Are Islamic mutual funds exposed to lower risk compared to their conventional counterparts?

Empirical evidence from Pakistan

Farrukh Naveed and Idrees Khawaja
Air University School of Management (AUSOM), AIR University, Islamabad, Pakistan, and

Lubna Maroof
Department of Business Studies, Bahria University, Islamabad, Pakistan

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Abstract

Purpose – This study aims to comparatively analyze the systematic, idiosyncratic and downside risk exposure of both Islamic and conventional funds in Pakistan to see which of the funds has higher risk exposure.

Design/methodology/approach – The study analyzes different types of risks involved in both Islamic and conventional funds for the period from 2009 to 2016 by using different risk measures. For systematic and idiosyncratic risk single factor CAPM and multifactor models such as Fama French three factors model and Carhart four factors model are used. For downside risk analysis different measures such as downside beta, relative beta, value at risk and expected short fall are used.

Findings – The study finds that Islamic funds have lower risk exposure (including total, systematic, idiosyncratic and downside risk) compared with their conventional counterparts in most of the sample years, and hence, making them appear more attractive for investment especially for Sharīʿah-compliant investors preferring low risk preferences.

Practical implications – As this study shows, Islamic mutual funds exhibit lower risk exposure than their conventional counterparts so investors with lower risk preferences can invest in these kinds of funds. In this way, this research provides the input to the individual investors (especially Sharīʿah-compliant investors who want to avoid interest based investment) to help them with their investment decisions as they can make a more diversified portfolio by considering Islamic funds as a mean for reducing the risk exposure.

Originality/value – To the best of the author's knowledge, this study is the first attempt at world level in looking at the comparative risk analysis of various types of the risks as follows: systematic, idiosyncratic and

The current research also provides input to the fund managers. As this study showed that Islamic mutual funds have lower risks compared to their conventional counterparts, fund managers can focus on launching Islamic mutual funds to attract risk-averse Sharīʿah-compliant investors. The managers in conventional investment firms should also deal with Islamic funds along with their conventional peers.

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downside risk, for both Islamic and conventional funds, and thus, provides significant contribution in the literature of mutual funds.

Keywords Downside risk, Systematic risk, Islamic mutual funds, Idiosyncratic risk, Total risk, Mutual fund

Paper type Research paper

Introduction

Mutual funds are considered an important method of investment. They represent an indirect way to invest for individual investors who do not possess relevant knowledge and expertise to invest directly. Different asset management firms exist, which collect money from individual investors for the purpose of investment in different securities. There is a growing trend in the mutual funds industry of Pakistan for asset management firms to have both Islamic and conventional funds. Investors are more interested in risk and return analyses of mutual funds because they make investment decisions on these bases. Although mutual funds are good investment vehicles, they are not free from risk. They involve various kinds of risks such as market risk, fund-specific risk, downside risk and others. Sharīʿah-compliance risk is also involved in Islamic mutual funds.

In case of systematic or market risk, the fund faces financial losses due to the uncertainty inherent in the entire market. This kind of risk cannot be reduced by proper diversification because it occurs due to factors beyond the control of asset management firms; for example, inflation, change of interest rate, bad economic conditions, etc. (Hayat and Kraeussl, 2011). Vidal-García and Vidal (2014) stated that mutual funds are also prone to idiosyncratic or fund-specific risk. Fund-specific risk is the risk associated with particular funds and is not a phenomenon of the whole market. This type of risk varies from fund to fund. It can be reduced by diversification because it occurs due to micro-economic factors that can be controlled and managed by fund managers. Finally, mutual funds are also exposed to downside risk. Downside risk is the probability of losses associated with the mutual funds in case of a decline in the market. In simple words, it is the financial risk associated with losses.

Both risk and return are important considerations for investors, which provide them with input to make investment decisions. Therefore, previous studies analyzed the risk and return characteristics of mutual funds in different countries of the world (Hayat and Kraeussl, 2011; Boo *et al.*, 2017). However, most of these studies provide a separate analysis of the performance and risk of mutual funds. Although, previous studies such as Ashraf (2013) and Boo *et al.* (2017) comparatively analyzed the performance of both Islamic and conventional mutual funds, these studies did not pay attention to comparatively analyze the risk exposure of these funds.

Investors have various risk preferences, and therefore, they want to know about the risk exposure of mutual funds to make investment decisions. Sharīʿah-compliant investors are more sensitive to risk exposures. They want to invest in funds, which are Sharīʿah-compliant on the one hand and are exposed to lower risk on the other. Therefore, a comparative risk analysis of both Islamic and conventional mutual funds is required to inform investors about the funds having low risk exposures.

Unfortunately, the literature does not explore this issue in detail and studies that undertake comparative risk analysis of mutual funds are rare. Reddy *et al.* (2017) took the initiative to comparatively analyze the risk exposure of mutual funds, but their study was limited only to the systematic risk exposure of mutual funds. Vidal-García *et al.* (2016) analyzed the idiosyncratic risk exposure of mutual funds, but their study was limited to

conventional funds. Rodriguez (2015) analyzed the total and systematic risk exposures of mutual funds, but his study only focussed on conventional mutual funds. Hayat and Kraeussl (2011) attempted to analyze the systematic and downside risk exposures of mutual funds, but they only looked at Islamic funds and did not compare the risks of Islamic and conventional funds to see which kind of fund has lower risk exposures.

Therefore, this study aims to compare the total, systematic, idiosyncratic and downside risk exposures of Islamic funds with their conventional counterparts to see which one has higher risk exposures. This study is different from previous studies conducted on mutual fund risk exposures in the sense that it provides a comparative risk analysis of both Islamic and conventional funds including total, systematic, idiosyncratic and downside risk. To the best of our limited knowledge, this study is the first attempt to comparatively analyze various types of risks involved in both kinds of funds and thus makes a significant contribution to the literature.

Therefore, it is worthwhile to explore the mutual funds industry of Pakistan and address various issues involved in it. The rest of the paper is organized as follows. After differentiating between Islamic and conventional mutual funds, as well as giving an insight into the mutual funds industry in Pakistan, the next section reviews the previous literature and presents the hypothesis. The research methodology is described in the following section. The paper then presents the study results, while the conclusion and study implications are provided in the last section.

Islamic vs conventional mutual funds

Mutual funds are classified in two different categories. Some are conventional funds, which have a long history and acceptance by investors, while others are Islamic funds, which are considered a relatively new phenomenon. Islamic funds differ from conventional funds on many bases. The basic difference is that Islamic funds follow investment rules prescribed by the Sharīʿah (Islamic law). Before making investments, Islamic funds ensure that the mode of operation and capital structure of each business is Sharīʿah compliant. Islamic mutual funds do not make investments in businesses that are prohibited by the Sharīʿah such as alcohol, tobacco, biotechnology for human cloning, arms/weapons and companies whose capital structure relies heavily on debt to avoid dealing with interest. Islamic mutual funds exclude investment in fixed capital instruments such as corporate bonds, certificates of deposits, warrants and some derivatives such as put and call options. The invested funds must also be free from interest-based debt, speculation, *maysir* (gambling) and *gharar* (excessive uncertainty).

Bin Mahfouz and Ahmed (2014) stated that Islamic scholars have developed Sharīʿah screening criteria for analyzing the Sharīʿah-compliance of Islamic funds. The Sharīʿah screening criteria are divided into two categories, namely, qualitative or sector screening and quantitative or financial screening. To be considered a Sharīʿah-compliant fund, an Islamic mutual fund must pass both of these criteria. Under the qualitative or sector screening, it is seen that mutual funds invest in the assets of those companies or sectors whose primary business is Sharīʿah-compliant and which do not produce or sell Sharīʿah-restricted products or services such as tobacco, alcohol, gambling and weapons. Similarly, Islamic funds cannot make investments in companies that are directly involved in interest or *gharar* (uncertainty). Therefore, Islamic mutual funds in Pakistan do not invest in the shares of conventional banks and insurance companies.

Islamic mutual funds must also comply with the quantitative or financial screening criteria (Ghoul and Karam, 2007). The financial screening criteria exclude investment in companies having high levels of debt, liquidity and interest-based investment. The

Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) proposed some financial screening ratios. Islamic mutual funds only invest in firms where these ratios are in the prescribed range. If these ratios exceed the range prescribed by Sharīʿah scholars, then investment in the company is prohibited. These ratios include debt to market capitalization ratio, cash and interest-bearing securities to market capitalization ratio, and finally cash and account receivables to market capitalization ratio. Total assets can also be used in place of market capitalization. According to AAOIFI's Investment Standard, the collective amount of the debt should not exceed 33 per cent of the total market capitalization of the firm. This restriction is imposed to make sure that the firm does not have an excessive level of debt because interest-based debts are forbidden in Islam. Therefore, Islamic mutual funds cannot make investment in the shares of a firm, which has raised interest-based debt more than 33 per cent of its market capitalization.

The second important financial screening criterion is cash and interest-bearing securities to market capitalization ratio. This ratio ensures that investment in interest-bearing securities is at an acceptable level. According to Sharīʿah investment rules, investment is forbidden in fixed-income securities such as treasury bills, corporate bonds, government bonds, certificates of deposits and preferred stock. AAOIFI prescribed that the total amount of interest-taking deposits should not exceed 33 per cent of the firm's market capitalization. Therefore, Islamic mutual funds cannot invest in shares of a firm where interest-taking deposits exceed 33 per cent of market capitalization or total assets. For example, as of 2017, the Meezan Islamic Fund (one of the premier Islamic funds in Pakistan) invested in cement, petroleum, oil and gas and fertilizer companies where the debt to asset ratio was 7.81 per cent, 5.85 per cent, 0.00 per cent and 23.5 per cent, respectively. Similarly, the cash and interest-bearing securities to market capitalization ratio of these companies was 15.66 per cent, 0.00 per cent, 22.29 per cent and 25.07 per cent, respectively. All these ratios are in the prescribed range, which shows the Sharīʿah-compliance of Meezan Islamic Fund. Similarly, other Islamic mutual fund ratios are also in the acceptable range.

Finally, the third important financial screening criterion is cash and account receivables to market capitalization ratio. According to the Sharīʿah rules, all liquid assets such as cash and account receivables (debt) must be traded at par value and cannot be traded above or below par. That is to avoid interest. Therefore, if any firm has the majority of its assets in the form of cash or account receivables (debts), its shares can only be traded at par value (Khatkhatay and Nisar, 2006). The cash and account receivables to market capitalization ratio criterion is imposed to avoid investment in firms whose liquid assets (cash and account receivables) are traded above or below par. AAOIFI prescribed that total value of the firm's tangible assets should not be less than 30 per cent of its total assets. Therefore, Islamic mutual funds can make investments only in those firms whose cash and account receivables to market capitalization ratio is at an acceptable level.

After all these restrictions, if some portion of the firm's income is generated by activities impermissible in Sharīʿah, it must be purified by applying the necessary purification process to make sure that the income generated by impermissible ways is excluded from total income.

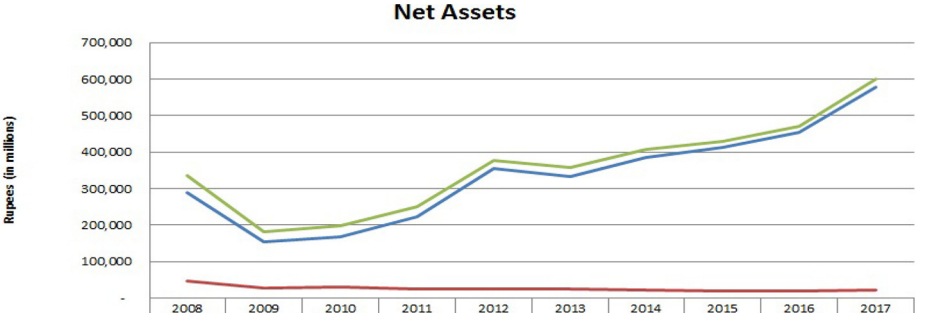
Conventional funds, on the other hand, do not follow these Sharīʿah investment rules and regulations. Islamic funds are gaining popularity, especially in Muslim countries because Muslims are not allowed to invest in interest-based products. Islamic funds are specially designed to meet the increasing demand for Sharīʿah-compliant investments by Muslim investors.

An insight into the mutual funds industry in Pakistan

A growing trend in the mutual fund industry of Pakistan has been seen from the last decade, which is presented in Figure 1. In this era, different new funds were launched, including both Islamic and conventional funds. The mutual funds industry of Pakistan contributes about 9.6 per cent share in the global Islamic mutual funds industry and is considered in the top five in the global Islamic mutual fund industry based on the number of funds and assets under management. Pakistan has 124 Islamic mutual funds with assets under management equal to US$2.6bn (as of 2017), which is the fourth largest share in the global Islamic mutual fund industry, after Malaysia, Saudi Arabia and Luxembourg. Malaysia and Saudi Arabia contribute significantly to the global Islamic mutual funds industry but the majority of their investment is limited to money market and equity funds. Luxembourg invests primarily in commodity-based Islamic funds. In contrast, asset management firms in Pakistan have invested in a variety of Islamic mutual funds, including equity, money market, asset allocation, balanced, growth, index tracker, commodity, pension, cash and fixed income.

Literature review

As mentioned above, various kinds of risks are involved in mutual funds. Therefore, various studies have been conducted which measured different kinds of fund risks using various risk measures. Studies such as Lhabitant (2001), Rodriguez (2015), Namvar *et al.* (2016) and Huang *et al.* (2017) analyzed the systematic risk exposure of conventional mutual funds using a single-factor capital asset pricing model (CAPM)or multifactor models. The multifactor models proposed by Fama and French (1993) and Carhart (1997) are widely used for analyzing the systematic risk exposure of mutual funds and various securities. Bali *et al.* (2014) analyzed hedge funds' exposure to different measures of macroeconomic risk that are interpreted as measures of economic uncertainty. In their earlier study, Bali *et al.* (2012) also analyzed the systematic risk behaviour of hedge funds using three-factor and four-factor models by taking a large data set of hedge funds. They also analyzed how systematic risk explains the cross-sectional variation in these funds and concluded that fund returns are positively associated with systematic risk. Huang *et al.* (2017) provided the empirical evidence that hedge funds are also exposed to systematic risk. They further stated that the performance of these funds is based on the direction of systematic risk exposure.



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Open End Funds	287,870	153,066	168,001	223,936	354,309	332,702	386,568	411,655	452,770	576,541
Close End Funds	46,588	28,415	30,748	25,263	23,488	24,165	21,417	18,231	18,796	22,804
Total Net Assets	334,458	181,481	198,748	249,199	377,797	356,868	407,985	429,885	471,566	599,345

Source: MUFAP (Mutual Funds Association of Pakistan) website

Figure 1. Growth of the Mutual Funds Industry in Pakistan

Yang and Hou (2016) analyzed the relationship between mutual fund pay-performance sensitivity and risk. They concluded that fund risk (measured by volatility of returns) is positively associated with pay performance. Philpot and Peterson (2006) analyzed the market risk exposure of different funds by using the CAPM model. They also analyzed the funds' systematic risk determinants and found that management fee, tenure and turnover significantly explain the funds' systematic risk. Bryant and Liu (2011) investigated the impact of funds' management structure on their risk exposure and found that team-managed funds have higher risk exposure than their risk-adjusted peers. Marco *et al.* (2011) comparatively analyzed the risk-taking behaviour of ethical and conventional mutual funds. They also analyzed how managerial compensation and incentives influence the risk of these funds. The study found significant difference in the risk-taking behaviour of these funds. Dwyer *et al.* (2002) analyzed the impact of gender diversity on the risk-taking behaviour of mutual funds and found that female managers take less risk compared to male fund managers.

Some other studies analyzed the idiosyncratic risk-taking behaviour of mutual funds. Wang (2011) studied the idiosyncratic risk of mutual funds and found that the funds having low idiosyncratic risk and high alpha have greater performance than the funds having low idiosyncratic risk and low alpha. Vidal-García *et al.* (2016) analyzed the idiosyncratic risk involved in mutual funds and its impact on fund returns. They found that idiosyncratic risk significantly determines the mutual funds' returns. Vidal-García and Vidal (2014) analyzed the idiosyncratic risk involved in mutual funds using Fama and French's (1993) three-factor model. They also investigated how this specific risk determines the fund performance seasonality and found that it does not significantly explain the seasonality in fund performance. A unique contribution in the literature is made by Gao *et al.* (2017) as they investigated the idiosyncratic risk involved in mutual funds along with analyzing the impact of local religious beliefs on it. They found that local religiosity negatively affects the idiosyncratic risk of mutual funds. Wagner and Winter (2013) also analyzed the idiosyncratic risk of mutual funds using a newly proposed liquidity-adjusted multifactor model.

Bodnaruk *et al.* (2019) investigated the downside risk and downside risk timing ability of conventional mutual funds. They found positive downside risk timing ability in mutual funds. Baghdadabad and Glabadanidis (2013) used downside risk-adjusted performance measures for performance analysis, including drawdown CAPM and downside beta. The downside risk of the funds is also measured using the data set of Malaysian mutual funds. Baghdadabad and Fooladi (2015) used the concept of downside risk for developing the downside risk-adjusted performance measure and applied it on the dataset of Malaysian mutual funds.

Many studies such as Abdullah *et al.* (2007), Ashraf (2013), Abdelsalam *et al.* (2014) and Boo *et al.* (2017) comparatively analyzed the performance of Islamic and conventional mutual funds. These studies primarily focussed on mutual fund performance while ignoring the risk aspect of mutual funds. As the Islamic mutual funds are distinguished from conventional funds on different bases, the researchers also focused on analyzing the risk behaviour of Islamic funds, but less work has been done in this regard. Hayat and Kraeussl (2011) took the initiative and analyzed the risk-return characteristics of Islamic mutual funds using the dataset of different countries. They measured the systematic risk of using the famous CAPM model while the downside risk was measured by downside CAPM and relative beta measures. They also analyzed the market timing ability of Islamic funds using the Treynor and Mazuy (1966) model. They found that Islamic mutual fund managers are bad market timers. A recent attempt was made by Reddy *et al.* (2017) as they comparatively

analyzed the performance of Islamic, socially responsible and conventional funds in the context of the United Kingdom. The study used CAPM and a three-factor model for the performance and risk evaluation. The result showed that Islamic and socially responsible funds perform close to the conventional funds and have better risk-return tradeoff.

A more recent attempt was made by Vidal-García *et al.* (2019) to analyze the idiosyncratic risk of mutual funds, along with analyzing the relationship between mutual fund risk and performance. They found that mutual fund risk is inversely related with fund performance. Similarly, Deb (2019) investigated downside risk exposure of Indian equity mutual funds. He used value at risk (VAR) for downside risk measurement. The result revealed that Indian equity mutual funds also exhibit considerable downside risk. Chowdhury *et al.* (2018) analyzed risk-return characteristics of mutual funds prevailing in Bangladesh using different measures and found higher risk in these funds.

Although all the above studies are important attempts to tackle the issue of mutual funds' various risks, some important aspects are still overlooked. These studies basically only analyzed the risk exposure of conventional funds; only a few studies included Islamic funds in their sample. Hayat and Kraeussl (2011) analyzed the systematic and downside risk of only Islamic equity funds. Reddy *et al.* (2017) included Islamic funds in their sample along with conventional funds but they only analyzed the systematic risk of both Islamic and conventional finds. None of the previous studies comparatively analyzed the idiosyncratic and downside risk exposures of both Islamic and conventional funds to show which ones have higher risk exposures.

Hypothesis development

Islamic mutual funds make investments in less leveraged firms. According to Fama and French (2002), high debt financing increases the agency cost and lowers the firm's profitability, and thus increases the firm's risk. Casey and Anderson (1997) stated that the debt agency cost reduces when the firm raises financing through equity rather than debt. Holmes and Kent (1991) argued that highly leveraged firms are riskier as they lose both property and control over the firm. Alaghi (2011) argued that a high level of debt financing increases the risk exposure because it increases the variability of the firm's income. Therefore, Khasawneh and Dasouqi (2017) showed a positive association between debt financing and risk exposure of firms. A more recent attempt was made by El Alaoui *et al.* (2016) for analyzing the impact of Sharīʿah screening criteria (debt ratio) on systematic risk. They showed that stocks, which pass through the Sharīʿah screening criteria have lower risk exposures in most cases due to employing lesser levels of debt. As discussed above, Islamic mutual funds only invest in the assets (shares) of those firms where the amount of the debt raised is less than 33 per cent of market capitalization or total assets. Therefore, due to investing in less leveraged firms, Islamic mutual funds face lower risk than their conventional counterparts. Islamic mutual funds also avoid investment in government or corporate bonds, treasury bills and collateralized debt obligations. Earlier studies found that various types of risks are involved in these securities such as interest rate risk, credit risk, etc. Weinstein (1981) investigated the systematic risk exposure of corporate bonds. These studies tried to create the link between default risk, interest rate risk and systematic risk and showed that high default risk and interest rate risk lead to higher exposure to systematic risk. They argued that as the debt level increases, the probability of default also increases, and thus systematic risk becomes higher.

Reddy *et al.* (2017) argued that, because of the Sharīʿah restrictions, Islamic funds cannot invest in collateralized debt obligations (CDOs) and credit default swaps (CDS), which protects them against market downturns. As mentioned earlier, Islamic funds can only

invest in firms where the cash and interest-bearing securities (fixed-income securities) to market capitalization ratio is at an acceptable level. The lower cash and interest-bearing securities to market capitalization ratio indicates that a smaller amount of funds is invested in fixed-income securities. Due to increasing cash ratio, the chances of default risk increase because more money is tied up in fixed-income securities. The high default risk increases the probability of systematic risk. Therefore, due to the acceptable level of investment in fixed-income securities, Islamic funds are exposed to lower risk. Based on the above arguments, the following hypothesis is developed:

H1. Islamic mutual funds have lower risk exposure (more especially in terms of total risk, systematic risk, fund specific risk and downside risk) than their conventional counterparts.

Research methodology

This study uses various risk measures for analyzing the risk exposure of both Islamic and conventional mutual funds in Pakistan. First, the funds' monthly returns are calculated using the following measure:

$$R_p = (NAV_t - NAV_{t-1})/NAV_{t-1} \tag{1}$$

where NAV_t and NAV_{t-1} are the funds' net asset values at the end of the month t and $t-1$.

Following Yang and Hou (2016), the total risk is measured by the standard deviation of the funds' monthly returns. For measuring systematic risk, two risk measures are used. Following Hayat and Kraeussl (2011) and Rodriguez (2015), the systematic risk is measured by the CAPM model:

$$R_{it} - R_{ft} = \alpha_1 + \beta_1(R_{mt} - R_{ft}) + \varepsilon \tag{2}$$

where:

$R_{it} - R_{ft}$ = excess returns;
R_{ft} = risk-free rate of return; and
R_{mt} = represents the market return.

By regressing the excess market return on the excess fund returns, the beta coefficient is calculated, which measures the systematic risk exposure. The CAPM is a single-factor model, the factor it accounts for being excess market return. Contrary to this model, multiple-factor models are introduced by the researchers, which are widely used in the finance literature for analyzing the performance and risk of stocks and mutual funds. A three-factor model, introduced by Fama and French (1993), also accounts for size and value premium factors along with market risk premium. The empirical studies proved that it is a better model than the single factor CAPM. The model is presented below:

$$R_{it} - R_{ft} = \alpha_1 + \beta_1(R_{mt} - R_{ft})\beta_2 SMB + \beta_3 HML + \varepsilon \tag{3}$$

where $R_p - R_f$ are the excess fund returns. R_m is market return and R_f is risk-free rate of return. SMB (small minus big) is the size premium, which is the difference of small cap and large cap portfolios. HML is the value premium factor, which accounts for high minus low book to market ratio. By regressing all three factors on excess returns, betas are estimated. The market beta of the three-factor model represents the systematic risk.

Carhart (1997) extended the three-factor model and presented a four-factor model, which is also widely used in the finance literature to measure the performance and risk of mutual

funds. He added the momentum factor in the three-factor model. The model is presented below:

$$R_{it} - R_{ft} = +\alpha_1 + \beta_1(R_{mt} - R_{ft}) + \beta_2 \text{SMB} + \beta_3 \text{HML} + \beta_4 \text{MOM} + \varepsilon \quad (4)$$

where the SMB and HML are size and value premium respectively, as explained above, and MOM represents the momentum factor. The systematic risk is measured by the beta coefficient of the market risk premium of the four-factor model.

The study also used Treynor and Mazuy's (1966) model of market timing ability. The market-timing beta of this model is used as a risk measure. Hayat and Kraeussl (2011) and Rodriguez (2015) used this model for measuring the market timing ability beta, which is also an important risk measure. The model is presented below:

$$R_{it} - R_{ft} = \alpha + \beta\left(R_{it} - R_{ft}\right) + \gamma\left(R_{it} - R_{ft}\right)^2 + \varepsilon_r \quad (5)$$

where $R_p - R_f$ is the excess return and $R_m - R_f$ is the market risk premium. The square of market risk-premium factor is also added in the model. The beta coefficient of market risk premium represents the market timing ability risk measure.

The study also analyzed the idiosyncratic risk of Islamic and conventional funds. For this purpose, two risk measures are used. Following Bali *et al.* (2005), CAPM is used for measuring idiosyncratic risk. It is equal to the standard deviation of the residuals of CAPM model. Most of the studies measured it by using the three-factor model instead of single-factor CAPM. The studies such as Wang (2011), Vidal-García and Vidal (2014) and Vidal-García *et al.* (2016) measured the idiosyncratic risk by the three-factor model. This study used all these measures for the measurement of idiosyncratic risk.

The fund managers and investors are also concerned with downside risk. This study used various measures of downside risk. Bawa and Lindenberg (1977) introduced the downside risk beta for measuring downside risk. According to them, downside beta is a covariance of the stocks' returns (in our case, fund returns) with the market return when the market returns are below their mean. Only negative market returns are considered for measuring downside beta. The downside risk measure is given below:

$$\beta_i^- = \frac{\text{COV}(r_i, r_m)|r_m < 0}{\text{VAR}(r_m)|r_m < 0} \quad (6)$$

For estimating the downside beta, all the market returns are sorted in descending order to identify all negative market returns and to eliminate all positive ones. Then the excess fund returns corresponding with the negative market returns are identified. The negative market returns are then regressed against their corresponding excess fund returns for estimating $\beta -$. Hayat and Kraeussl (2011) and Alles and Murray (2017) measured the downside risk in the same way. The relative beta (a pure measure of downside risk) is also calculated by subtracting the estimated downside beta from the original CAPM beta. The relative beta equation is given below:

$$\beta_i^r = \beta_i^- - \beta_i \quad (7)$$

where β^- is the estimated downside beta while β is the original CAPM beta.

VAR is another measure of downside risk, which is widely used in the literature. According to Reber (2017), it is the maximum loss faced by a security I at time period m at a

given confidence interval $(1 - \alpha)$. This study calculated VAR at a 95 per cent confidence interval. Expected shortfall is also a measure of downside risk, which is the loss of security that is incurred beyond the VAR for the worst possible cases. In VAR, we estimate the chances of loss at a given confidence interval but the expected shortfall tells us the chances of loss beyond that particular interval for the worst possible cases. The expected shortfall measure is provided below:

$$ES = \left| \sum_{j=1}^{n} R_{i,j} \Big/ n \right| \forall R_{I,j} < -VaR_{i,t} \tag{8}$$

where R is the monthly returns of the funds and n is the number of monthly returns below VAR_{it}.

Sample and data collection

This study uses a comprehensive data set of all possible funds available in Pakistan. The sample size comprises 206 funds, including 90 Islamic and 116 conventional funds. It is the largest sample size that has ever been used in the context of Pakistan. Rao *et al.* (2015) and Arif *et al.* (2019) used a relatively small sample of Pakistani mutual funds (60 and 28 mutual funds, respectively) while analyzing the comparative performance of Islamic and conventional funds. In the current study, only those funds having net asset values of at least 12 months are included in the sample. Newly launched funds with net asset value for less than this period have been excluded due to the unavailability of data on their net asset values. The sample includes both open-ended and pension funds. Furthermore, it is free from survivorship bias. The study used quantitative data, which is collected from different sources. The monthly net asset values are used for measuring the funds' various kinds of risks. The net asset value data is taken from the mutual fund association of Pakistan (MUFAP), which also provides other valuable information about Islamic and conventional funds prevailing in Pakistan. The three-month T-bill rate is used as a measure of risk-free rate of return, and its data is collected from the State Bank of Pakistan (SBP). For conventional funds, risk evolution KSC 100 Index is used as a benchmark and proxy of market return. KMI 30 Shari'ah index, which was developed by the mutual cooperation of Meezan Bank and State Bank of Pakistan in 2009, is used as a benchmark for the risk evaluation of Islamic funds. Pakistan Stock Exchange (PSX) provides the historical data of both these indices. For implementing the multifactor models, the size and value premium factors are calculated using the market capitalization and book to market ratio of stocks. The annual financial statements of stock issuing firms are used for this purpose. The data of 8 years from 2009 to 2016 is collected because the KMI Shari'ah index was developed in 2009 and thus no data is available for this index from previous years.

Empirical results

Before analyzing the risk exposure, the normality of the funds return is analyzed. This is done by using skewness, kurtosis and the JarqueBera test. Table I shows the values of these tests. The values of skewness show that the return distribution is not symmetric in most of the study years. These values are positively or negatively skewed. Similarly, the kurtosis values show that the return distribution of both kinds of funds is platykurtic in most of the study years. Table I also shows the values of the JarqueBera test. The null hypothesis of this test assumes the normality of distribution. All the p-values of this test are significant in most

Years	No. of funds	Mean	Skewness	Kurtosis	JarqueBera	*p*-value
Islamic funds						
2009	26	0.01	−0.367	1.063	2.756	0.252
2010	34	0.005	−0.746	2.306	34.63	0.00
2011	40	−0.007	−0.095	1.477	0.534	0.765
2012	47	0.011	0.234	2.937	4.712	0.094
2013	51	0.01	0.257	3.131	6.186	0.045
2014	61	0.007	−0.268	3.067	8.037	0.018
2015	67	0.002	0.505	2.303	31.26	0.00
2016	90	0.016	0.739	1.482	89.98	0.00
Conventional funds						
2009	51	0.024	0.831	1.52	64.38	0.00
2010	63	0.004	−0.507	0.872	29.5	0.00
2011	78	−0.004	−0.085	1.095	0.867	0.647
2012	88	0.009	−0.315	2.579	15.97	0.00
2013	93	0.005	−0.326	3.023	17.91	0.00
2014	101	0.008	−0.682	2.704	86.09	0.00
2015	108	−0.002	0.114	2.654	2.549	0.279
2016	116	0.011	0.397	2.261	33.47	0.00

Table I.
Descriptive statistics of normality test

of the study years for both Islamic and conventional funds; therefore, the null hypothesis assuming the normality of returns distribution is rejected.

Previous studies such as Chunhachinda *et al.* (1997) and Boo *et al.* (2017) showed that the portfolio returns, in general, are not normally distributed. Lamm (2003) highlighted the issue of asymmetric portfolio returns and stated that portfolio returns exhibit asymmetric patterns in general, and these are either positively or negatively skewed. It happens because of the higher downside risk than expected. When sizable losses occur, the returns often appear as "six standard deviation" events. Ang and Chen (2002) and Hong *et al.* (2006) also showed lack of symmetry in the equity portfolio returns and stated that these returns are not normal because of losses that are too large and occur too often to fit into the balanced symmetry of a normal distribution. According to all these studies, higher downside or upside risk is the reason for the lack of the normal return distribution of the portfolios.

For analyzing the Islamic and conventional funds risk, different risk measures are used. The result of all these risk measures for both Islamic and conventional mutual funds is presented below. A separate table has been made for presenting the result of each risk measure along with analyzing the difference between the risks of both kinds of funds in each

Years	Islamic funds	Conventional funds	Mean difference	*t*	Sig
2009	0.0355	0.0374	0.0018	−0.316	0.753
2010	0.0310	0.0354	0.0043	−1.095	0.276
2011	0.0255	0.0274	0.0019	−0.656	0.514
2012	0.0227	0.0236	0.0009	−0.339	0.735
2013	0.0321	0.0263	0.0057	1.538	0.126
2014	0.0218	0.0262	0.0044	−1.510	0.133
2015	0.0356	0.0411	0.0055	−1.558	0.121
2016	0.0350	0.0304	0.0045	1.222	0.223

Table II.
Mean values of total risk (SD of returns) for both Islamic and conventional funds

year. Table II shows the mean values of total risk exposure (measured by standard deviation (SD) of funds' return) in each year along with t score and p-values. This table indicates that Islamic mutual funds have lower mean values of total risk exposure in most of the study period. The total risk exposure of conventional mutual funds is lower only in 2 years: 2013 and 2016. Although the mean difference exists in the total risk values for both kinds of funds, it is not statistically significant. Thus, the overall result of Table II indicates that Islamic mutual funds have lower total risk compared to their conventional peers.

Table III indicates the yearly mean values of market risk or systematic risk for both kinds of funds measured by CAPM beta. Market risk is the phenomenon of the whole market and not the phenomenon of specific funds or the industry. This type of risk cannot be reduced by diversification. It can be seen from Table III that both Islamic and conventional funds exhibit different systematic risk exposures. In some years (2009, 2010, 2011 and 2012), the systematic risk exposure of Islamic funds is lower than their conventional counterparts while in other years conventional funds have lower systematic risk exposure. The systematic risk is also measured by using multi-factor models. Tables IV and V indicate the mean values of these risk measures. The systematic risk of Islamic funds (measured by the three-factor model) has lower mean values in most of the study years. Table III shows that Islamic funds have a lower systematic risk exposure in all the years except 2013, 2015 and 2016, wherein the conventional funds show a lower risk exposure. Although mean differences in the three-factor systematic risk exist between Islamic and conventional funds, these are not statistically significant in any of the years except 2009. Similarly, the four-factor systematic risk exhibits the same pattern.

Table III.
Yearly mean values of systematic risk (CAPM beta) for both Islamic and conventional funds

Years	Islamic funds	Conventional funds	Mean difference	t	Sig
2009	−0.1965	0.4255	0.6221	−8.386	0.000*
2010	0.2208	0.3122	0.0914	−1.116	0.267
2011	0.2664	0.2844	0.0180	−0.258	0.797
2012	0.3725	0.4026	0.0301	−0.552	0.582
2013	0.2364	0.1450	0.0914	1.698	0.094
2014	0.4039	0.4214	0.0175	−0.166	0.868
2015	0.4129	0.3542	0.0586	0.812	0.418
2016	0.3907	0.3463	0.0562	0.792	0.430

Note: * Indicate the level of significance at 1%

Table IV.
Yearly mean values of systematic risk (three-factor beta) for both Islamic and conventional funds

Years	Islamic funds	Conventional funds	Mean difference	t	Sig
2009	−0.2137	0.4323	0.6460	−8.791	0.000*
2010	0.2229	0.3232	0.1002	−1.197	0.234
2011	0.2720	0.2976	0.0256	−0.342	0.733
2012	0.2954	0.4333	0.1379	−2.489	0.014**
2013	0.1356	0.0652	0.0704	1.310	0.195
2014	0.4039	0.4214	0.0175	−0.209	0.835
2015	0.4229	0.3828	0.0400	0.558	0.577
2016	0.4010	0.3481	0.0529	0.916	0.361

Note: *, ** Indicate the level of significance at 1 and 5%, respectively

Table V indicates that Islamic funds have a lower systematic risk exposure (measured by the four-factor model) in the whole study period except 2013, 2015 and 2016. The mean differences of this risk measure are insignificant in all the years except 2009 and 2012. Table VI shows the yearly mean values of market timing ability risk measure for both kinds of funds. The table indicates that the Islamic mutual funds have a lower market-timing beta in the first four study years while in the remaining period, conventional funds exhibit a lower market timing risk. The mean differences of this risk measure are not statistically significant in any of the study years except 2009 and 2013. Table VII indicates the mean values of idiosyncratic risk (measured by CAPM) in each year for both kinds of funds. Idiosyncratic risk is firm-specific risk rather than a phenomenon of the whole market. It can be reduced by proper diversification. Each individual firm has different level of idiosyncratic risk, and thus the funds do too.

Table VII indicates that Islamic mutual funds have lower idiosyncratic risk in most of the study years as these funds have lower mean values of this risk measure. The idiosyncratic risk of conventional funds is lower only in two years: 2009 and 2013. The mean differences of this risk measure are not significant in any of the years except 2011 and 2015. The idiosyncratic risk was also measured by multi-factor (three-factor and four-factor) models. Tables VIII and IX show the results of these risk measures. It can be seen from these tables that Islamic funds have lower idiosyncratic risk (measured by multi-factor models) in most of the study years as the mean values of these risk measures are lower for Islamic funds compared to their conventional counterparts. The conventional funds have lower idiosyncratic risk only in two years: 2009 and 2013. The mean differences of these risk measures are also not statistically significant in most of the study years.

Years	Islamic funds	Conventional funds	Mean difference	*t*	Sig
2009	−0.2864	0.4215	0.7079	−7.611	0.000*
2010	0.2210	0.3205	0.0995	−1.164	0.247
2011	0.2528	0.2788	0.0260	−0.403	0.687
2012	0.3335	0.4317	0.0981	−1.749	0.083**
2013	0.1455	0.0650	0.0804	1.482	0.143
2014	0.4142	0.4292	0.0149	−0.177	0.860
2015	0.4273	0.4042	0.0231	0.330	0.741
2016	0.3714	0.2787	0.0927	1.527	0.128

Note: *, ** Indicate the level of significance at 10 and 5%, respectively

Table V.
Yearly mean values of systematic risk (four-factor beta) for both Islamic and conventional funds

Years	Islamic funds	Conventional funds	Mean difference	*t*	Sig
2009	−0.3192	0.3667	0.6859	−8.262	0.000*
2010	−0.2166	−0.2406	0.0240	0.101	0.920
2011	0.8418	0.8511	0.0092	−0.038	0.970
2012	0.0840	0.2496	0.1656	−0.967	0.335
2013	0.1312	0.0069	0.1242	2.183	0.033**
2014	0.6990	0.4830	0.2160	0.885	0.379
2015	0.4795	0.3891	0.0904	1.152	0.251
2016	0.4182	0.3768	0.0413	0.692	0.490

Note: *, ** Indicate the level of significance at 1 and 5%, respectively

Table VI.
Yearly mean values of market timing ability beta for both Islamic and conventional funds

This study also analyzed the downside risk exposure of both Islamic and conventional funds. For this purpose, different downside risk measures are used. Downside beta is the first and most famous measure of downside risk. Table X indicates the yearly mean values of downside beta for both kinds of funds. This table clearly shows that Islamic funds have lower mean values of downside beta in most of the study years. Conventional funds have lower downside beta only in three years: 2013, 2015 and 2016. Although the differences in the mean values of this risk measure exist for both kinds of funds, these are insignificant in all the years except 2009. Table XI shows the relative beta yearly mean values, which is a pure downside risk measure. In some years, the value of this risk measure is zero for both

Table VII.
Yearly mean values of idiosyncratic risk (CAPM) for both Islamic and conventional funds

Years	Islamic funds	Conventional funds	Mean difference	*t*	Sig
2009	0.0235	0.0221	0.0013	0.380	0.705
2010	0.0215	0.0227	0.0012	−0.450	0.654
2011	0.0180	0.0208	0.0028	−1.761	0.081***
2012	0.0206	0.0217	0.0011	−0.675	0.501
2013	0.0238	0.0225	0.0012	0.442	0.659
2014	0.0159	0.0180	0.0021	−1.131	0.260
2015	0.0177	0.0254	0.0077	−4.496	0.000*
2016	0.0189	0.0210	0.0020	−1.402	0.162

Note: *, *** Indicate the level of significance at 1 and 10%, respectively

Table VIII.
Yearly mean values of idiosyncratic risk (three factors) for both Islamic and conventional funds

Years	Islamic funds	Conventional funds	Mean difference	*t*	Sig
2009	0.0468	0.0178	0.0290	7.141	0.000*
2010	0.0202	0.0212	0.0009	−0.363	0.718
2011	0.0159	0.0192	0.0032	−2.214	0.029**
2012	0.0184	0.0197	0.0012	−0.774	0.440
2013	0.0200	0.0189	0.0011	0.446	0.656
2014	0.0135	0.0152	0.0016	−0.989	0.324
2015	0.0163	0.0228	0.0065	−4.236	0.000*
2016	0.0161	0.0176	0.0015	−1.244	0.215

Note: *, ** Indicate the level of significance at 1 and 5%, respectively

Table IX.
Yearly mean values of idiosyncratic risk (four factors) for both Islamic and conventional funds

Years	Islamic funds	Conventional funds	Mean difference	*t*	Sig
2009	0.0299	0.0153	0.0146	3.670	0.000*
2010	0.0189	0.0193	0.0004	−0.161	0.872
2011	0.0145	0.0160	0.0015	−1.147	0.254
2012	0.0164	0.0174	0.0010	−0.622	0.535
2013	0.0188	0.0182	0.0006	0.261	0.795
2014	0.0129	0.0143	0.0013	−0.849	0.397
2015	0.0154	0.0219	0.0064	−4.216	0.000*
2016	0.0153	0.0160	0.0007	−0.599	0.550

Note: *Indicate the level of significance at 1%

Islamic and conventional funds because it is calculated by subtracting the downside beta from the original CAPM beta. If all the market returns are negative in any particular year, the value of both downside beta and original CAPM beta will be the same; thus, the relative beta value will be equal to zero.

Table XI also shows that Islamic mutual funds have lower mean values for relative beta risk measure in all of the study years. The mean differences of this risk measure for both kinds of funds are also insignificant in all the relevant years except 2009. Tables XII and XIII show the mean values of VAR (95 per cent) and expected shortfall, respectively. These values are shown in negative numbers. Reber (2017) stated that the values of VAR and expected shortfall are taken as positive in empirical analysis, which facilitates interpretation. Table XII shows that Islamic funds have lower mean values of VAR (95 per cent) downside risk measure in all the study years except 2009 and 2013. The mean differences exist between the Islamic and conventional funds VAR (95 per cent) values but are not statistically significant in any year except 2015.

Finally, Table XIII shows that Islamic funds also have lower expected shortfall values in most of the study years. The mean differences of this risk measure for both Islamic and conventional funds exist but are statistically significant at a 1 per cent level only in two years. The Islamic funds show a higher level of risk exposure (measured by expected shortfall) only in two years: 2011 and 2015; however, in the remaining years the conventional funds exhibit higher risk compared with their Islamic peers.

All the above results clearly indicate that Islamic funds have overall lower total, systematic, idiosyncratic and downside risk exposures than their conventional counterparts,

Years	Islamic funds	Conventional funds	Mean difference	*t*	Sig
2009	−0.1965	0.5171	0.7137	−7.926	0.000*
2010	0.2208	0.3122	0.0914	−1.116	0.267
2011	0.2664	0.2844	0.0180	−0.258	0.797
2012	0.3725	0.4040	0.0314	−0.575	0.566
2013	0.3626	0.3140	0.0485	0.605	0.546
2014	0.4432	0.5277	0.0142	−0.166	0.868
2015	0.3660	0.3031	0.0628	0.895	0.372
2016	0.2892	0.2312	0.0580	0.904	0.367

Note: *Indicate the level of significance at 1%

Table X.
Yearly mean values of downside beta for both Islamic and conventional funds

Years	Islamic funds	Conventional funds	Mean difference	*t*	Sig
2009	0.0000	0.0915	0.0915	−2.309	0.025**
2010	0.0000	0.0000	0.0000	–	–
2011	0.0000	0.0000	0.0000	–	–
2012	0.0000	0.0000	0.0000	–	–
2013	0.1261	0.1690	0.0428	−0.959	0.339
2014	0.0000	0.0000	0.0000	–	–
2015	−0.0468	−0.0511	0.0042	0.359	0.720
2016	−0.1015	−0.1150	0.0135	0.563	0.574

Note: **Indicate the level of significance at 5%

Table XI.
Yearly mean values of relative beta for both Islamic and conventional funds

which leads to the acceptance of the study hypothesis. In a recent study, Reddy *et al.* (2017) also reported a lower risk (only systematic risk) exposure of Islamic funds than their conventional counterparts in the context of the United Kingdom and global mutual funds.

Conclusion and implications

This study analyzed the systematic, fund-specific and downside risk exposures of both Islamic and conventional funds to see which ones have higher risk exposures. The study used different risk measures, which are widely used in the finance literature. After analyzing these risk measures, it is found that Islamic funds have a lower total risk exposure in most of the sample years. The systematic or market risk of Islamic funds is found to be lower in most of the study years using different systematic risk measures. The study also found that Islamic funds have a lower idiosyncratic (fund-specific) risk in most of the study periods by employing all three fund-specific risk measures. Finally, for analyzing the downside risk exposure of mutual funds, four risk measures are used and the result indicates that Islamic funds have a lower downside risk exposure than their conventional counterparts in most of the study years. All the above results lead to the acceptance of the study hypothesis that Islamic funds exhibit lower risk exposures than their conventional counterparts.

The current research has implications for individual investors and fund managers. Individual investors need to consider mutual funds' risk along with their returns when making investment decisions. Earlier studies showed that investors also care about risk and prefer to invest in less risky investment alternatives. In Pakistan, the demand for Sharīʿah-compliant investment and Islamic mutual funds is increasing, which can be traced from the mutual funds'

Table XII.
Yearly mean values of VAR 95% for both Islamic and conventional funds

Years	Islamic funds	Conventional funds	Mean difference	*t*	Sig
2009	0.0252	−0.0217	0.0050	−0.700	0.486
2010	−0.0419	−0.0512	0.0092	1.455	0.149
2011	−0.0350	−0.0404	0.0054	1.179	0.242
2012	−0.0197	−0.0249	0.0052	1.555	0.123
2013	−0.0339	−0.0335	0.0004	−0.065	0.948
2014	−0.0271	−0.0340	0.0069	1.568	0.119
2015	−0.0444	−0.0560	0.0116	2.424	0.016**
2016	−0.0232	−0.0266	0.0034	1.451	0.144

Note: **Indicate the level of significance at 5%

Table XIII.
Yearly mean values of expected shortfall for both Islamic and conventional funds

Years	Islamic funds	Conventional funds	Mean difference	*t*	Sig
2009	−0.0315	−0.0282	0.0032	−0.483	0.630
2010	−0.0536	−0.0634	0.0097	1.259	0.211
2011	−0.0426	−0.0475	0.0049	0.884	0.378
2012	−0.0286	−0.0374	0.0087	1.588	0.115
2013	−0.0440	−0.0418	0.0022	−0.334	0.739
2014	−0.0355	−0.0430	0.0074	1.360	0.176
2015	−0.0603	−0.0820	0.0216	4.013	0.000*
2016	−0.0358	−0.0451	0.0092	2.577	0.011*

Note: *Indicate the level of significance at 1%

historical data. Sharīʿah-compliant investors want to avoid interest, and they also want to make their investment less risky compared to conventional investment alternatives. As this study shows that Islamic mutual funds exhibit a lower risk exposure than conventional funds, investors with lower risk preferences can invest in these kinds of funds more comfortably. In this way, the current research provides input to individual investors (especially Sharīʿah-compliant investors) to help them with their investment decisions as they can create a more diversified portfolio by considering Islamic funds as a means of reducing their risk exposure.

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About the authors

Farrukh Naveed is a PhD scholar at Air University School of Management, Air University, Islamabad, Pakistan. He is currently working as lecturer at Riphah International University, Faisalabad, Pakistan. His areas of specialization include Islamic finance, investment management, and corporate governance. Farrukh Naveed is the corresponding author and can be contacted at: farrukhnaveed22@gmail.com

Idrees Khawaja, PhD, is a Professor of Economics and Business at Air University, Islamabad. He holds a PhD in Economics from Pakistan Institute of Development Economics (PIDE) and Post Docs from the University of Oxford and the University of California, Los Angeles (UCLA). He has 11 years of corporate experience and 20 years of teaching experience in different reputed universities of Pakistan.

Lubna Maroof, PhD, is an Assistant Professor of Finance at Bahria University, Islamabad, Pakistan. She holds a PhD in Business Administration from NUST Business School, Rawalpindi, Pakistan. Her areas of interest include investment management and corporate finance.