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Investment opportunities and stock liquidity: evidence from DJIM index additions in the Persian Gulf states

Abstract

This paper investigates the impacts of index additions on the return and liquidity of Shariah-compliant shares in Kuwait, Oman, Qatar, and UAE. The author uses the sample of companies added to the Dow Jones Islamic Market index over the period of January 2008-December 2009. The findings show that stock prices respond positively to index addition events. However, evidence in support of the changes in the liquidity of added shares is mixed, depending on the country and the liquidity measures. These findings have important implications for Shariah-complaint investors, showing that companies whose activities reflect the beliefs and ethos of their investors in the Middle East may also be attractive from an investment point of view.

Keywords: Shariah-compliant investment, index addition, event study, abnormal returns, liquidity effects.
JEL Classification: G14, G15.

Introduction

Islamic equity funds (IEFs) market is one of the most dynamic sectors within the Islamic finance industry, growing at 15%-20%[1] per year. These funds are different from conventional equity funds because they select their placements on the basis of their compatibility with the Shariah[2] principles. The current number of Islamic funds is estimated at around 700, managing $55.4bn assets[3]. Although, this market may still be small by the world standards, it offers big potential over time as Muslem's awareness for these products increases. Shariah compliant funds also have the potential to appeal to a wider constituency of investors keen to pursue socially responsible investment principles.

While Muslems with large amounts to invest can purchase Shariah-compliant equities directly and build up their own investment portfolios, IEFs mostly benefit investors with limited capital and no means to acquire a diversified portfolio, or benefit from the proportionately lower dealing charges associated with large scale share acquisitions and disposals. The selection of Shariah-compliant companies takes place by a Shariah Supervisory Board (SSB) of financial institution, such as Dow Jones, which provides indexes that represent a portfolio of these shares.

SSB acts as an independent body to ensure that no form of investment or business activity is undertaken against Islamic law. Shariah-compliant companies are screened according to two qualitative and quantitative procedures. The qualitative criteria are used to assure that companies are not involved in activities such as financial services based on riba (usury), gharar (conventional insurance), maisir (gambling), or the production or trade of non-halal (prohibited) goods such as alcohol or pork. For companies whose activities comprise both halal and non-halal elements, SSB considers additional criteria, such as the core activity of the company that must be in line with the public interest, with non-halal elements as a negligible part of their activity.

Quantitative parameters are mainly used to determine the level of contribution from halal and non-halal elements towards revenue and profit of a company. For those companies which revenue is tainted by an avoidable non-halal activity, a cleansing mechanism which helps to estimate the percentage of such incomes that would be paid to a charitable organization is used to purify the dividends that are paid to the investors.

Shariah-complaint equity investment demands an active strategy, requiring individuals or fund managers to continuously monitor the market for buying the newly screened Shariah-complaint shares and selling those which have been deleted from the index. This is true, even for investors in the index funds, who replicate the performance of an index by holding all, or in the case of very large indices, a representative sample of shares. While, "indexing" is generally categorised as a passive investment strategy, index fund managers still have to actively minimise the tracking error of their portfolio when the composition of the index they follow is changed by buying the stocks that are added to the index and selling the stocks that are deleted from the index. These trading activities are expected to change demand for shares and affect their market price. Previous studies document price and liquidity rise following index additions.

There are two theoretical perspectives on the effects of index revisions: (1) a demand-based explanation; and (2) an information-based explanation. The de-

[1] Price Waterhouse 2009 Report on Shariah-compliant funds.
[2] Islamic jurisprudent.
[3] Price Waterhouse 2009 Report.

mand-based explanation sees index changes as information-free events. For example, Shleifer (1986) showed that the price increase following the index additions are due to the demand from index tracking. The demand effects can be temporary or permanent. The temporary effect is explained by the price pressure hypothesis[1], the permanent effect by the imperfect substitute hypothesis[2].

Information-based explanations include the information hypothesis and the liquidity hypothesis. Information-based explanations assume that index changes are not information-free events. Studies by Dhillon and Johnson (1991), and Jain (1987) support the information hypothesis. Amihud & Mendelson (1986), Beneish & Whaley (1996), and Hegde & McDermott (2003) contend that the price reactions to index additions can be explained by changes in market liquidity. According to this hypothesis, the price increase at index inclusion is from the increased liquidity as a result of greater visibility of the stock, greater interest from institutional investors, higher trading volume, and lower bid-ask spreads.

Current paper investigates the effects on the price performance and liquidity of the Shariah-complaint investments resulting from the addition of stocks to Dow Jones Islamic Market (DJIM) index in several Middle Eastern countries, including Kuwait, Oman, Qatar, and UAE. Although, Southeast Asia dominates the Islamic market with a 45% market share in terms of the number of funds in 2009, the Persian Gulf states led the ranking with 59% market share in terms of assets under management in 2009[3]. Our major findings show that stock prices respond positively to index additions events in these countries. However, evidence in support of the changes in the liquidity of added shares is mixed, depending on the country and the liquidity measures.

1. Data and methodology

1.1. Data. The data used in the present study were sourced from DJIM indexes and DataStream. Data series consisting of daily stock prices, bid and ask prices, and volume of trade were collected from DataStream. The rest of the data, such as the announcement dates of the additions, and daily index time series, were collected from DJIM indexes.

We used the following criteria to select our samples:

1. The firms were not involved in a merger or an acquisition event that led to their addition to or deletion from the DJIM index.
2. The firms' stocks did not split in the period during the study period.
3. The firms are not excluded for reasons such as unstable income, low profitability, and involvement in a merger or acquisition.
4. The firms had historical data available for a period commencing 150 trading days before and ending 150 trading days after the announcement dates.

Our sample consists of 29 Kuwaiti, 12 Omani, 11 Qatari, and 9 UAE shares.

1.2. Methodology. *1.2.1 Price effect.* To estimate abnormal share price returns, an event study methodology was applied. The estimated abnormal return is the difference between the realized return observed from the shares and the benchmark return. The return to the market portfolio is estimated via both ordinary least square (OLS) and Scholes and William (1977) procedures. The latter method is usually used when stocks do not trade at the same level of frequency as the market index and OLS may produce biased beta estimates. This problem is exacerbated for infrequently or thinly traded stocks as the sampling interval is reduced[4].

The event day is defined as the day of index addition announcement. For each event, the return time series data are divided into an estimation period and an event window. The estimation time series data are used to calculate the benchmark parameters, and the event window period is used for computing prediction errors based on the estimated parameters. The abnormal returns are represented by the prediction errors. The event window is extended from 10 days before, to 25 days after the event. The normal returns of stocks are the expected returns if there are no events, estimated over a period commencing 125 trading days before to 125 trading days after the announcement dates, excluding the event period of day -10 to day 25[5].

A major challenge in event study research is associated with the size of the data sample from which evidence can be presented in support of some hypothesis. MacKinlay (1997) suggest that a small sample will detect sufficiently large abnormal returns in an event study. However, the test statistics of these returns can be sensitive to the sample size. According to Brown and Warner (1985), a sample size of at least 50 securities makes the mean abnormal return distribution close to normal, and the

[1] Refer to Harris and Gurel (1986).
[2] Refer to Beneish and Whaley (1996), Lynch and Mendenhall (1997), Kaul et al. (2000), and Wurgler and Zhuravskaya (2002) for more details.
[3] Lipper 2010 Report.
[4] The frequency of trading declines with the reduction in the sampling interval.
[5] To save on space, the details of event study methodology are not presented here. Interested readers may refer to MacKinlay (1997), and Kothari and Warner (2004) for more details.

standard parametric tests (relying on the normality assumption) are well specified. For a sample of 5 and 20 securities, the goodness of fit tests does not indicate misspecification. However, the degree of skewness and kurtosis in the test statistics is higher than for samples of 50 (Brown and Warner, 1985). This can impact the level of the statistical significance of parametric t-statistics. Since the sample size for countries in our study is very small, non-normality in the distribution of abnormal returns can prevail, affecting our test statistics. McWilliams and Siegel (1997) suggest using non-parametric tests, such as the binomial Z-statistic, or the Wilcoxon signed rank test instead of parametric tests to solve this problem. In the present study, we estimate the non-parametric generalized sign test in conjunction with parametric t-statistics to check the robustness of the conclusions based on the last ones.

1.2.2. Liquidity effect. Market liquidity is an elusive concept and difficult to measure. In this study, we use four proxies to evaluate changes in the market liquidity during post event periods, compare to the pre event control periods. These include: (1) percentage spread as the quoted spread normalized by the midpoint of bid and ask price; (2) percentage change in the standard deviation of returns. Changes in these variables are inversely related to liquidity; (3) the volume of trade as the daily average of the transaction size; (4) amivest liquidity ratio, measured as the average ratio of share volume to the absolute return over all days with non zero returns. This ratio tests the ability of shares to absorb changes in trading volume without any significant change in their price. Changes of the last two variables are directly related to the liquidity. In calculating the percentage bid-ask spread and change in the volume of trade, we largely follow Hegde and McDermott (2003). Amivest liquidity ratio is estimated according to Amihud (2002).

To extend our study of liquidity changes from short to long term, we estimate the liquidity proxy coefficients for several intervals, including (days 1 to day 25), (day 1 to day 50), (day 1 to day 100), and (day 1 to day 150), compare to the corresponding control periods of (day -35 to day -10), (day -60 to day -10), (day -110 to day -10), and (day -160 to day -10), respectively. Mean difference represents the difference between average liquidity measures in each interval compare the corresponding interval in the control period.

2. Results

2.1. Price effects. Table 1 through Table 4 present cumulative abnormal returns (CARs) for the firms added to DJIM index. In order to test the robustness of our findings, we have used both the single factor, and Scholes-Williams market models as the benchmark for estimating normal return. Our results show that the magnitudes of CARs and the level of their statistical significance from the application of two methods are similar. Nevertheless, we report and discuss the results from Scholes-Williams model to avoid non-synchronous trading bias, as a considerable proportion of shares included in this study are likely to trade less frequently. We discuss the significance of CARs according to the estimated parametric t-statistics, and then apply non-parametric tests to investigate the robustness of our parametric tests due to small sample of our data.

Table 1 presents the estimated CARs for index addition in the pre- and post-event period for Kuwait. The coefficients for CARs in prevent period are negative and statistically insignificant at the conventional levels. CARs coefficient for the day 0 increases to 5.71% and becomes highly significant at 0.001 levels. For the post event period, the magnitude of these coefficients continuously increase and reach to 6.51% during day 0 to day 25, with a t-statistics that is significant at the 0.01 level. The significance and direction of the generalized sign tests are generally consistent with the magnitude and direction of the t-statistics.

Table 1. Mean cumulative abnormal return and relevant statistics for stock addition to DJIM index

Scholes-Williams market model				
Intervals	MCARs	t-statistics	Generalized sign Z-test	Negative/ positive
(-10, 0)	-2.45%	-1.17	-0.90	12/17
(-5, 0)	-0.76%	-0.41	-0.90	12/17
(0, 0)	5.80%	5.71***	4.67***	27/2>>>
(0, +5)	6.99%	2.76**	3.19***	23/6>>>
(0, +10)	7.33%	2.01*	2.46**	21/8>>
(0, +15)	4.33%	1.01	1.70*	19/10>
(0, +25)	6.51%	1.12	1.33$	18/11)

Notes: This Table presents CARs around the index addition for the 29 Kuwait firms in our sample. Results are presented for the windows (-10, 0), (-5, 0), (0, 0), (0, +5), (0, +10), (0, +15), and (0, +25). The positive/negative column reflects how many firms had positive cumulative abnormal returns in that respective window. The generalized sign Z-test is a test with the null hypothesis that the fraction of positive cumulative returns is the same as in the estimation period. The symbols $, *,**, and *** denote statistical significance at the 10%, 5%, and 1%, and 0.1% levels, respectively, using the one-tail test. The symbols (, < or), > , etc., correspond to $,* and show the significance and direction of the generalized sign test.

Table 2 presents the estimated CARs for index addition in the pre- and post-event period for Oman. The coefficient for CARs, accumulated during day -10 to day 0, and day -5 to day 0 are -4.96% and -3.96%, respectively. These coefficients are statistically sig-

nificant at 0.01% level. CARs coefficient for the day 0, and the post event period become statistically insignificant based on the magnitude of the t-statistics. However, the magnitude of the generalised sign Z-test indicates that the zero value of CARs for day 0 to day 15 is statistically significant at the 0.05 level.

Table 2. Mean cumulative abnormal return and relevant statistics for stock addition to DJIM index

Scholes-Williams market model				
Intervals	MCARs	t-statistics	Generalized sign Z-test	Negative/ positive
(-10, 0)	-4.96%	-2.83**	-1.08	4/8
(-5, 0)	-3.96%	-2.43**	-1.08	4/8
(0, 0)	-0.04%	-0.05	0.65	7/5
(0, +5)	0.045%	0.14	0.65	7/5
(0, +10)	-0.34%	-0.10	0.07	6/6
(0, +15)	0.00%	0.00	1.81*	9/3>
(0, +25)	-0.71%	-0.10	1.23	8/4

Notes: This Table presents the CARs around the index addition for the 12 Omani firms in our sample. Results are presented for the windows (-10, 0), (-5, 0), (0, 0), (0, +5), (0, +10), (0, +15), and (0, +25). The positive/negative column reflects how many firms had positive cumulative abnormal returns in that respective window. The generalized sign Z-test is a test with the null hypothesis that the fraction of positive cumulative returns is the same as in the estimation period. The symbols $, *, **, and *** denote statistical significance at the 10%, 5%, and 1%, and 0.1% levels, respectively, using the one-tailed test. The symbols (, < or), > etc., correspond to $,* and show the significance and direction of the generalized sign test.

Table 3 presents the estimated CARs for index addition in the pre- and post-event period for Qatar. The estimated coefficients for CARs in pre-event period is around -1% and marginally significant at the 0.1 level for day -10 to day 0 according to the generalised sign Z-test. CARs coefficient for day 0 increases to -0.54% and remain marginally significant according to the generalised sign Z-test. The CARs coefficients for the period after the event day gradually become positive and statistically insignificant at the conventional levels.

Table 3. Mean cumulative abnormal return and relevant statistics for stock addition to DJIM index

Scholes-Williams market model				
Intervals	MCARs	t-statistics	Generalized sign Z-test	Negative/ positive
(-10, 0)	-1.00%	-0.55	-1.51$	3/8(
(-5, 0)	-1.01%	-0.69	-0.91	4/7
(0, 0)	-0.54%	-0.96	-1.51$	3/8(
(0, +5)	-1.48%	-1.30$	-0.30	5/6
(0, +10)	0.36%	0.27	-0.91	7/4
(0, +15)	0.96%	0.72	-0.91	7/4
(0, +25)	0.46%	0.02	-0.30	5/6

Notes: This Table presents the CARs around the index addition for the 11 Qatari firms in our sample. Results are presented for the windows (-10, 0), (-5, 0), (0, 0), (0, +5), (0, +10), (0, +15), and (0, +25). The positive/negative column reflects how many firms had positive CARs in that respective window. The generalized sign Z-test is a test with the null hypothesis that the fraction of positive cumulative returns is the same as in the estimation period. The symbols $, *, **, and *** denote statistical significance at the 10%, 5%, and 1%, and 0.1% levels, respectively, using the one-tailed test. The symbols (, < or), > etc., correspond to $,* and show the significance and direction of the generalized sign test.

Table 4 presents the estimated CARs for index addition in the pre- and post-event period for UAE. The coefficient for CARs, accumulated during day -10 to day 0, and day -5 to day 0 are -3.12% and -4.71%, respectively. However, only coefficient for day -5 to day 0 is significant at the 0.01 level. CARs coefficients for the event day, and day 0 to day 5 period increase to 4.96% and 5.33%, respectively, and remain highly significant at the conventional level. The size of these coefficients for period the later interval hover around 3%, and is marginally significant for day 0 to day 25 according to the generalised sign Z-test. The significance and direction of the generalized sign tests in Table 4 are generally consistent with the magnitude and direction of the t-statistics.

Table 4. Mean cumulative abnormal return and relevant statistics for stock addition to DJIM index

Scholes-Williams market model				
Intervals	MCARs	t-statistics	Generalized sign Z-test	Negative/ positive
(-10, 0)	-3.12%	-1.57	-0.25	4/5
(-5, 0)	-4.71%	2.43**	1.58$	2/7(
(0, 0)	4.96%	5.57***	3.09**	9/0>>
(0, +5)	5.33%	2.08**	2.42**	8/1>>
(0, +10)	2.26%	0.80	1.75*	7/2>
(0, +15)	3.12%	1.16	1.09	6/3
(0, +25)	3.92%	1.04	1.75$	7/2>

Notes: This Table presents the CARs around the index addition for the 9 UAE firms in our sample. Results are presented for the windows (-10, 0), (-5, 0), (0, 0), (0, +5), (0, +10), (0, +15), and (0, +25). The positive/negative column reflects how many firms had positive cumulative abnormal returns in that respective window. The generalized sign Z-test is a test with the null hypothesis that the fraction of positive cumulative returns is the same as in the estimation period. The symbols $, *, **, and *** denote statistical significance at the 10%, 5%, and 1%, and 0.1% levels, respectively, using the one-tailed test. The symbols (,< or), > etc., correspond to $,* and show the significance and direction of the generalized sign test.

An examination of estimated CARs in Table 1 through Table 4 show that the reaction of the stock markets in our sample to the index addition of Shariah-complaint shares is generally positive, however, CARs vary in magnitude from one country to another. While in a country such as Kuwait and UAE, the stock market reaction to the index addition is highly positive, in countries such as Oman and Qatar, stock market positive reaction is less pronounced. Overall, the results from non-parametric tests in these Tables confirm that the results from parametric tests are robust, and the small sample size doesn't seem to be an issue in this study.

The prolonged effects of the index addition and deletion on CARs in Tables 1 through 4 indicate that these events are likely to contain information, thus sending signals about the features of the index additions to the market. To test this hypothesis, we compared the cumulative returns (CRs) for the added firms with cumulative return for the market over the period from day -10 to day 150[1].

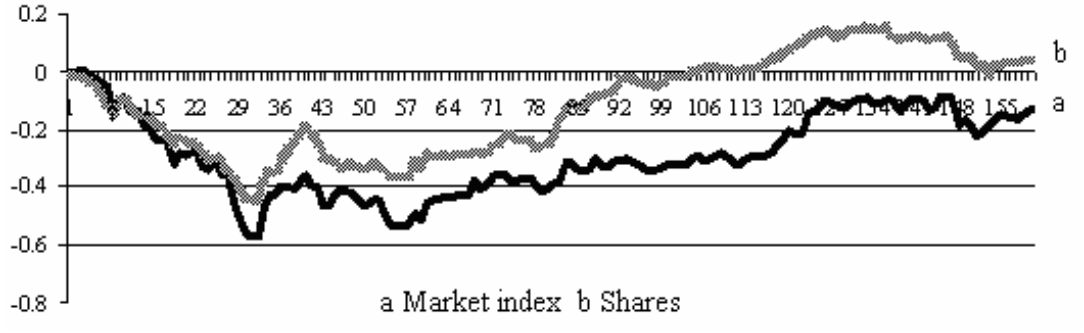

Fig. 1. Cumulative firm return and market return around day -10 to day 150
Kuwaiti stocks addition to DJIM index

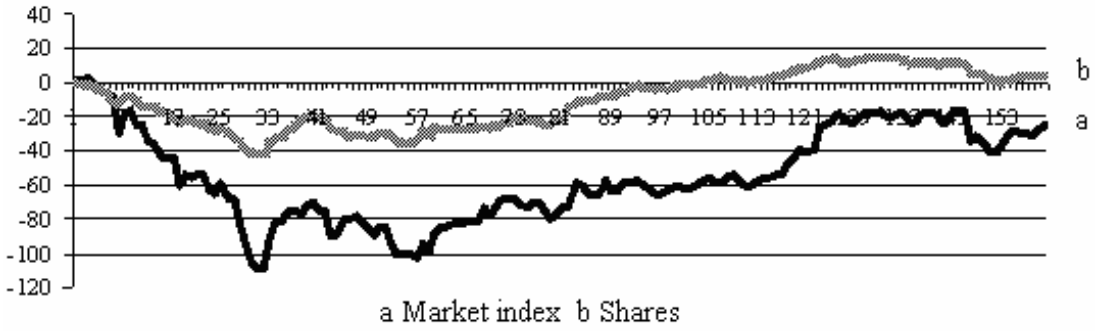

Fig. 2. Risk-adjusted commulative firm return and market return around day 10 to day 150
Kuwaiti index addition to DJIM index

Figure 1 through Figure 8 provides long term evidence of market reaction to the index addition for all countries included in this study. Figure 1 and Figure 2 provide evidence of market reactions to the index addition for Kuwait during day -10 to day 150. According to Figure 1, CRs for the portfolio of added shares continuously increase and reach to 4.25% by day 150, compare to the market CRs of -12.92% during the same period. Figure 2 compares the performance of the same variables on risk adjusted[2] basis. According to this Figure, the market risk-adjusted CRs on day 150 is -24.63 compare with the CRs of 3.98 for Shariah-compliant shares.

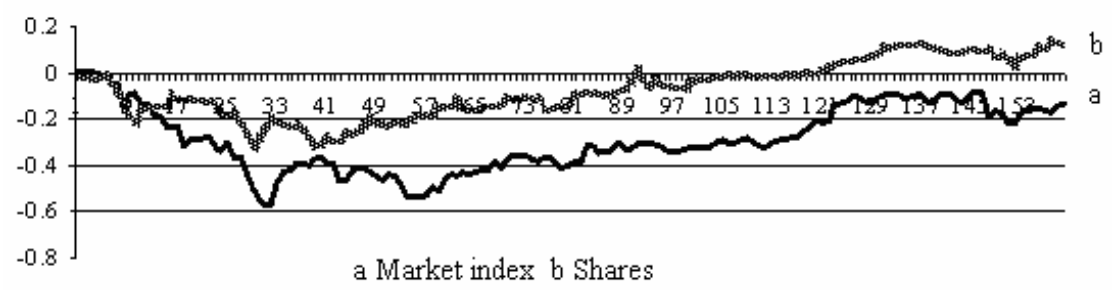

Fig. 3. Cumulative firm return and market return around day -10 to day 150
Omani stock addition to DJIM index

[1] We believe that if index inclusion contains information, this information must have been reflected in share prices earlier than the event day and should extend for some time afterwards. As a result, we have used a sample of data that extends from 10 days before to 150 days after the event.
[2] We used Sharpe ratio for this purpose.

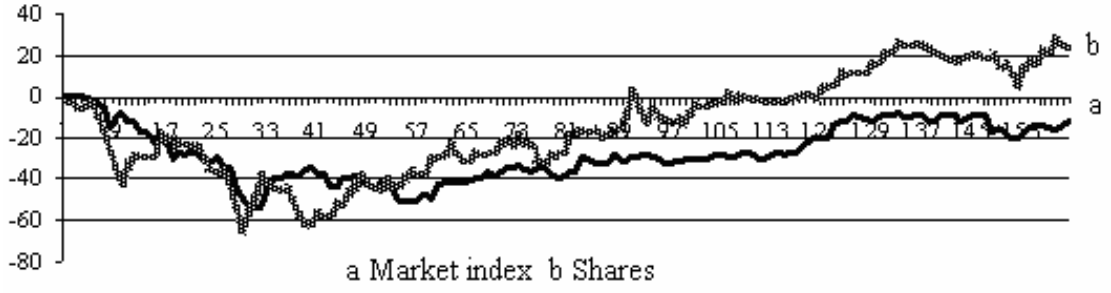

Fig. 4. Risk-adjusted cumulative firm return and market return aroun day -10 to day 150 Omani stock addition to DJIM index

Figure 3 and Figure 4 presents the long-term evidence of market reactions to the index addition for Oman during day -10 to day 150. According to Figure 3, CRs for the portfolio of added shares reach to 12.28% compare to the market CRs of -12.92%, demonstrating shares' superior performance on day 150. Figure 4 compares the performance of the same variables on risk-adjusted basis. On risk-adjusted basis, CRs for market on day 150 shows the figure of -12.21 compare with the CRs figure of 24.31 for Shariah compliant shares.

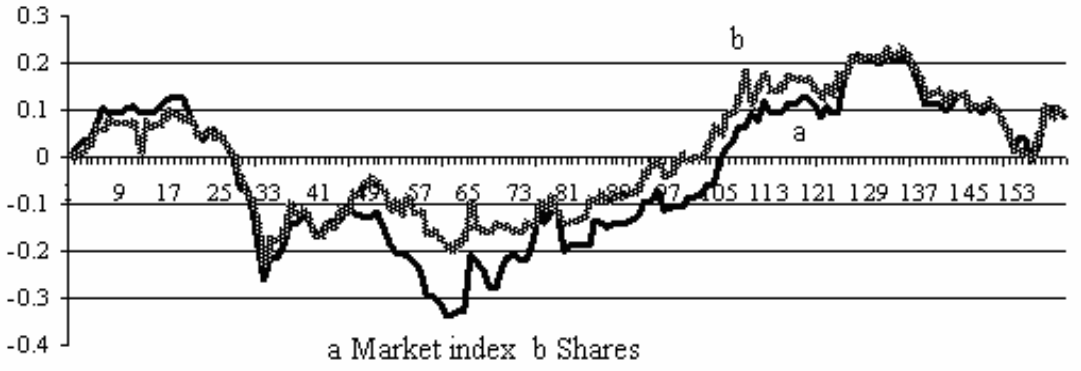

Fig. 5. Cumulative firm return and market return around day -10 to day 150 Qatari stock addition to DJIM index

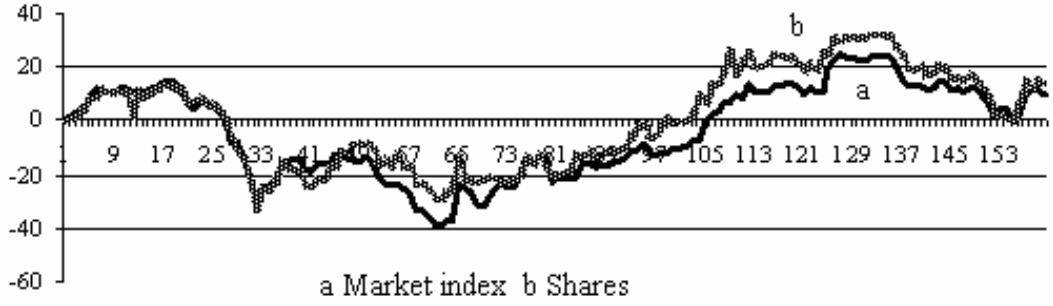

Fig. 6. Risk-adjusted cumulative firm return and market return around day -10 to day 150 Qatari stock addition to DJIM index

Figure 5 and Figure 6 presents the long-term evidence of market reactions to the index addition for Qatar during day -10 to day 150. According to Figure 5, CRs for the portfolio of added shares reach to 9.80% on day 150, compare to the market CRs of 8.59% for the same day. Figure 6 compares the performance of the same variables on risk-adjusted basis. According to this Figure, the ratio for the market reach 9.74 on day, compare to the figure of 14.29 for Shariah-compliant shares on the same day.

Figure 7 and Figure 8 presents the long-term evidence of market reactions to the index addition for UAE during day -10 to day 150. According to Figure 7, CRs for the portfolio of added shares reach to 13.7% compare to the market CRs of 7.2%, demonstrating shares' superior performance on day 150. Figure 8 compares the performance of the same variables on risk adjusted basis. According to this figure, the risk adjusted CRs for Shariah compliant shares on day 150 is 42.39, compare to CRs of 18.68 for the market on the same day.

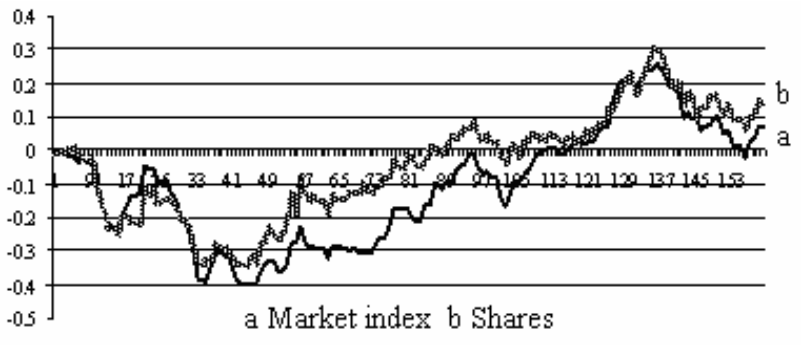

Fig. 7. Cumulative firm return and market return around day -10 to day 150 UAE stock addition to DJIM index

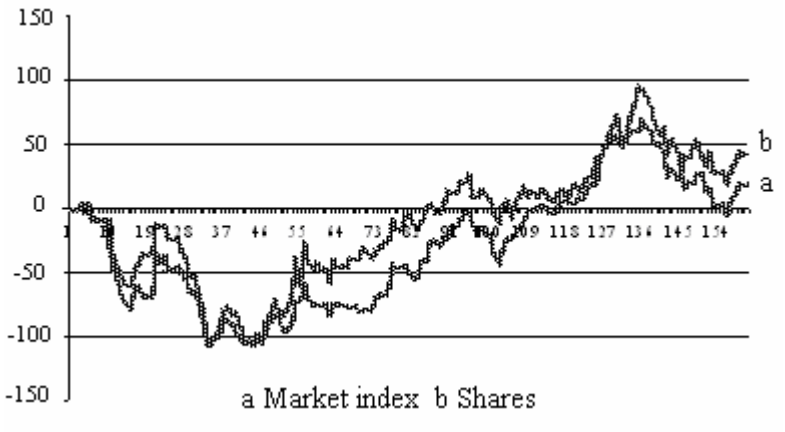

Fig. 8. Risk-adjusted cumulative firm return and market return around day -10 to day 150 UAE stock addition to DJIM index

Figure 1 through Figure 8 provides strong evidence that Shariah-compliant index additions convey positive information to the market, generating superior cumulative return relative to the market in the long term.

2.2. Liquidity effect. In this Section, we examine the liquidity effects of changes in the composition of the DJIM index. Tests were extended to different intervals to distinguish between the short- and long-term effects of the events. According to Amihud (2002), liquidity shocks and return shocks are positively correlated. So, the examination of liquidity changes in this Section should be considered as a complement to the findings of price effect analysis in the previous Section.

Table 5. Measures of liquidity changes from pre to post DJIM index additions

Intervals / Liquidity measures	Day 1 to day 25 (-35 to -10)	Day 1 to day 50 (-60 to -10)	Day 1 to day 100 (-110 to -10)	Day 1 to day 150 (-160 to -10)
Standard deviation (SD)	5.82%	4.93%	4.55%	4.29%
SD (control period)	3.51%	5.51%	4.24%	3.51%
SD change	2.31%**	-0,58%	0.31%	0.78%*
Relative bid-ask spread	15.07	19.07	21.39	22.81
Relative bid-ask spread (control period)	17.27	21.78	21.32	19.98
Bid-ask mean difference	-2.20	-2.71	0.07	2.83$
Average daily volume	31.76	101.27	107.01	233.33
Average daily volume (control period)	25.00	50.00	100.00	150.00
Average daily volume change	27.04%*	102.54$	7.01%	55.56%***
Amivest liquidity measure	7.47	7.32	8.25	8.36
Amivest liquidity measure (control period)	7.21	7.48	8.12	9.06
Amivest liquidity measure change	0.26	-0.16	0.13	-0.70*

Notes: This Table presents the change of a variety of liquidity measures around the index addition for an equally weighted portfolio of 29 Kuwaiti firms in our sample. Results are presented for the intervals (day 1 to day 25, day 1 to day 50, day 1 to day 100, and day 1 to day 150), compare to control periods (day -35 to day -10, day -60 to day -10, day -110 to day -10, and day -160 to day -10), respectively. Mean difference represents the difference between average liquidity measures in each interval compare the corresponding interval in the control period. Control period estimated coefficients are shown in brackets. The symbols $, *, **, and *** denote statistical significance at the 10%, 5%, and 1%, and 0.1% levels, respectively, using the one-tailed test.

Table 5 provides evidence changes in liquidity measures for Kuwait. The standard deviation of return shows an increase of 2.31% in the short term and 0.78% in the long term. The coefficients for changes in this variable in the medium term are not statistically significant. Changes in the volume of trade show an increase of 27.04% to 102.54% according to the estimated coefficients that are statistically significant. Changes in Amivest liquidity and bid-ask spread measures show decline in liquidity in the long term and no change in liquidity in short to medium terms. Overall, there is more evidence supporting decline in liquidity in Kuwaiti shares following index addition.

Table 6. Measures of liquidity changes from pre to post DJIM Index additions

Intervals / Liquidity measures	Day 1 to day 25 (-35 to -10)	Day 1 to day 50 (-60 to -10)	Day 1 to day 100 (-110 to -10)	Day 1 to day 150 (-160 to -10)
Standard deviation (SD)	3.35%	3.09%	2.95%	2.73%
SD (control period)	2.49%	2.90%	2.62%	2.35%
SD change	0.86%*	0.19%	0.33%$	0.38%*
Relative bid-ask spread	4.07	4.07	3.66	3.49
Relative bid-ask spread (control period)	4.58	4.17	4.17	4.17
Bid-ask mean difference	-0.51	0.10	-0.52$	-0.68**
Average daily volume	17.64	44.90	126.81	165.95
Average daily volume (control period)	25.00	50.00	100.00	150.00
Average daily volume change	-29.46%*	-10.21%	26.81%***	10.63%$
Amivest liquidity measure	8.92	8.59	7.41	7.23
Amivest liquidity measure (control period)	9.15	8.48	7.85	8.18
Amivest liquidity measure change	-0.23	0.11	-0.44	-0.95

Notes: This Table presents the change of a variety of liquidity measures around the index addition for an equally weighted portfolio of 12 Omani firms in our sample. Results are presented for the intervals (day 1 to day 25, day 1 to day 50, day 1 to day 100, and day 1 to day 150), compare to control periods (day -35 to day -10, day -60 to day -10, day -110 to day -10, and day -160 to day -10), respectively. Mean difference represents the difference between average liquidity measures in each interval compare the corresponding interval in the control period. Control period estimated coefficients are shown in brackets. The symbols $, *, *, and *** denote statistical significance at the 10%, 5%, and 1%, and 0.1% levels, respectively, using the one-tailed test.

According to the estimated liquidity measures in Table 6 for Oman, changes in the standard deviation of returns for significant coefficients are positive and vary from 0.33% to 0.86%. The volume of trade declines by 29.46% in short term and increase up to 26.81% in the long term. All of the Amivest liquidity measure coefficients show a decline in liquidity, however, they are not statistically significant. All of the coefficients for relative bid-ask spread is negative, but the long term coefficient is statistically significant. Overall, evidence for changes in liquidity of stock market in Oman is mixed, and a clear inference about increase or decline in the liquidity of stock market can not be made.

Table 7. Measures of liquidity changes from pre to post DJIM index additions

Intervals / Liquidity measures	Day 1 to day 25 (-35 to -10)	Day 1 to day 50 (-60 to -10)	Day 1 to day 100 (-110 to -10)	Day 1 to day 150 (-160 to -10)
Standard deviation (SD)	2.07%	2.28%	2.21%	2.07%
SD (control period)	2.60%	2.35%	1.94%	1.73%
SD change	-0.53%*	-0.07%	0.27%*	0.34%***
Relative bid-ask spread	2.61	2.63	2.29	2.23
Relative bid-ask spread (control period)	2.60	2.23	2.23	2.23
Bid-ask mean difference	0.01	0.40*	0.06	0.00
Average daily volume	05.83	13.47	128.89	153.55
Average daily volume (control period)	25.00	50.00	100.00	150.00
Average daily volume change	-76.65%*	-73.06%*	28.89%**	2.37%
Amivest liquidity measure	12.67	11.29	12.27	12.55
Amivest liquidity measure (control period)	12.39	11.77	12.39	13.20
Amivest liquidity measure change	-0.28	-0.48	-0.12	-0.65$

Notes: This Table presents the change of a variety of liquidity measures around the index addition for an equally weighted portfolio of 11 Qatari firms in our sample. Results are presented for the intervals (day 1 to day 25, day 1 to day 50, day 1 to day 100, and day 1 to day 150), compare to control periods (day -35 to day -10, day -60 to day -10, day -110 to day -10, and day -160 to day -10), respectively. Mean difference represents the difference between average liquidity measures in each interval compare the corresponding interval in the control period. Control period estimated coefficients are shown in brackets. The symbols $, *, **, and *** denote statistical significance at the 10%, 5%, and 1%, and 0.1% levels, respectively, using the one-tailed test.

Evidences of changes in the liquidity of Qatar stock exchange due to index additions are presented in Table 7. The standard deviation coefficients show a decline of 0.53% in the short term, and an increases of 0.34% in the long term. The volume of trade shows a decline of 76.65% in short term and an increase of 28.89% in medium to long term. The coefficients for Amivest liquidity measure are all negative and marginally significant only in the long term. The coefficient for bid-ask spread are all positive, however, only show a significant increase of 0.40 basis point in the short to medium term. Similar to the case of Oman, evidence for changes in liquidity of stock market in Qatar is mixed, and a clear inference about increase or decline in the liquidity of stock market in this country can not be made.

Table 8. Measures of liquidity changes from pre to post DJIM index additions

Intervals / Liquidity measures	Day 1 to day 25 (-35 to -10)	Day 1 to day 50 (-60 to -10)	Day 1 to day 100 (-110 to -10)	Day 1 to day 150 (-160 to -10)
Standard deviation (SD)	3.06%	3.20%	2.84%	2.84%
SD (control period)	3.11%	3.24	2.88%	2.58%
SD change	-0.05%	-0.04	-0.04%	-0.26%
Relative bid-ask spread	0.34%	0.32%	0.36%	0.25%
Relative bid-ask spread (control period)	0.31%	0.33%	0.25%	0.24%
Bid-ask mean difference	0.03%$	-0.01%	0.11%**	0.01%
Average daily volume	31.61	61.49	123.05	190.9
Average daily volume (control period)	25	50	100	150
Average daily volume change	26.45%*	22.98%	23.05%**	27.27%***
Amivest liquidity measure	16.38	16.12	16.33	16.45
Amivest liquidity measure (control period)	16.95	16.45	17.01	17.30
Amivest liquidity measure change	-0.57$	-0.33	-0.68**	-0.85***

Notes: This Table presents the change of a variety of liquidity measures around the index addition for an equally weighted portfolio of 9 UAE firms in our sample. Results are presented for the intervals (days 1 to day 25, day 1 to day 50, day 1 to day 100, and day 1 to day 150), compare to control periods (day -35 to day -10, day -60 to day -10, day -110 to day -10, and day -160 to day -10), respectively. Mean difference represents the difference between average liquidity measures in each interval compare to the corresponding interval in the control period. Control period estimated coefficients are shown in brackets. The symbols $, *, **, and *** denote statistical significance at the 10%, 5%, and 1%, and 0.1% levels, respectively, using the one-tailed test.

Table 8 presents change in the liquidity measures from pre to post index additions in the UAE shares. The results show a decline in the standard deviation of return from 4% to 26%. This is accompanied by an increase in the volume of trade between 22.98% and 27.27%. However, other liquidity proxies, including bid-ask spread, and Amivest liquidity measure coefficients suggest a decline in liquidity. Overall, there is more evidence in support of increase in liquidity than a decline in UAE market. Evidence in Table 5 through Table 8 show mixed findings of liquidity changes in stock markets in Persian Gulf states from DJIM index additions.

Concluding remarks

This paper investigates the impacts of index additions on the return and liquidity of Shariah-compliant shares in Kuwait, Qatar, Oman and UAE. We use the sample of companies added to Dow Jones Islamic market index over the period of January 2008-December 2009.

We used an event study methodology to estimate CARs in the days surrounding the event for testing the price effect. We used several liquidity measures; including the bid-ask spread, Amivest liquidity ratio, standard deviation of returns, and volume of trade to estimate changes in the liquidity of the added shares. Consistent with findings of the index additions studies from developed countries, our results show that stock prices respond positively to index additions for all of the countries in our samples. However, our evidences for changes in the liquidity of added shares are mixed. While, evidence supports some improvement in the liquidity of shares in UAE, results from Kuwait, Oman, and Qatar, largely indicate either no change, or decline in liquidity of shares following index additions. This is against evidence from index additions studies in developed markets which support liquidity hypothesis. However, it is consistent with Chakrabarti et al. (2002) for 12 developing countries, showing a decline in market liquidity. Hacibedel and Bommel (2006) also found that "the liquidity analysis results do not support the liquidity hypothesis for explaining the permanent price impact" of stock additions to the Morgan Stanley Capital International Emerging Market index for 24 countries.

The possible reasons behind these mixed results include small data sample, clustering problem, and adverse information effect. For instance, liquidity suppliers may revise their bid-ask spread upwards following index addition due to increases in adverse

selection cost. There are also evidences that increase in volume of trade, implying improvement in liquidity may be accompanied by increase in the standard deviation of returns, suggesting a decline in liquidity.

The overall findings of our study have important implications for ethical funds in general, and Shariah-complaint investors in particular, as it clearly show that companies whose activities mirror the beliefs and value of their investors may also be attractive from an investment point of view. An obvious limitation of our study is that it was carried on a relatively small sample of stocks added to DJIM index. As a result, our findings should not be freely generalized.

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