{R}_i - \bar{R}_f}{DR_i} \qquad (13)$$

ST_i = *Sotino ratio*

DR_i = *semi standard deviation*

The alpha measure is an important indicator in assessing investment performance. In this study, two different alpha are estimated under the heading of alpha analysis. The first is the Jensen alpha estimated from the standard CAPM model. The alpha coefficients are multiplied by twelve and are reported in the empirical findings together with the t-statistics and probability values (Jensen, 1968).

$$(R_i - R_f) = \alpha_i + \beta_i[R_m - R_f] + e_i \qquad (14)$$

α_i = *Jensen alpha*

The second is the alpha coefficient estimated from the Fama-French three-factor model. Risk factors such as value and size are used in this model besides market risk (Fama & French, 1992; Fama & French, 1993).

$$(R_i - R_f) = \alpha_i + \beta_{i1}(R_m - R_f) + \beta_{i2}HML + \beta_{i3}SMB + e_i \qquad (15)$$

α_i = *Fama – French alpha*

In the alpha analysis, the hypothesis that alpha coefficients calculated from single and multi-factor models are not different from zero ($H_0 : \beta_0 = 0$) is tested and reported. The fact that the alpha coefficient is greater than zero and statistically significant means that the index being analyzed has superior performance/abnormal return.

The beta coefficient is estimated by applying standard CAPM form. The slope coefficient of the market risk premium, which is the independent variable in this model, is called the beta coefficient (Sharpe, 1964).

$$(R_i - R_f) = \alpha_i + \beta_i[R_m - R_f] + e_i \quad (16)$$

$\beta_i = beta\ coef\ficient$

Beta coefficient is equal to zero ($H_0 : \beta_1 = 0$) and alpha coefficient is equal to zero ($H_0 : \beta_0 = 0$), beta coefficient is equal to one ($H_0 : \beta_1 = 1$), proposed by Fama & French (2004) and Schröder (2007), is tested. In addition, the spanning test proposed by Huberman & Kandel (1987) is performed. The spanning test will reveal whether the risk and return characteristics of Islamic indices are statistically different from the market portfolio. Coefficient tests are reported together with t / f statistics and probability values under the Wald Test heading (Fama & French, 2004, p. 34; Schröder, 2007, p. 338).

$$\sigma_p^2 = \beta_p^2 \sigma_I^2 + \sigma_{ep}^2$$

The total risk of a portfolio can be divided into two components as the systematic and non-systematic risk. The share of systematic and non-systematic risk in total risk can be calculated from the ($\sigma_p^2 = \beta_p^2 \sigma_I^2 + \sigma_{ep}^2$) (17) formula. This calculation can also be done with the help of the coefficient of determination ($Adj\ R^2$). Therefore, in this study, the share of the systematic risk in the total risk of the examined index is calculated to be equal to the coefficient of determination and the non-systematic risk ($1 - Adj\ R^2$).

Fama-French three-factor and Carhart four-factor models are used to determine the sensitivity of the indices to risk factors such as value, size, and momentum factors other than market risk premium. Because, according to empirical research, funds investing in small-cap, value, and low beta stocks tend to perform better independently of fund managers' ability (Fama & French, 2004). Therefore, the presentation of investment styles of Islamic indices has a critical importance in analyzing their performance.

Fama-French has extended the standard CAPM model to two new risk factors called value and size (Fama & French, 1992; Fama & French, 1993).

$$(R_i - R_f) = \alpha_i + \beta_{i1}(R_m - R_f) + \beta_{i2}HML + \beta_{i3}SMB + e_i \quad (18)$$

$HML = value\ factor$

$SMB = size\ factor$

The value factor is calculated as the difference between the asset portfolio with the higher BV / MV and the asset portfolio with the lower BV / MV using the relevant MSCI indices (BinMahfouz, 2012; BinMahfouz & Hassan, 2013). The positive and statistically significant β_{i2} coefficient indicates that the index has exposure to val-

ue stocks and the negative β_{i2} coefficient indicates that the index has exposure to growth stocks. According to finance theory, it is expected that value stocks will provide better returns.

HML = DLOG MSCI Value – DLOG MSCI Growth

The size factor used in this study is calculated as the return difference between the small-cap portfolio and the large-cap portfolio using the relevant MSCI indices (BinMahfouz, 2012; BinMahfouz & Hassan, 2013). The positive and statistically significant β_{i3} coefficient indicates that the examined index has exposure to small-cap stocks and the negative β_{i3} coefficient indicates that the examined index has exposure to large-cap stocks. It is expected that small-cap stocks will perform better.

SMB = DLOG MSCI Small Cap – DLOG MSCI Large Cap

Value and size factor premiums have been calculated for each country and term examined to ensure a healthy assessment of the Fama-French three-factor model results. Value factor premium is calculated by annualizing the difference between MSCI Value index return and MSCI Growth index return. In a similar manner, size factor premium is calculated by annualizing the return difference of the MSCI Small Cap index and MSCI Large Cap index.

Value Factor Premium = (*DLOG MSCI Value – DLOG MSCI Growth) * 12*
(19)

Size Factor Premium = *(DLOG MSCI Small Cap – DLOG MSCI Large Cap*) * 12

(20)

Adding the momentum factor to the Fama-French three-factor model, Carhart (1997) has developed another multi-factor model. The relevant MSCI index is used to represent the momentum factor, as in the Fama-French model. However, this index is only calculated for the USA and UK markets. For this reason, Carhart four-factor model has not been tested for the Turkish and Malaysian market (Carhart, 1997).

$$(R_i - R_f) = \alpha_i + \beta_{i1}(R_m - R_f) + \beta_{i2}HML + \beta_{i3}SMB + \beta_{i4}MOM + e_i \quad (21)$$

MOM = momentum factor

The positive and statistically significant β_{i4} coefficient indicates that there is momentum effect in the examined index.

Empirical Findings

As table 6 shows that, in the long run, mean return and standard deviation of Islamic indices in the USA is lower than conventional counterparts, higher in Malaysia and the UK. However, during the crisis period, Islamic indices have lower mean returns in Turkey and Malaysia and relatively higher returns in USA and UK markets. The skewness is negative for all examined indices. This implies that index returns are skewed to the left. Kurtosis, are above 3 in the long term. This means that the distribution of returns has thicker tail and sharp peak than the normal distribution. According to the JB test

statistic, index returns do not fit normal distribution in the long run but show the normal distribution in the sub-periods.

According to absolute return analysis results, Table 9 illustrates that the vast majority of Islamic indices provided higher average return than their conventional counterparts. According to Wald test results, the return difference between Islamic indices and their conventional counterparts is statistically significant only in Turkey and USA.

When standard deviations are examined in long-term, mixed results arise. Standard deviations of Islamic indices are lower than conventional counterparts in the USA; however, standard deviations are higher in Turkey, Malaysia, and the UK. Besides, the difference between the variances is statistically significant only in the DJIMTR index.

During the crisis period, Islamic indices examined in Turkey and Malaysia has lower average return than conventional counterparts. However, Islamic indices provided a relatively higher average return in USA and UK market in the crisis period. Moreover, in the case of the United States, the difference between Islamic and conventional index returns is statistically significant at the 1% confidence level. In general, in the crisis period, the standard deviations of Islamic indices are lower than conventional counterparts. The Islamic indices in the USA have a relatively lower standard deviation but have a relatively better return. As a result, there is not enough statistical evidence to reject sub-hypotheses 1 and 2 according to the findings obtained in this study.

The expected returns and standard deviations of Islamic indices also vary depending on the country and term studied. As a matter of fact, there are many cases that support this phenomenon both in our study and in other empirical studies Walkshäusl & Lobe (2012a) [emerging markets]; Boujelbène Abbes (2012) [emerging markets]; Al-Khazali et al. (2014); Rifqi (2016) find similar return / higher volatility. Girard & Hassan (2008) and Sherif (2016) find high return / high volatility. Kok et al., (2009) find low return low volatility.

The vast majority of Islamic indices have better risk-adjusted performance measures than their conventional counterparts in the long term. In the crisis period, only Islamic indices in the USA and UK case have performed better than their conventional counterparts. All Islamic indices perform poorly than their conventional counterparts in Turkey and Malaysia. However, the Sharpe ratio difference between Islamic indices and conventional equivalents is not found to be significant in any case. So, in general terms, sub-hypothesis 3 has not been rejected.

In the vast majority of empirical studies like (Girard & Hassan, 2008; Alam & Rajjaque, 2010; Hassan & Girard, 2010; Walkshäusl & Lobe, 2012b [developed markets]; Walkshäusl & Lobe, 2012a [developed markets]; Boujelbène Abbes, 2012 [developed markets]; Ashraf & Mohammad, 2014; Jawadi et al., 2014; Ho et al., 2014; Al-Khazali et al., 2014; Charfeddine et al., 2016; Sherif, 2016; Mohammad & Ashraf, 2015) researchers have come to the conclusion that, Islamic indices perform better than their conventional

counterparts. However, there are also claims in the literature that this situation is caused by the financial crisis of 2008 - 2009 and Islamic indices cannot be expected to sustain this superior performance.

As seen in table 7, alpha analysis results show that in general, Islamic indices have higher alpha values in the long run than their conventional counterparts. In some cases, there are substantial differences between the alpha values depending on single factor model and three-factor models. In these cases, Alpha values calculated according to the single factor and three-factor models give opposite results. However, very few of the alpha coefficients are statistically significant. That is, there is not enough statistical evidence to reject the sub-hypothesis 4.

The majority of empirical studies have found that Islamic indices have higher alpha values than conventional equivalents (Girard & Hassan, 2008; Alam & Rajjaque, 2010; Hassan & Girard, 2010; Walkshäusl & Lobe, 2012b [developed markets]; Boujelbène Abbes, 2012 [developed markets]; BinMahfouz & Hassan, 2013; Jawadi et al., 2014; Ho et al., 2014; Charfeddine et al., 2016; Sherif, 2016).

According to the results of risk analysis, beta coefficients of Islamic indices are lower than conventional counterparts in the long run. Conventional index betas, which are determined as the benchmark for comparison, are usually around 1.

Sub-hypotheses 5 and 6 are not rejected in many cases. In other words, it cannot be said that the systematic risk level of Islamic indices is statistically lower than the conventional counterparts. There is also insufficient evidence to suggest that Islamic indices have a different risk-return profile than the market portfolio.

However, in the vast majority of empirical studies on Islamic indices, it is concluded that Islamic indices have lower level of systematic risk than conventional counterparts (Alam & Rajjaque, 2010; Hassan & Girard, 2010; Ashraf & Mohammad, 2014; BinMahfouz & Hassan, 2013; Ho et al., 2014; Dewandaru et al., 2015; Ashraf & Mohammad, 2014; Sherif, 2016). It is claimed that in some studies Islamic indices have higher systematic risk than conventional counterparts (Girard & Hassan, 2008; Al-Khazali et al., 2014; Sherif, 2016; Mohammad & Ashraf, 2015).

In general, the share of non-systematic risks of Islamic indices in total risk is higher than in conventional counterparts. In the empirical studies examined, it has been found that the coefficients of determination of the Islamic indices are lower than the conventional indices (Sherif, 2016). Consequently, according to the findings obtained in this study, sub-hypotheses 7 cannot be rejected.

As table 8 illustrates that, value factor coefficients of the DJ Islamic indices are negative and statistically significant in the case of Malaysia, USA, and the UK. This finding applies only to the case of Malaysia and USA for MSCI Islamic indices. The size factor coefficients of DJ and MSCI Islamic indices are only negative and statistically significant in the case of Malaysia and England. In other words, the DJ and MSCI

Islamic indices have exposure to big cap and growth stocks in the case of Malaysia and the UK, and growth stocks in the USA.

The value and size factor coefficients of Islamic indices are positive and statistically significant in the case of Turkey. So unlike other cases, Islamic indices in Turkey have exposure to small-cap value stocks.

According to the results of the four-factor model, applied only for the case of USA and UK, there is no momentum effect in Islamic indices in long term. The momentum effect was only detected in USA case during the crisis period.

There are mixed results in the empirical literature on the momentum effect. Along with studies claiming that there is momentum effect in Islamic indices, there are also cases where this effect is not seen (Walkshäusl & Lobe, 2012b [developed markets]; Mohammad & Ashraf, 2015; Hassan & Girard, 2010; Ashraf & Mohammad, 2014).

Almost all of the studies examined in the literature have concluded that Islamic indices have exposure to growth stocks. In the meantime, Islamic indices have exposure small-cap stocks and vice versa in some cases (Walkshäusl & Lobe, 2012b [developing markets]; Walkshäusl & Lobe, 2012a; BinMahfouz & Hassan, 2013; Sherif, 2016; Mohammad & Ashraf, 2015; Hassan & Girard, 2010; Walkshäusl & Lobe, 2012b [developed markets]; Ashraf & Mohammad, 2014; Sherif, 2016).

When Islamic indices are evaluated in terms of investment style, the most obvious finding is that these indices have exposure to growth stocks and the investment style of these indices are changing depending on the country, the time period studied and the market conditions. As a result, the sub-hypothesis 9 is rejected in the long term, except Turkey. Nevertheless, important findings have been found in this study support the claim that Islamic indices are growth oriented. Indeed, sub-hypothesis 8 cannot be rejected in most cases, except Turkey. As mentioned earlier, the momentum effect is valid only in the USA. In this case, sub-hypothesis 10 cannot be rejected in the long run. Moreover, the prediction of Islamic index returns by multi-factor models has increased the coefficient of determination. This finding indicates that the value and size risk factors have explanatory power in evaluating the performance of Islamic indices.

There are mixed results during the crisis period as seen in table 9. Islamic indices have performed relatively better in comparison with conventional counterparts in the USA and UK, but they showed poor performance in Turkey and Malaysia. The most general conclusion that can be expressed according to these findings is that the performance of Islamic indices varies according to economic dynamics in times of crisis. So, sub-hypothesis 11 is not rejected in USA and UK, but it is rejected in Turkey and Malaysia.

However, there are important findings in the literature that Islamic indices perform better than conventional counterparts, especially during crisis periods (Alam & Rajjaque, 2010; Ashraf & Mohammad, 2014; Jawadi et al., 2014; Ho et al., 2014; Al-Khazali et

al., 2014; Sherif, 2016). The results of these studies are considerably due to the large-scale Islamic indices examined. Because large-scale Islamic indices give more weight to developed countries in their composition.

Discussion

In some cases, Islamic indices have provided higher return with lower standard deviation then their conventional counterparts. This fact shows that Islamic indices have not only mean-variance dominance in the relevant periods, but also have first order stochastic dominance. In such cases, the risk and return characteristics of Islamic indices should be assessed by stochastic dominance approach that considers all the moments of the return distribution, not only by the mean-variance analysis which considers only mean and variance (Walkshausl, 2012b: p. 55).

The first point that comes to mind in evaluating the risk and return characteristics of Islamic indices relates to the leverage of the shares in the composition of these indices. As a usual consequence of limiting the level of leverage in Islamic screening techniques to 30-33%, there are low leverage companies in the composition of these indices. According to empirical research on capital structure theories, high-profit firms tend to use less foreign resources. That is, leverage is inversely proportional to profitability (Fama & French, 2002; Myers, 1993). This phenomenon can be one of the reasons for the high performance of Islamic indices.

In finance literature, it is accepted that leverage has a positive relationship with systematic risk (Breen & Lerner, 1973; Hamada, 1972). It is evident that Islamic indices have lower beta coefficient than their conventional counterparts as mentioned before. Islamic screening criteria limit the financial risks of the companies included in these indices (Hayat & Kraeussl, 2011; Hoepner et al., 2011). For this reason, Islamic index returns are less sensitive to price movements in the market and beta coefficients are lower than conventional counterparts. This finding suggests that Islamic indices may be favored by traditional investors for the purpose of hedging.

In some cases, beta coefficients of Islamic indices are higher than conventional counterparts. This situation needs to be explained differently than the above. That is, beta can be decomposed into financial and operational risk components (Hamada, 1972; Rubinstein, 1973). Limiting the level of leverage in Islamic indices will limit financial risk anyway. However, in cases where the Islamic index betas are similar to conventional counterparts, it can be said that the relatively low level of financial risk may be offset by an increase in the level of operational risk (Dewandaru et al., 2015).

According to the capital market theory, only systematic risk determines expected return on assets. In other words, non-systematic risk has no place in pricing behavior. The violation of this phenomenon means overpricing or underpricing of risk (Sharpe, 1964). As previously stated, it has been found that Islamic indices provide higher return with lower beta and volatility in some cases. This means that

the risk of the relevant Islamic index is highly priced. It means that investors obtained more return than they should have been.

Another explanation for pricing errors is the possibility that Islamic screening has chosen undervalued stocks independently of the original intent. These assets, which are not considered for different reasons or escaped the attention of fund managers, could have caused the Islamic indices to provide an abnormal return (Dewandaru et al., 2015).

One of the reasons that Islamic indices provide high returns with low risk may be related to their investment style. For example, MSCITRIS index performs better than its conventional counterpart. This may have been due to the high performance of value and small stocks in its composition. An another example is MSCIUKIS index. This index is outperformed its benchmark and growth-oriented. But, in UK case, the long-term expected return of growth stocks is higher and big cap stocks are lower. Hence,

Table 2
Value and Size Factor Premium and Standard Deviation Difference (Turkey)

	HML		SMB	
Time Period	% $\Delta\bar{R}_p$	% $\Delta\sigma_p$	% $\Delta\bar{R}_p$	% $\Delta\sigma_p$
February 2006-March 2017	0.12	2.63	0.60	0.41
February 2006-October 2007	3.36	-4.29	-8.04	-1.38
May 2002-March 2017	3.12	3.70	1.80	-3.98
November 2002-October 2007	10.20	1.83	-7.92	-5.12
January 2008-June 2010	3.60	6.40	2.40	4.98
July 2010-June 2015	0.12	1.59	2.88	-2.11

Table 3
Value and Size Factor Premium and Standard Deviation Difference (Malaysia)

	HML		SMB	
Time Period	% $\Delta\bar{R}_p$	% $\Delta\sigma_p$	% $\Delta\bar{R}_p$	% $\Delta\sigma_p$
February 2007-March 2017	3.12	-3.29	1.20	6.51
December 2003-March 2017	2.16	-2.77	-0.36	5.68
December 2003-October 2007	-0.60	-1.80	-1.80	4.19
May 2002-March 2017	1.68	-2.35	-0.72	4.91
November 2002-October 2007	-0.60	-1.87	-1.56	2.87
January 2008-June 2010	0.87	-5.09	-2.52	9.35
July 2010-June 2015	0.12	-2.70	1.08	5.09

Table 4
Value and Size Factor Premium and Standard Deviation Difference (USA)

	HML		SMB	
Time Period	% $\Delta\bar{R}_p$	% $\Delta\sigma_p$	% $\Delta\bar{R}_p$	% $\Delta\sigma_p$
May 2002-March 2017	-0.60	0.24	2.04	4.84
November 2002-October 2007	3.96	1.03	4.68	6.09
January 2008-June 2010	-2.40	0.24	7.08	7.41
July 2010-June 2015	-3.00	-0.72	0.72	3.98

Table 5
Value and Size Factor Premium and Standard Deviation Difference (UK)

	HML		SMB	
Time Period	% $\Delta\bar{R}_p$	% $\Delta\sigma_p$	% $\Delta\bar{R}_p$	% $\Delta\sigma_p$
May 2002-March 2017	-0.12	2.00	4.32	3.81
November 2002-October 2007	3.96	1.21	7.32	5.02
January 2008-June 2010	-6.24	2.97	5.52	6.02
July 2010-June 2015	1.44	-0.10	8.04	2.21

it is unlikely that this index has performed well due to the growth and big cap stocks in its composition.

The reason why Islamic indices are growth-oriented is explained different viewpoints in the literature. In one view, the screening out of value stocks in banking, chemicals, energy and basic materials sectors makes these indices more oriented to growth stocks (Girard & Hassan, 2008, p. 118).

One of the arguments put forward in the literature is that since large-cap stocks will be eliminated by screening practices, small-cap stocks will remain in the composition of Islamic indices (Hoepner et al., 2011; Mohammad & Ashraf, 2015). However, if the case of Turkey exempt, especially Islamic indices studied in UK and Malaysia is big cap oriented.

There are remarks in the literature that Islamic indices perform better during crisis periods because there are no financial companies that are experiencing significant losses in the composition of Islamic indices (Alam & Rajjaque, 2010).

Alam and Rajjaque (2010) compared the performance of Islamic portfolio with an unrestricted conventional portfolio as well as another conventional portfolio from which the financial sector stocks were extracted. According to the findings of this research, Islamic portfolio outperformed both conventional portfolios during the financial crisis period (Alam & Rajjaque, 2010: p. 237; Ashraf, 2016).

Enron, WorldCom, Tyco and Global Crossing shares have been removed from Islamic indices between 2007 and 2012, due to the leverage threshold. For this reason, Islamic indices have not been affected by the disembarkment of the listed companies. So, this phenomenon may have caused Islamic indices to perform better than conventional indices.

Implications

The main purpose of this study is to analyze the risk and return characteristics of Islamic indices. In line with this objective and above mentioned research questions, the following basic hypotheses have been developed.

Hypotheses 1: There is no difference between Islamic indices and conventional counterparts in terms of risk and return characteristics.

Hypotheses 2: Islamic investors bear additional costs.

According to the empirical findings, there are noticeable differences between the risk and return characteristics of Islamic indices and their conventional counterparts depending on the country, index type and time period studied. However, most of these findings are not statistically significant. There is therefore insufficient statistical evidence to reject the basic hypothesis 1. Therefore, in technical terms, this study concludes that there are no statistically significant differences between the risk and return characteristics of Islamic indices and their conventional counterparts.

In terms of investors, the meaning of these findings is expressed in the basic hypothesis 2. This study found some evidence supporting the claim that Islamic indices do not have an optimal risk-return profile. However, if the performance of Islamic indices is taken into account, they are not performing poorly than their conventional counterparts. Therefore, although there is no strong statistical evidence to reject the basic hypothesis 2, it is seen that the Islamic index investors have not incurred additional costs in the period examined.

Consequently, according to the findings obtained in this study, investors investing in Islamic indices due to their religious beliefs cannot be claimed to face disadvantaged financial results (BinMahfouz & Hassan, 2013). It is even possible that the Islamic index investors may obtain abnormal returns because of mispricing in some time periods (Dewandaru et al., 2015).

Conventional investors, especially socially responsible investors, may invest in Islamic indices. Because, there are no statistically significant differences between the risk and return characteristics of Islamic indices and their conventional counterparts (BinMahfouz & Hassan, 2013, p. 175).

There are significant differences in the risk and return characteristics of Islamic indices and conventional counterparts between developed and developing countries, supported by sufficient findings in the literature (Mohammad & Ashraf, 2015; Walkshäusl & Lobe, 2012b).

Market value and total assets used as divisors in screening techniques affect the risk and return characteristics of Islamic indices (Ashraf, 2016; Ashraf & Mohammad, 2014; Mohammad & Ashraf, 2015).

The fact that Islamic index betas are lower than conventional counterparts, especially in times of economic crisis, indicates that Islamic indices can be used for the purpose of hedging by conventional investors (Ashraf & Mohammad, 2014).

From the information that index providers have published, Islamic indices seem to give more weight to the energy and basic materials sectors. In some previous empirical researches, it is understood that about 40% of the Islamic indices originate from these sectors (Walkshäusl & Lobe, 2012a). This phenomenon is one of the important reasons for the variability in risk and return characteristics of Islamic indices. Because the varying performance of the above-mentioned sectors affects the performance of Islamic indices.

Constraints

The most important constraint for this research is that limited historical data of Islamic indices due to the very short history. As known, even the history of the DJ family dates back to the late 1990s.

Islamic indices have different purification practices. The purification ratio, which is fixed in some indices, may change periodically in others. In most cases, purification ratios are not reached serially. Due to the lack of a standard method between index providers and difficulties in applications, the purification process is ignored in this study. So, it is assumed that purification does not affect the index performance.

The MSCI momentum indices, which is used as the momentum risk factor in the four-factor model, is calculated for only two of the four countries examined (USA and UK). Thus Carhart four-factor model has not been applied in Turkey and Malaysia.

Conclusion

In this study where the risk and return characteristics of Islamic indices are analyzed, Islamic index data collected from four countries (Turkey, Malaysia, USA, and the UK) and two index provider (DJ and MSCI) are used. Several ratio analyzes have been applied along with single and multi-factor asset pricing models within the framework of mean-variance analysis.

According to the empirical findings, there are noticeable differences between the risk and return characteristics of Islamic indices and their conventional counterparts depending on the country, index type and time period studied. However, most of these findings are not statistically significant. Therefore, in technical terms, this study concludes that there are no statistically significant differences between the risk and return characteristics of Islamic indices and their conventional counterparts.

This study found some evidence supporting the claim that Islamic indices do not have an optimal risk-return profile. However, if the performance of Islamic indices is taken into account, they are not performing poorly than their conventional counterparts. So, it is seen that Islamic index investors have not born additional costs in the period examined.

Consequently, according to the findings obtained in this study, investors investing in Islamic indices due to their religious beliefs cannot be claimed to face disadvantaged financial results. It is even possible that the Islamic index investors may obtain abnormal returns because of mispricing in some time periods.

The fact that there are no statistically significant differences between the risk and return characteristics of Islamic indices and their conventional counterparts indicates that conventional investors may invest in Islamic indices and Islamic indices can be used for the purpose of hedging in times of crises.

Market value and total assets used as divisors in screening techniques affect the risk and return characteristics of Islamic indices. There are also significant differences in the

risk and return characteristics of Islamic indices and conventional counterparts between developed and developing countries.

There is no doubt that empirical research on Islamic indices that began at the end of the nineties will continue at a rising speed. In order to fully demonstrate the effect of Islamic screening techniques on index performance, studies on large-scale samples are needed.

References

Alam, N., & Rajjaque, M. S. (2010). Shariah-compliant equities: Empirical evaluation of performance in the European market during credit crunch. *Journal of Financial Services Marketing*, 15(3), 228–240.

Al-Khazali, O., Lean, H. H., & Samet, A. (2014). Do Islamic stock indexes outperform conventional stock indexes?: A stochastic dominance approach. *Pacific-Basin Finance Journal*, 28:29–46.

Ashraf, D. (2016). Does Shari'ah screening cause abnormal returns?: Empirical evidence from Islamic equity indices. *Journal of Business Ethics*, *134*(2), 209–228.

Ashraf, D., & Mohammad, N. (2014). Matching perception with the reality?: Performance of Islamic equity investments. *Pacific-Basin Finance Journal*, *28*, 175–189.

Bauer, R., Otten, R., & Rad, A. T. (2006). Ethical investing in Australia: Is there a financial penalty? *Pacific-Basin Finance Journal*, *14*(1), 33–48.

BinMahfouz, S. S. (2012). *Investment characteristics of Islamic investment portfolios: Evidence from Saudi mutual funds and global indices*. Ph.D. Dissertation, Durham University. Retrieved from http://etheses.dur.ac.uk/4440/

BinMahfouz, S., & Hassan, M. K. (2013). Sustainable and socially responsible investing: Does Islamic investing make a difference? *Humanomics*, *29*(3), 164–186.

Boujelbène Abbes, M. (2012). Risk and return of Islamic and conventional indices. *International Journal of Euro-Mediterranean Studies*, 5(1), 1–23.

Breen, W. J., & Lerner, E. M. (1973). Corporate financial strategies and market measures of risk and return. *The Journal of Finance*, *28*(2), 339–351.

Carhart, M. M. (1997). On persistence in mutual fund performance. *The Journal of Finance*, 52(1), 57–82.

Charfeddine, L., Najah, A., & Teulon, F. (2016). Socially responsible investing and Islamic funds: New perspectives for portfolio allocation. *Research in International Business and Finance,* 36, 351–361.

Dewandaru, G., Bacha, O. I., Masih, A. M. M., & Masih, R. (2015). Risk-return characteristics of Islamic equity indices: Multi-timescales analysis. *Journal of Multinational Financial Management*, *29*, 115–138.

Erragraguy, E., & Revelli, C. (2015). Should Islamic investors consider SRI criteria in their investment strategies? *Finance Research Letters,* 14, 11–19.

Fama, E. F., & French, K. R. (1992). The cross-section of expected stock returns. *The Journal of Finance*, 47(2), 427–465.

Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, 33(1), 3–56.

Fama, E. F., & French, K. R. (2002). Testing tradeoff and pecking order predictions about dividends and debt. *Review of Financial Studies*, *15*(1), 1-33.

Fama, E. F., & French, K. R. (2004). The capital asset pricing model: Theory and evidence. *Journal of Economic Perspectives*, *18*(3), 25–46.

Girard, E., & Hassan, M. K. (2008). Is there a cost to faith-based investing: Evidence from FTSE Islamic indices. *The Journal of Investing*, *17*(4), 112–121.

Hamada, R. S. (1972). The effect of the firm's capital structure on the systematic risk of common stocks. *The Journal of Finance*, *27*(2), 435–452.

Hassan, M. K., & Girard, E. (2010). Faith-based ethical investing: The case of Dow Jones Islamic Indexes. *Islamic Economic Studies*, 17(2), 1-31.

Hayat, R. & Kraeussl, R. (2011). Risk and return characteristics of Islamic equity funds, *Emerging Markets Review*, 12(2), 189-203.

Ho, C. S. F., Abd Rahman, N. A., Yusuf, N. H. M., & Zamzamin, Z. (2014). Performance of global Islamic versus conventional share indices: International evidence. *Special Issue on Islamic Banking and Finance,* 28(0), 110–121.

Hoepner, A. G. F., Rammal, H. G., & Rezec, M. (2011). Islamic mutual funds' financial performance and international investment style: Evidence from 20 countries. *The European Journal of Finance*, 17(9-10), 829-850.

Huberman, G. U., & Kandel, S. (1987). Mean-variance spanning. *The Journal of Finance*, *42*(4), 873–888.

Ismath Bacha, O., & Mirakhor, A. (2013). *Islamic capital markets: A comparative approach*. Wiley finance series. Singapore: Wiley.

Jawadi, F., Jawadi, N., & Louhichi, W. (2014). Conventional and Islamic stock price performance: An empirical investigation. *International Economics*, 137, 73–87.

Jensen, M. C. (1968). The performance of mutual funds in the period 1945-1964. *The Journal of Finance*, 23(2), 389–416.

Jobson, J. D., & Korkie, B. M. (1981). Performance hypothesis testing with the Sharpe and Treynor measures. *The Journal of Finance*, *36*(4), 889-908.

Kok, S., Giorgioni, G., & Laws, J. (2009). Performance of Shariah-Compliant indices in London and NY stock markets and their potential for diversification. *International Journal of Monetary Economics and Finance*, *2*(3/4), 398-408.

Merdad, H. J., Hassan, M. K., Hippler, W. J. (2015). The Islamic risk factor in expected stock returns: An empirical study in Saudi Arabia, *Pacific-Basin Finance Journal*, 34, 293-314.

Mohammad, N., & Ashraf, D. (2015). The market timing ability and return performance of Islamic equities: An empirical study. *Pacific-Basin Finance Journal*, *34*, 169–183.

Myers, S. C. (1993). Still searching for optimal capital structure. *Journal of Applied Corporate Finance*, *6*(1), 4–14.

NBER. (2012). US Business Cycle Expansions and Contractions. Retrieved May 5, 2017, from http://www.nber.org/cycles/US_Business_Cycle_Expansions_and_Contractions_20120423.pdf

Proffitt, D., & Taylor, K. L. (1985). Evaluating negative composite performance scores. *Journal of Financial Education*, 14, 17–21.

Renneboog, L., Ter Horst, J., & Zhang, C. (2008). The price of ethics and stakeholder governance: The performance of socially responsible mutual funds. *Special Issue: Contractual Corporate Governance*, *14*(3), 302–322.

Rifqi, M. (2016). The cost of Sharia investing: Comparative empirical study in Indonesian stock market. *Journal of Emerging Economies and Islamic Research*, *4*(1), 1-13.

Rubinstein, M. E. (1973). A mean-variance synthesis of corporate financial theory. *The Journal of Finance*, *28*(1), 167–181.

S&P Global. (2016). S&P 500 Shariah Fact Sheet. Retrieved April 4, 2017, from https://us.spindices.com/indices/equity/sp-500-shariah-index

Sauer, D. A. (1997). The impact of social-responsibility screens on investment performance: Evidence from the Domini 400 social index and Domini Equity Mutual Fund. *Review of Financial Economics*, *6*(2), 137–149.

Schröder, M. (2007). Is there a difference?: The performance characteristics of SRI equity indices. *Journal of Business Finance & Accounting*, *34*(1-2), 331–348.

Securities Commission Malaysia. (2017). List of Shariah-compliant securities. Retrieved from https://www.sc.com.my/wp-content/uploads/eng/html/icm/sas/sc_syariahcompliant_170526.pdf

Sharpe, W. F. (1964). Capital Asset Prices: A theory of market equilibrium under conditions of risk. *The Journal of Finance*, 19(3), 425–442.

Sherif, M. (2016). Ethical Dow Jones indexes and investment performance: International evidence. *Investment Management and Financial Innovations*, 13(2(1)), 206–225.

Sortino, F. A., & van der Meer, R. (1991). Downside risk. *The Journal of Portfolio Management*, 17(4), 27–31.

Walkshäusl, C., & Lobe, S. (2012a). Islamic equity investing: Alternative performance measures and style analysis. *Journal of Investing*, *21*(4), 182–189.

Walkshäusl, C., & Lobe, S. (2012b). Islamic investing. *Review of Financial Economics*, *21*(2), 53–62.

Table 6
Descriptive statistics

Country	Indice	Islamic					Conventional				
		Mean	Std. Dev.	Skew.	Kurt.	JB	Mean	Std. Dev.	Skew.	Kurt.	JB
Long Term (May 2002-March 2017, 179 Observations)											
Turkey	DJ	0.6428	6.1503	-0.7448	4.1541	19.6790***	0.7201	7.7863	-0.2409	3.9461	6.2467**
	MSCI	1.5028	9.1141	-0.0773	5.4108	43.2824***	1.2990	8.8435	-0.2024	3.6089	3.9655
Malaysia	DJ	0.8616	3.8958	-0.8284	6.0189	78.5618***	0.7689	3.7881	-0.7788	6.9542	119.659***
	MSCI	0.8827	4.2116	-0.6216	7.2873	147.786***	0.7057	3.7922	-0.4399	5.7400	61.4198***
USA	DJ	0.6317	4.1278	-0.7843	4.7736	41.5764***	0.6565	4.2763	-0.9478	5.3951	69.1966***
	MSCI	0.6094	3.9601	-0.8481	5.0266	51.7994***	0.6226	4.2017	-0.9509	5.4267	70.5040***
UK	DJ	0.5827	4.1271	-0.8228	4.3583	33.7662***	0.5509	4.0409	-0.8752	4.3291	35.8281***
	MSCI	0.5708	4.1770	-0.7417	4.3079	29.0052***	0.4996	4.0239	-0.8270	4.1239	29.6593***
Pre-Crisis (November 2002-October 2007, 60 Observations)											
Turkey	DJ	0.4913	5.7073	-0.7181	3.5896	2.0086	1.4160	6.3210	-0.5953	2.9008	1.1896
	MSCI	2.6154	10.4355	0.2616	5.9514	22.4611***	3.0107	9.8079	-0.3668	3.7169	2.6303
Malaysia	DJ	2.0966	3.6893	-0.2152	3.4442	0.7332	1.6075	3.6600	-0.4226	3.4279	1.7200
	MSCI	1.8473	4.5673	0.2751	4.1831	4.2561	1.5221	3.8437	0.1635	3.3430	0.5614
USA	DJ	1.1275	2.8245	-0.3946	3.0074	1.5570	1.1809	2.6996	-0.1201	2.9080	0.1654
	MSCI	1.1119	2.6468	-0.2719	3.0072	0.7393	1.0983	2.6205	-0.0803	3.2732	0.2511
UK	DJ	1.2189	2.8610	-0.7585	3.8817	7.6960**	1.2059	2.8443	-1.0296	5.9259	32.0036***
	MSCI	1.2258	2.8714	-0.8364	3.9763	9.3790***	1.1382	2.8072	-1.0431	5.8164	30.7109***
Crisis Period (January 2008-June 2010, 30 Observations)											
Turkey	DJ	0.2458	9.2257	-0.6702	2.7565	2.3203	0.3764	11.8797	-0.1707	2.7564	0.2199
	MSCI	-0.7131	11.5892	-0.5573	2.6881	1.6746	0.0464	11.7322	-0.2274	2.6623	0.4012
Malaysia	DJ	-0.5396	6.0301	-0.6892	3.6521	2.9069	-0.1738	5.8387	-0.5979	4.9460	6.5209**
	MSCI	-0.4590	6.1357	-1.2260	5.3702	14.5376***	-0.1478	5.5062	-0.5007	4.5238	4.1563
USA	DJ	-0.8095	6.0448	-0.7292	3.0076	2.6589	-0.9081	6.8267	-0.6395	2.9588	2.0470
	MSCI	-0.7200	5.7485	-0.7962	3.1687	3.2054	-0.9800	6.6314	-0.6292	2.9182	1.9875
UK	DJ	-0.2622	5.9438	-0.7088	3.0651	2.5171	-0.5158	6.1156	-0.3631	2.2849	1.2985
	MSCI	-0.2951	6.2654	-0.6241	2.7567	2.0216	-0.5641	6.0702	-0.3184	2.1299	1.4531
Post-Crisis (July 2010-June 2015, 60 Observations)											
Turkey	DJ	0.9183	4.6992	-0.6628	3.1404	4.4417	0.7909	6.5389	-0.0913	2.1991	1.6870
	MSCI	1.4756	6.5181	-0.5327	2.9458	2.8455	0.8232	6.6093	-0.0612	2.2410	1.4777
Malaysia	DJ	0.7169	2.7562	-0.2865	3.3513	1.1294	0.6860	2.7404	-0.2662	3.8409	2.4765
	MSCI	0.9158	2.8217	-0.2778	3.2011	0.8730	0.6273	2.6959	-0.2207	3.4611	1.0188
USA	DJ	1.2762	3.5488	-0.0201	3.4206	0.4463	1.3448	3.5606	-0.1577	3.5241	0.9354
	MSCI	1.2214	3.4334	-0.0917	3.7296	1.4151	1.3457	3.4463	-0.1448	3.3826	0.5757
UK	DJ	0.6656	3.8211	-0.2642	3.3478	1.0003	0.8464	3.3945	-0.2217	2.9350	0.5019
	MSCI	0.6589	3.7105	-0.0805	3.2299	0.1969	0.7659	3.3748	-0.1989	2.9104	0.4155

Note: ***, **, and * indicate that the null hypothesis is rejected at the 1%, 5%, and 10% significance levels in the Jarque-Bera (JB) test, respectively. Long-term for Turkey and Malaysia is (February 2006-March 2017, 134 Observations), (December 2003-March 2017, 160 Observations) and the pre-crisis period is (February 2006-October 2007, 21 observations), (December 2003-October 2007, 47 observations) respectively.

Table 7
Single Factor Model Findings

Country	Indice	Islamic							Conventional						
		Jensen Alpha (%)	Beta	Adj. R^2	i.	ii.	Syst. Risk (%)	Non-Syst. Risk (%)	Jensen Alpha (%)	Beta	Adj. R^2	i.	ii.	Syst. Risk (%)	Non-Syst. Risk (%)
Long Term															
Turkey	DJ	0.31 (0.9344)	0.73 [16.5081] (**0.0000**)	0.66	[-5.8184] (**0.0000**)	[17.3627] (**0.0000**)	66.0	34.0	2.21 (0.3872)	1.04 [39.9594] (0.0000)	0.82	[1.6349] (0.1045)	[1.6613] (0.1939)	82.7	17.3
	MSCI	2.82 (0.5926)	0.87 [14.2393] (**0.0000**)	0.58	[-2.0996] (**0.0372**)	[2.3114] (0.1021)	58.8	41.2	-0.01 (0.9968)	1.04 [61.5612] (0.0000)	0.88	[2.4237] (0.0164)	[2.9956] (0.0526)	88.8	11.2
Malaysia	DJ	1.47 (0.3985)	0.94 [23.8027] (**0.0000**)	0.83	[-1.3179] (0.1894)	[0.9948] (0.3721)	83.9	16.1	0.14 (0.7495)	0.99 [76.9226] (0.0000)	0.98	[-0.2610] (0.7944)	[0.0615] (0.9403)	98.1	1.9
	MSCI	1.82 (0.3186)	0.97 [14.7148] (**0.0000**)	0.81	[-0.4241] (0.6720)	[0.5185] (0.5963)	81.2	18.8	-0.24 (0.6112)	0.96 [74.5907] (0.0000)	0.97	[-3.0481] (0.0027)	[4.9305] (0.0083)	97.8	2.2
USA	DJ	0.39 (0.6548)	0.96 [34.7908] (**0.0000**)	0.95	[-1.2716] (0.2052)	[0.8198] (0.4422)	95.3	4.7	0.36 (0.2725)	1.02 [94.4516] (0.0000)	0.99	[1.8887] (0.0606)	[3.5819] (0.0299)	99.2	0.8
	MSCI	0.39 (0.6751)	0.91 [32.3693] (**0.0000**)	0.94	[-2.8278] (**0.0052**)	[4.3472] (**0.0144**)	94.1	5.9	0.03 (0.7918)	1.00 [227.3661] (0.0000)	0.99	[1.3168] (0.1896)	[1.8151] (0.1659)	99.8	0.2
UK	DJ	0.57 (0.6966)	0.93 [24.4705] (**0.0000**)	0.84	[-1.6253] (0.1059)	[1.3268] (0.2679)	84.4	15.6	-0.09 (0.5617)	1.00 [234.5237] (0.0000)	0.99	[0.0690] (0.9450)	[0.2133] (0.8081)	99.8	0.2
	MSCI	0.41 (0.7876)	0.93 [23.0784] (**0.0000**)	0.82	[-1.4755] (0.1418)	[1.1002] (0.3351)	82.8	17.2	-0.67 (0.0664)	0.99 [102.9301] (0.0000)	0.99	[-0.8475] (0.3979)	[3.2540] (0.0410)	99.0	1.0
Pre-Crisis															
Turkey	DJ	-3.06 (0.6369)	0.86 [8.4940] (**0.0000**)	0.71	[-1.3657] (0.1888)	[0.9394] (0.4092)	71.6	28.4	9.54 (0.0940)	1.04 [17.3843] (0.0000)	0.86	[0.7693] (0.4517)	[1.5863] (0.2320)	86.9	13.1
	MSCI	-1.14 (0.8899)	0.93 [12.8108] (**0.0000**)	0.70	[-0.9465] (0.3478)	[0.4773] (0.6228)	70.7	29.3	2.28 (0.3669)	1.02 [45.0062] (0.0000)	0.97	[1.1604] (0.2506)	[0.9432] (0.3952)	97.1	2.9
Malaysia	DJ	9.17 (**0.0015**)	0.88 [13.0354] (**0.0000**)	0.77	[-1.7229] (**0.0919**)	[7.7075] (**0.0013**)	77.7	22.3	2.10 (0.1131)	0.96 [25.2816] (0.0000)	0.94	[-0.9001] (0.3729)	[1.3939] (0.2588)	94.9	5.1
	MSCI	3.27 (0.2796)	1.05 [12.7788] (**0.0000**)	0.78	[0.6743] (0.5028)	[0.8063] (0.4514)	78.7	21.3	0.38 (0.6821)	0.98 [46.3929] (0.0000)	0.97	[-0.5595] (0.5779)	[0.2082] (0.8126)	97.7	2.3
USA	DJ	0.19 (0.8968)	1.03 [16.1340] (**0.0000**)	0.90	[0.5351] (0.5946)	[0.2477] (0.7813)	90.4	9.6	0.84 (0.1160)	1.03 [53.8992] (0.0000)	0.98	[1.7434] (0.0865)	[3.7387] (0.0297)	98.3	1.7
	MSCI	0.58 (0.5935)	0.97 [22.8305] (**0.0000**)	0.91	[-0.5487] (0.5853)	[0.2177] (0.8050)	91.9	8.1	0.09 (0.6076)	1.00 [233.1018] (0.0000)	0.99	[2.2195] (0.0304)	[3.5378] (0.0355)	99.8	0.2
UK	DJ	1.04 (0.6050)	0.87 [18.9811] (0.0000)	0.75	[-2.6526] (**0.0103**)	[3.5982] (**0.0336**)	75.9	24.1	-0.36 (0.1056)	0.99 [160.2324] (0.0000)	0.99	[-0.1887] (0.8509)	[1.6412] (0.2026)	99.8	0.2
	MSCI	0.99 (0.6065)	0.89 [20.7857] (0.0000)	0.77	[-2.5565] (**0.0132**)	[3.2760] (**0.0449**)	77.7	22.3	-0.97 (0.0443)	0.97 [89.8996] (0.0000)	0.98	[-1.8655] (0.0672)	[3.8623] (0.0266)	98.6	1.4
Crisis Period															

Turkey	DJ	-2.22 (0.8761)	0.72 [8.6308] (**0.0000**)	0.53	[-3.2787] (**0.0028**)	[5.9815] (**0.0069**)	53.0	47.0	2.10 (0.8299)	1.07 [20.2260] (0.0000)	0.71	[1.3903] (0.1754)	[0.9692] (0.3917)	71.9	28.1
	MSCI	-13.14 (0.5535)	0.79 [6.1583] (**0.0000**)	0.40	[-1.5415] (0.1344)	[2.3944] (0.1097)	40.2	59.8	-2.03 (0.8487)	1.05 [23.5029] (0.0000)	0.70	[1.1682] (0.2526)	[0.7014] (0.5044)	70.6	29.4
Malaysia	DJ	-5.41 (0.1868)	0.98 [23.3248] (**0.0000**)	0.89	[-0.3812] (0.7059)	[1.0229] (0.3726)	89.5	10.5	-0.95 (0.3122)	1.00 [64.1263] (0.0000)	0.99	[0.2002] (0.8427)	[0.6374] (0.5361)	99.6	0.4
	MSCI	-4.46 (0.4364)	0.97 [8.8614] (**0.0000**)	0.85	[-0.1978] (0.8446)	[0.3181] (0.7301)	85.4	14.6	-0.87 (0.5306)	0.94 [48.6840] (0.0000)	0.98	[-2.9619] (0.0062)	[4.7847] (0.0163)	98.7	1.3
USA	DJ	0.72 (0.7957)	0.89 [23.0180] (0.0000)	0.95	[-2.7987] (**0.0092**)	[4.5184] (**0.0199**)	95.1	4.9	1.32 (0.0899)	1.02 [75.4891] (0.0000)	0.99	[2.0967] (0.0452)	[5.7521] (0.0081)	99.6	0.4
	MSCI	1.14 (0.6665)	0.84 [23.1859] (0.0000)	0.93	[-4.3563] (**0.0002**)	[10.0598] (**0.0005**)	93.7	0.3	0.09 (0.8172)	1.00 [105.2137] (0.0000)	0.99	[0.0831] (0.9343)	[0.0726] (0.9301)	99.9	0.1
UK	DJ	2.06 (0.6753)	0.88 [12.8206] (0.0000)	0.83	[-1.7332] (**0.0941**)	[1.5657] (0.2267)	83.1	16.9	-0.02 (0.9601)	0.99 [150.7831] (0.0000)	0.99	[-1.1210] (0.2718)	[0.9274] (0.4074)	99.9	0.1
	MSCI	2.00 (0.7064)	0.91 [11.2610] (0.0000)	0.81	[-0.9847] (0.3332)	[0.5074] (0.6075)	81.6	18.4	-0.69 (0.4943)	0.98 [54.6171] (0.0000)	0.99	[-0.9611] (0.3447)	[1.4551] (0.2505)	99.4	0.6
Post-Crisis Period															
Turkey	DJ	2.94 (0.2741)	0.66 [14.7980] (**0.0000**)	0.80	[-7.4010] (**0.0000**)	[27.4461] (**0.0000**)	80.3	19.7	0.91 (0.6680)	1.01 [69.5881] (0.0000)	0.95	[0.7254] (0.4711)	[0.4082] (0.6667)	95.8	4.2
	MSCI	9.54 (**0.0976**)	0.72 [8.8989] (**0.0000**)	0.49	[-3.3238] (**0.0015**)	[5.5677] (**0.0061**)	49.4	50.6	1.29 (0.5789)	1.01 [57.7681] (0.0000)	0.94	[0.8402] (0.4042)	[0.5206] (0.5969)	94.6	5.4
Malaysia	DJ	0.26 (0.8699)	0.93 [14.2562] (0.0000)	0.83	[-1.0578] (0.2945)	[0.6023] (0.5509)	83.5	16.5	-0.54 (0.2040)	1.00 [66.1881] (0.0000)	0.99	[0.4365] (0.6641)	[0.8301] (0.4411)	99.1	0.9
	MSCI	2.55 (0.2893)	0.94 [13.8864] (**0.0000**)	0.82	[-0.7566] (0.4523)	[0.5824] (0.5618)	82.8	17.2	-1.07 (0.1166)	0.97 [38.0909] (0.0000)	0.96	[-0.9452] (0.3485)	[1.6429] (0.2023)	96.2	3.8
USA	DJ	-1.08 (0.1969)	1.02 [77.4063] (0.0000)	0.97	[1.9220] (**0.0595**)	[2.1481] (0.1259)	97.8	2.2	-0.42 (0.4703)	1.03 [68.9493] (0.0000)	0.99	[2.3980] (0.0197)	[4.6642] (0.0132)	99.2	0.8
	MSCI	-1.06 (0.3243)	0.98 [36.5096] (0.0000)	0.95	[-0.6430] (0.5227)	[0.7190] (0.4915)	95.9	4.1	0.06 (0.7326)	1.00 [296.3431] (0.0000)	0.99	[1.7723] (0.0816)	[2.9224] (0.0618)	99.9	0.1
UK	DJ	-3.15 (**0.0542**)	1.09 [31.3411] (0.0000)	0.92	[2.7692] (**0.0075**)	[5.1967] (**0.0084**)	92.3	7.7	-0.17 (0.4641)	1.01 [167.9016] (0.0000)	0.99	[2.1157] (0.0387)	[2.7148] (0.0746)	99.8	0.2
	MSCI	-2.77 (0.2204)	1.04 [26.7414] (0.0000)	0.89	[1.2526] (0.2154)	[1.5910] (0.2125)	89.5	10.5	-1.04 (0.1105)	1.00 [76.2947] (0.0000)	0.99	[0.2244] (0.8232)	[1.8666] (0.1608)	99.0	1.0

Note: [ ] indicates the t / F statistics, and ( ) indicates the probability value. The hypothesis H_0: $\beta_1 = 1$ is tested in the first column (i), and H_0: $\beta_0 = 0$, H_0: $\beta_1 = 1$ is the second column (ii).

Table 8
Three and Four Factor Model Findings

Country	Indice	Islamic						Conventional					
		FF Alpha (%)	Beta	HML	SMB	MOM	Adj. R^2	FF Alpha (%)	Beta	HML	SMB	MOM	Adj. R^2
Long Term													
Turkey	DJ	0.33 (0.9230)	0.75 [15.9370] (**0.0000**)	0.12 [1.4074] (0.1617)	0.26 [2.8263] (**0.0055**)	-	0.70	2.20 (0.3969)	1.00 [37.0490] (0.0000)	0.26 [4.1225] (0.0001)	-0.12 [-1.1477] (0.2532)	-	0.84
	MSCI	1.31 (0.8127)	0.86 [13.8481] (**0.0000**)	0.38 [2.5979] (**0.0102**)	0.21 [2.6176] (**0.0096**)		0.62	-0.22 (0.9263)	1.00 [55.6399] (0.0000)	0.15 [2.2859] (0.0235)	-0.10 [-1.7752] (0.0776)	-	0.89
Malaysia	DJ	1.91 (0.1810)	0.95 [24.9271] (**0.0000**)	-0.24 [-2.2689] (**0.0247**)	-0.17 [-3.9404] (**0.0001**)	-	0.86	0.29 (0.5333)	0.98 [67.9446] (0.0000)	-0.02 [-1.2445] (0.2152)	0.01 [1.4132] (0.1596)	-	0.98
	MSCI	2.35 (0.1455)	0.96 [16.9214] (**0.0000**)	-0.40 [-4.3176] (**0.0000**)	-0.22 [-4.0244] (**0.0001**)	-	0.85	-0.46 (0.2189)	0.99 [79.4621] (0.0000)	-0.05 [-2.8592] (0.0048)	-0.15 [-13.6836] (0.0000)	-	0.99
USA	DJ	0.16 (0.8235)	0.92 [13.5565] (**0.0000**)	-0.24 [-7.2994] (**0.0000**)	0.01 [0.4905] (0.6244)	0.04 [0.8095] (0.4194)	0.97	0.23 (0.0934)	0.97 [172.0043] (0.0000)	-0.03 [-5.5819] (0.0000)	0.14 [27.7551] (0.0000)	0.01 [3.2283] (0.0015)	0.99
	MSCI	0.28 (0.7540)	0.86 [11.7858] (**0.0000**)	-0.11 [-2.4020] (**0.0174**)	-0.01 [-0.4264] (0.6704)	0.07 [1.1531] (0.2505)	0.94	0.00 (0.9992)	1.00 [92.6382] (0.0000)	-0.04 [-4.3766] (0.0000)	0.00 [0.7510] (0.4537)	-0.00 [-0.3475] (0.7286)	0.99
UK	DJ	1.13 (0.3574)	1.05 [11.5384] (**0.0000**)	-0.26 [-4.4466] (**0.0000**)	-0.19 [-5.7214] (**0.0000**)	-0.06 [-0.7580] (0.4495)	0.88	0.05 (0.5698)	0.99 [197.8039] (0.0000)	0.00 (0.4949) (0.6213)	-0.03 [-11.0125] (0.0000)	0.00 [1.0341] (0.3025)	0.99
	MSCI	1.51 (0.2198)	0.89 [8.7332] (**0.0000**)	-0.05 [-0.9968] (0.3202)	-0.29 [-6.3878] (**0.0000**)	0.10 [1.0178] (0.3102)	0.88	-0.25 (0.0890)	1.00 [111.2875] (0.0000)	0.00 [0.7505] (0.4540)	-0.10 [-14.2542] (0.0000)	0.00 [0.2763] (0.7826)	0.99
Pre-Crisis													
Turkey	DJ	-0.81 (0.9087)	0.95 [9.7910] (**0.0000**)	0.28 [1.1504] (0.2669)	0.16 [0.9815] (0.3410)	-	0.71	4.95 (0.1764)	1.02 [19.7972] (0.0000)	0.07 [1.2387] (0.2333)	-0.40 [-4.2143] (0.0007)	-	0.94
	MSCI	-3.66 (0.6957)	0.93 [9.8841] (**0.0000**)	0.44 [1.9984] (**0.0505**)	0.27 [1.3961] (0.1682)	-	0.73	1.37 (0.5096)	1.00 [40.7083] (0.0000)	-0.03 [-0.7508] (0.4559)	-0.20 [-3.1066] (0.0030)	-	0.97
Malaysia	DJ	8.00 (**0.0057**)	0.93 [12.1763] (**0.0000**)	-0.13 [-0.9735] (0.3359)	-0.26 [-3.6723] (**0.0007**)	-	0.81	1.92 (0.1384)	0.97 [21.6900] (0.0000)	0.07 [1.1656] (0.2503)	-0.00 [-0.1511] (0.8806)	-	0.94
	MSCI	2.14 (0.4704)	1.08 [15.9727] (**0.0000**)	-0.18 [-1.1201] (0.2674)	-0.35 [-3.7380] (**0.0004**)	-	0.83	-0.12 (0.8516)	1.00 [64.6330] (0.0000)	-0.02 [-0.8559] (0.3957)	-0.13 [-7.1290] (0.0000)	-	0.98
USA	DJ	0.91 (0.4034)	1.02 [10.4155] (**0.0000**)	-0.25 [-4.0307] (**0.0002**)	0.05 [1.1605] (0.2508)	0.02 [0.3164] (0.7528)	0.93	0.97 (0.0000)	0.94 [119.2215] (0.0000)	-0.02 [-4.9875] (0.0000)	0.12 [21.3789] (0.0000)	0.02 [4.3295] (0.0001)	0.99
	MSCI	0.96 (0.3656)	0.93 [10.4179] (**0.0000**)	-0.12 [-2.0646] (**0.0437**)	-0.00 [-0.0236] (0.9812)	0.06 [0.8404] (0.4043)	0.92	0.12 (0.4468)	1.00 [127.5959] (0.0000)	-0.01 [-1.5140] (0.1357)	0.01 [1.5812] (0.1196)	0.00 [0.2781] (0.7819)	0.99
UK	DJ	2.65 (**0.0778**)	1.09 [11.9614] (**0.0000**)	-0.22 [-2.4658] (**0.0168**)	-0.23 [-6.5085] (**0.0000**)	-0.13 [-2.3890] (**0.0204**)	0.86	-0.22 (0.0847)	1.01 [177.4208] (0.0000)	0.00 [0.2943] (0.7696)	-0.02 [-7.7445] (0.0000)	-0.00 [-1.1854] (0.2410)	0.99
	MSCI	2.51 (**0.0688**)	1.06 [12.8960] (**0.0000**)	-0.14 [-1.6279] (**0.1093**)	-0.24 [-5.6323] (**0.0000**)	-0.09 [-1.8538] (**0.0691**)	0.87	-0.56 (0.0335)	1.02 [85.7695] (0.0000)	0.00 [0.1031] (0.9182)	-0.08 [-11.7625] (0.0000)	-0.02 [-2.0824] (0.0420)	0.99

Crisis Period														
Turkey	DJ	-3.91 (0.7392)	0.70 [8.2226] (0.0000)	0.15 [0.9743] (0.3389)	0.40 [2.5136] (**0.0185**)	-	0.59	0.41 (0.9659)	1.02 [17.6458] (0.0000)	0.34 [2.9031] (0.0074)	0.00 [0.0164] (0.9870)	-	0.71
	MSCI	-16.49 (0.3768)	0.73 [6.5654] (0.0000)	0.46 [1.9309] (**0.0645**)	0.47 [2.2350] (**0.0342**)	-	0.48	-3.70 (0.7288)	1.00 [20.1656] (0.0000)	0.31 [2.6166] (0.0146)	0.05 [0.2514] (0.8034)	-	0.70
Malaysia	DJ	0.64 (0.8755)	0.89 [15.3323] (**0.0000**)	-0.65 [-2.0596] (**0.0496**)	-0.17 [-2.6341] (**0.0140**)	-	0.92	-0.12 (0.8867)	0.97 [61.0932] (0.0000)	-0.08 [-3.3176] (0.0027)	0.00 [0.1649] (0.8703)	-	0.99
	MSCI	3.06 (0.5358)	0.86 [10.2386] (**0.0000**)	-0.81 [-3.2258] (**0.0034**)	-0.23 [-2.4969] (**0.0192**)	-	0.89	-0.63 (0.6011)	1.00 [46.3181] (0.0000)	-0.04 [-0.8646] (0.3952)	-0.17 [-8.7399] (0.0000)	-	0.99
USA	DJ	1.09 (0.5104)	0.78 [16.8131] (**0.0000**)	-0.27 [-5.9072] (**0.0000**)	-0.08 [-2.4567] (**0.0213**)	0.14 [3.7313] (**0.0010**)	0.98	-0.38 (0.1258)	0.98 [101.4291] (0.0000)	-0.03 [-4.9408] (0.0000)	0.15 [20.7420] (0.0000)	0.00 [0.8433] (0.4070)	0.99
	MSCI	2.73 (0.1901)	0.72 [11.5363] (**0.0000**)	-0.21 [-3.5739] (**0.0015**)	-0.18 [-3.5720] (**0.0015**)	0.17 [3.3731] (**0.0024**)	0.97	-0.24 (0.2116)	0.98 [82.1916] (0.0000)	-0.04 [-5.8106] (0.0000)	0.02 [3.6560] (0.0012)	0.00 [0.7882] (0.4380)	0.99
UK	DJ	2.89 (0.4640)	0.50 [1.5673] (0.1296)	-0.08 [-0.6558] (0.5179)	-0.21 [-2.4713] (**0.0206**)	0.46 [1.3861] (0.1779)	0.88	0.27 (0.1346)	0.99 [101.1900] (0.0000)	0.00 [0.9109] (0.3710)	-0.03 [-9.3908] (0.0000)	0.00 [0.6566] (0.5174)	0.99
	MSCI	4.08 (0.3495)	0.24 [0.7466] (0.4622)	0.11 [0.7947] (0.4342)	-0.27 [-3.6835] (**0.0011**)	0.77 [2.2560] (**0.0331**)	0.91	0.12 (0.4781)	1.00 [111.2875] (0.0000)	0.00 [0.7505] (0.4540)	-0.10 [-14.2542] (0.0000)	0.00 [0.2763] (0.7826)	0.99
Post-Crisis														
Turkey	DJ	2.18 (0.3774)	0.70 [15.7554] (**0.0000**)	0.06 [0.4125] (0.6815)	0.24 [3.6900] (**0.0005**)	-	0.84	1.41 (0.4643)	0.96 [37.7465] (0.0000)	0.18 [1.4788] (0.1448)	-0.16 [-3.1188] (0.0029)	-	0.97
	MSCI	9.31 (0.1452)	0.72 [6.1192] (**0.0000**)	0.18 [0.3986] (0.6917)	0.07 [0.4743] (0.6371)		0.48	1.97 (0.3368)	0.96 [33.1329] (0.0000)	0.08 [0.5926] (0.5558)	-0.21 [-3.6079] (0.0007)	-	0.96
Malaysia	DJ	0.25 (0.8732)	0.95 [16.2491] (**0.0000**)	-0.05 [-0.8266] (0.4119)	-0.12 [-1.7274] (**0.0896**)	-	0.84	-0.41 (0.2692)	0.97 [67.6164] (0.0000)	-0.05 [-2.6883] (0.0094)	0.03 [3.1075] (0.0030)	-	0.99
	MSCI	2.74 (0.2071)	0.94 [13.7039] (**0.0000**)	-0.18 [-1.4837] (0.1435)	-0.13 [-2.2670] (**0.0273**)	-	0.84	-1.16 (0.0108)	1.02 [50.5288] (0.0000)	-0.03 [-1.1634] (0.2496)	-0.16 [-8.8019] (0.0000)	-	0.98
USA	DJ	-1.47 (**0.0421**)	1.03 [26.3411] (**0.0000**)	-0.23 [-5.8724] (**0.0000**)	0.02 [1.0126] (0.3157)	-0.03 [-0.7847] (0.4360)	0.98	0.02 (0.8486)	0.99 [124.7862] (0.0000)	-0.02 [-2.9709] (0.0044)	0.16 [45.6957] (0.0000)	0.00 [0.6766] (0.5015)	0.99
	MSCI	-0.50 (0.6245)	0.97 [16.5877] (**0.0000**)	0.07 [1.4062] (0.1653)	0.12 [2.4859] (**0.0160**)	-0.02 [-0.3930] (0.6958)	0.96	0.06 (0.6590)	0.99 [106.1950] (0.0000)	-0.03 [-3.8436] (0.0003)	0.02 [4.5243] (0.0000)	0.00 [0.2266] (0.8215)	0.99
UK	DJ	-3.14 (0.1154)	1.28 [20.0656] (**0.0000**)	-0.12 [-2.1203] (**0.0385**)	-0.01 [-0.2453] (0.8071)	-0.21 [-2.8080] (**0.0069**)	0.92	0.07 (0.6075)	1.00 [87.1442] (0.0000)	0.01 [1.1257] (0.2652)	-0.03 [-6.5016] (0.0000)	0.01 [1.3835] (0.1721)	0.99
	MSCI	-1.56 (0.4192)	1.17 [21.6588] (**0.0000**)	0.09 [1.3669] (0.1772)	-0.20 [-3.6952] (**0.0005**)	-0.13 [-2.0083] (**0.0495**)	0.91	-0.10 (0.4575)	1.00 [88.9562] (0.0000)	0.01 [2.0666] (0.0435)	-0.12 [-21.7534] (0.0000)	0.00 [0.4226] (0.6742)	0.99

Note: [ ] indicates the t statistic, and ( ) indicates the probability value.

Table 9
Absolute and Risk-Adjusted Performance Measures

Country	Indice	Islamic								Conventional				
		Mean Return (%)	Std. Dev. (%)	Wald Test	F Test	Sharpe {Mod}	ΔSharpe	Treynor {Dist}	Sortino	Mean Return (%)	Std. Dev. (%)	Sharpe {Mod}	Treynor {Dist}	Sortino
Long Term														
Turkey	DJ	7.71	21.31	[-6.3522] (**0.0000**)	[1.6027] (**0.0071**)	-0.10 {-44.02}	[-0.3735] (1.2912)	-2.81 {2.20}	-0.13	8.64	26.97	-0.04 {-30.80}	-1.10 {1.55}	-0.06
	MSCI	18.03	31.57	[-2.5361] (**0.0121**)	[1.0621] (0.6889)	0.15	[0.4692] (0.6389)	5.53	0.20	15.59	30.63	0.08	2.28	0.12
Malaysia	DJ	10.34	13.50	[-1.4459] (0.1502)	[1.0576] (0.7251)	0.54	[0.5732] (0.5665)	7.68	0.62	9.23	13.12	0.47	6.18	0.56
	MSCI	10.59	14.59	[0.2999] (0.7646)	[1.2334] (0.1638)	0.52	[0.9307] (0.3520)	7.76	0.64	8.47	13.14	0.41	5.64	0.54
USA	DJ	7.58	14.30	[-1.9545] (**0.0522**)	[1.0732] (0.6387)	0.43	[-0.0804] (1.0641)	6.31	0.54	7.88	14.81	0.43	6.26	0.52
	MSCI	7.31	13.72	[-3.1757] (**0.0018**)	[1.1257] (0.4315)	0.43	[0.1934] (0.8466)	6.33	0.52	7.47	14.56	0.41	5.95	0.49
UK	DJ	6.99	14.30	[-1.5293] (0.1280)	[1.0430] (0.7793)	0.33	[0.1908] (0.8487)	4.94	0.41	6.61	14.00	0.30	4.25	0.37
	MSCI	6.85	14.47	[-0.8884] (0.3755)	[1.0775] (0.6198)	0.31	[0.4861] (0.6269)	4.78	0.40	6.00	13.94	0.26	3.67	0.32
Pre-Crisis														
Turkey	DJ	5.90	19.77	[-2.2118] (**0.0402**)	[1.2266] (0.6607)	-0.52 {-193.81}	[-1.0939] (1.7260)	-11.67 {10.09}	-0.61	16.99	21.90	0.05	0.99	0.07
	MSCI	31.39	36.15	[-1.2477] (0.2172)	[1.1320] (0.6353)	0.33	[-0.6077] (1.4566)	12.69	0.44	36.13	33.98	0.49	16.13	0.71
Malaysia	DJ	25.16	12.78	[-1.4039] (0.1673)	[1.0161] (0.9575)	1.74	[1.3770] (0.1685)	24.89	2.48	19.29	12.68	1.29	16.69	1.80
	MSCI	22.17	15.82	[1.2883] (0.2027)	[1.4119] (0.1882)	1.21	[0.2898] (0.7720)	18.04	2.05	18.27	13.32	1.15	15.32	2.14
USA	DJ	13.53	9.78	[0.0623] (0.9505)	[1.0947] (0.7293)	1.07	[-0.6348] (1.4744)	10.05	1.70	14.17	9.35	1.19	10.68	2.16
	MSCI	13.34	9.17	[-0.6792] (0.4997)	[1.0201] (0.9391)	1.12	[0.0374] (0.9702)	10.45	1.80	13.18	9.08	1.12	9.95	1.89
UK	DJ	14.63	9.91	[-2.2307] (**0.0296**)	[1.0117] (0.9644)	1.02	[0.0393] (0.9687)	11.46	1.37	14.47	9.85	1.01	9.91	1.18
	MSCI	14.71	9.95	[-1.3137] (0.1941)	[1.0462] (0.8627)	1.03	[0.3786] (0.7050)	11.39	1.35	13.66	9.72	0.94	9.28	1.08
Crisis Period														
Turkey	DJ	2.95	31.96	[-4.6033] (**0.0001**)	[0.6607] (0.1793)	-0.25 {-249.69}	[-0.2894] (1.2277)	-10.97 {7.98}	-0.34	4.52	41.15	-0.16 {-258.09}	-5.94 {6.47}	-0.26
	MSCI	-8.56	40.15	[-1.3506] (0.1876)	[1.0248] (0.9478)	-0.49{-761.96}	[-0.5654] (1.4282)	-24.14 {19.32}	-0.61	0.56	40.64	-0.26{-413.15}	-9.83 {10.39}	-0.42
Malaysia	DJ	-6.48	20.89	[-0.4937] (0.6253)	[1.0666] (0.8633)	-0.45 {-188.75}	[-0.7792] (1.5641)	-9.34 {9.24}	-0.51	-2.09	20.23	-0.24 {-95.47}	-4.79 {4.90}	-0.29
	MSCI	-5.51	21.25	[-2.3989] (0.7175)	[1.2417] (0.5637)	-0.39 {-171.83}	[-0.5369] (1.4087)	-8.41 {8.28}	-0.40	-1.77	19.07	-0.24 {-84.17}	-4.76 {4.59}	-0.28
USA	DJ	-9.71	20.94	[-4.3230] (**0.0002**)	[1.2754] (0.5165)	-0.53 {-224.50}	[-0.0435] (1.0347)	-12.23 {10.94}	-0.70	-10.90	23.65	-0.52 {-281.05}	-11.75 {12.13}	-0.71
	MSCI	-8.64	19.91	[-5.2297] (**0.0000**)	[1.3307] (0.4463)	-0.50 {-192.47}	[0.3029] (0.7620)	-11.68 {9.87}	-0.65	-11.76	22.97	-0.57 {-292.50}	-12.94 {12.99}	-0.78
UK	DJ	-3.15	20.59	[-1.5591] (0.1302)	[1.0586] (0.8790)	-0.27 {-112.58}	[0.4458] (0.6557)	-6.31 {5.63}	-0.42	-6.19	21.19	-0.41 {-179.22}	-8.67 {8.66}	-0.63
	MSCI	-3.54	21.70	[-0.6706] (0.5079)	[1.0653] (0.8658)	-0.28 {-127.09}	[0.5379] (0.5906)	-6.48 {6.03}	-0.45	-6.77	21.03	-0.44 {-189.87}	-9.35 {9.24}	-0.68

		Post-Crisis											
Turkey	DJ	11.02	16.28	[-7.7201] (**0.0000**)	[1.9362] (**0.0123**)	0.24	[0.5975] (0.5502)	5.88	0.32	9.49	22.65	0.11	2.37	0.18
	MSCI	17.71	22.58	[-3.6525] (**0.0006**)	[1.0281] (0.9153)	0.47	[1.0166] (0.3093)	14.57	0.65	9.88	22.90	0.12	2.74	0.21
Malaysia	DJ	8.60	9.55	[-1.5746] (0.1208)	[1.0115] (0.9649)	0.58	[0.1662] (0.8680)	5.93	0.83	8.23	9.49	0.55	5.12	0.78
	MSCI	10.99	9.77	[-0.6834] (0.4970)	[1.0955] (0.7272)	0.82	[1.5487] (0.1215)	8.34	1.25	7.53	9.34	0.48	4.56	0.72
USA	DJ	15.31	12.29	[-0.7969] (0.4287)	[1.0066] (0.9798)	1.24	[-0.3999] (1.3108)	14.73	2.14	16.14	12.33	1.30	15.38	2.09
	MSCI	14.66	11.89	[-0.8907] (0.3767)	[1.0075] (0.9772)	1.23	[-0.7116] (1.5233)	14.71	2.11	16.15	11.94	1.35	15.85	2.23
UK	DJ	7.99	13.24	[2.1907] (**0.0325**)	[1.2670] (0.3659)	0.57	[-1.5459] (1.8779)	6.77	0.79	10.16	11.76	0.82	9.48	1.28
	MSCI	7.91	12.85	[1.3381] (0.1861)	[1.2088] (0.4686)	0.58	[-0.9855] (1.6756)	7.01	0.83	9.19	11.69	0.74	8.61	1.15

Note: [ ] indicates t / f statistics, and ( ) indicates the probability value.