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Stock return comovement around the Dow Jones Islamic Market World Index revisions

Abstract

We examine patterns of comovement in stock returns around the Dow Jones Islamic Market World Index (DJIMWI) quarterly revision events. Our analysis is based on a sample of 8,250 companies from eighteen countries during the period May 1999 to June 2012. We find that a stock's comovement with the DJIMWI increases when it joins and decreases when it leaves the index. We also find that the comovement of newly added (deleted) stocks with the existing DJIMWI constituents increases (declines) during periods of high trading activity and during the month of Ramadan. Further tests reveal that changes in the fundamentals have no impact on the comovements of added and deleted stocks. Overall, our results indicate that stock returns respond to the emotional state of investors around information-free events.

JEL classification: G12, G14

Keywords: DJIMWI revisions; religion; comovement; Ramadan effect; behavioral finance; market efficiency.

1. Introduction

Several studies show that religion affects human psychology and market behavior. Stulz and Williamson (2003), for example, show that religion is a key determinant of the cross-sectional variation in creditor rights and the level of enforcement. Ariel (1990) and Cadsby and Ratner (1992) report significant abnormal returns prior to the Christian festivals of Christmas and Good Friday. Frieder and Subrahmanyam (2004) show that the US equity market is affected by the major Catholic and Jewish High Holy Days, including St. Patrick's Day and Rosh Hashanah. Many studies also report significant and positive calendar effects in the month of Ramadan in most Muslim countries (e.g. Al-Hajieh et al., 2011; Bialkowski et al., 2012; Al-Khazali, 2014). They argue that Ramadan has a positive effect on investor psychology and this effect translates into optimistic investment decisions.

In this study, we argue that if the practice of Islam influences the mood and the investment decisions of Muslim investors, stocks traded by this group may move together even when their fundamental characteristics are uncorrelated. To investigate this issue, we examine the changes in stock return comovement around Dow Jones Islamic Market World Index (DJIMWI) revision events. Our study makes two important contributions to the literature. First, the fact that the DJIMWI revision criteria are clearly defined and publicly available provides us with an interesting setting to study the patterns of stock returns around events that do not carry any signals about changes in fundamentals. Second, the comovement literature focuses mainly on revision events associated with the major country indexes (e.g. Barberies et al., 2005; Coakley, Kougoulis, and Nankervis 2014; Claessens and Yafeh, 2012). However, several studies document that the revision events associated with some of the major country indexes, including the S&P 500, are not entirely information-free (see, e.g., Cai, 2007; Kaul et al., 2000; Jain, 1987). Furthermore, previous studies on religion and stock markets focus mainly on the stock price reactions to festival occasions. In this study, we take a different approach and examine the return comovement around DJIMWI index revisions. We argue that investigating the change in the correlation structure of stock returns following revision events that are bounded by well-defined religious guidelines should enhance our understanding of the impact of religious practice on stock returns.

Our analysis allows us to distinguish between the fundamental- and the sentiment-based views of return comovement. Specifically, the efficient market hypothesis suggests that stock returns reflect firms' fundamentals and that any price comovement should be due to comovement in fundamentals. Thus, information-free events, such as DJIMWI revisions, should not alter the comovement structure of the added and deleted stocks. However, recent theories suggest that emotions and feelings judgements affect decision-making (e.g. Loewenstein et al., 2001). Wright

and Bower (1992) show that stock prices are affected by changes in investor sentiment even around events with an economically neutral cost-benefit perspective. Thus, correlated sentiment may induce a common factor in stock returns and affect price comovement. When a stock enters (exits) the DJIMWI index, it will be held and traded by a new group of investors. If these investors share a common sentiment, the correlation of the added (deleted) stock's return with the returns of other DJIMWI constituents will increase (decline).

We use a univariate regression approach similar to that in Vijh (1994), Barberis et al. (2005), and Green and Hwang (2009) to measure the shift in the comovement structure of event stocks around DJIMWI revisions. Specifically, we regress the returns of each event stock on the returns of the DJIMWI. To examine the change in the event stock's comovement with the DJIMWI, we estimate the univariate regression separately for the period before and the period after the revision event. Consistent with the sentiment-based view, we find that a stock's comovement with the DJIMWI increases after additions and decreases after deletions.

For a better distinction between the fundamental- and sentiment-based theories, we use two approaches. The first is bivariate analysis, which involves regressing the event stock returns on both the DJIMWI and the local index.[1] The bivariate regression is also estimated separately for the pre- and post-index-revision periods. We show that, when a stock joins the DJIMWI, its beta with the DJIMWI rises and falls in relation to the local index. We also show that these comovement patterns move in the opposite direction when a stock is excluded from the DJIMWI. The second approach involves regressing changes in the beta on firm characteristics and market and economic factors (see, e.g., Claessens and Yafeh, 2012; Eun et al., 2015). We find no significant relationships between changes in beta, firm characteristics, and market and economic variables. This finding is consistent with the sentiment-based theory, which suggests that the correlated sentiment of DJIMWI investors induces a common factor in stock returns, causing their comovement with the DJIMWI to increase and their comovement with the local index to decline.

Agyei-Ampomah and Mazouz (2011) argue that since sentiment affects stock prices through trading, it is reasonable to expect a positive relationship between comovement and trading volume. This implies that the comovement of newly added stocks with the DJIMWI should increase during periods of trading activity. To examine this issue, we estimate the excess

[1] We use the major local indexes of each of the eighteen countries in our sample. For example, we use the FTSE All Share Index for the UK sample companies added to (deleted from) the DJIMWI. For Egypt we use EGX30 a local index.

comovement of newly added stocks that exhibit the highest daily volumes in a given quarter.[2] Despite some cross-country differences, we find that the comovement of newly added stocks with the DJIMWI tends to increase during periods of high trading volume. This implies that the comovement of DJIMWI stocks is driven, at least partly, by investor sentiment.

Although the results reported above suggest that the comovement of DJIMWI stocks reflects the sentiment of index investors, we have not yet established that this sentiment is related to the religiosity practice of Muslim investors. To investigate this issue, we estimate the excess comovement of stock returns around DJIMWI revisions during the month of Ramadan. Our focus on that excess comovement is motivated by Beit-Hallahmi and Argyle (1997), who argue that religion delivers social support that can promote optimism. Since Ramadan is one of the five pillars of Islam, the comovement amongst DJIMWI constituents would be expected to increase significantly during the month of Ramadan. Consistent with this argument, we find that newly added stocks co-move more strongly with the DJIMWI during the month of Ramadan. We also show some (weak) evidence that the comovement of deleted stocks with the DJIMWI is particularly low during Ramadan.

The remainder of the paper is organised as follows. Section 2 provides a brief review of the related literature. Section 3 describes the data. Section 4 discusses the methodology and empirical results. Section 5 concludes.

2. Related literature

This study forms part of the literature on the impact of behavioral biases on asset returns. Several studies show that investor sentiment and social mood play a significant role in general decision making (Schwarz, 1990; Loewensteinet al., 2001). Others establish that emotions play an important role in economic decision-making (Etzioni, 1988; Mehra and Sah, 2002). Edman et al. (2007), for example, report significant falls in stock returns following defeats for national football teams. Saunders (1993) examines the relationship between stock returns and sunshine in the City of New York over the period 1927-1989. He finds that stock returns on the sunny days are significantly higher than those on the cloudy days. Similar findings are reported by Hirshleifer and Shumway (2003), based on data from 26 stock market indexes over the period 1982-1997.

The strand of the literature closest to this study examines the effect of religious practice on asset prices. Frieder and Subrahmanyam (2004) examine US equity returns and volume around

[2] We define high trading activity as the highest 10%, 20% and 30% respectively. Our results remain qualitatively unchanged irrespective of the cut-off point used. In the current paper, we report the 30% cut-off point, consistent with Agyei-Ampomah and Mazouz (2011).

important Catholic and Jewish Holy Days over the period 1946-2000. They find significant positive abnormal returns around both St. Patrick's Day and Rosh Hashanah and a volume decline around Rosh Hashanah and Yom Kippur. The authors attribute the return increase to optimism and/or increased investor confidence linked with religious celebrations, and the volume decline to the fact that investors exit the market for reasons of religious observance. Many studies also examine the Ramadan effect. For example, Bialkowski et al. (2012) examine stock returns during Ramadan for 14 predominantly Muslim countries over the period 1989-2007. They show that stock returns are significantly higher and less volatile during Ramadan. They argue that Ramadan promotes feelings of solidarity and social identification, which affect investment decisions. Seyyed et al. (2005) also find a significant decline in the volatility of Saudi Arabian stock returns, but no significant change in the average return, during Ramadan. Bialkowski et al. (2013) find that Turkish stock returns are significantly higher during Ramadan. However, the effect has fallen over recent years. Similarly, Al-Khazali (2014) finds that the Ramadan effect exists in most sample countries over the period 1996-2006, but disappears completely after 2007.

Several studies show strong common factors in the returns of different types of stocks. Pirinsky and Wang (2006) document strong comovement amongst the stocks of firms headquartered in the same geographical location. Kumar and Lee (2006) show that stocks held and traded by individual investors tend to comove strongly. Pirinsky and Wang (2006) also report strong comovement among stocks that are held and traded by institutional investors. Green and Hwang (2009) document strong comovement amongst similarly priced stocks. Specifically, they show that stocks that undergo a stock split comove more with low-priced stocks and less with high-priced stocks. Agyei-Ampomah and Mazouz (2011) show that option-listed stocks exhibit an increase in comovement with a portfolio of option-listed stocks and a decrease in comovement with a portfolio of non-optioned stocks. Vijh (1994) and Barberis et al. (2005) investigate comovement theories in the context of S&P 500 index revisions. They show that stocks added to the S&P 500 index covary more with the existing constituents of the index. Finally, Claessens and Yafeh (2012) use data on forty developed and developing countries to show that firms experience an increase in their betas when added to a major index.

Despite the presence of strong comovement amongst certain types of stocks, many studies have found it difficult to establish whether the comovement is driven by common fundamentals or correlated sentiment. This is because events such as stock splits, option listing and index revisions may not be entirely information-free. For example, firms may take the decision to undergo a stock split in response to changes in their fundamental characteristics, which may not yet be known to outside investors. The endogenous nature of option listing decisions, which are made by

exchanges and regulators in response to changes in certain market conditions, may also make the interpretation of the results of option-listing studies difficult (see, e.g., Mayhew and Mihov, 2004). Several authors, including Cai (2007), Kaul et al. (2000) and Jain (1987), also argue that additions and deletions from a major index, such as the S&P 500, may carry signals about the future financial health of the event firm.

The fact that DJIMWI revision decisions are based entirely on publicly available information provides a unique opportunity to test comovement theories in an environment where index changes do not contain signals about firms' fundamentals. Furthermore, since the DJIMWI is likely to be an attractive trading venue for Muslim investors, investigating changes in the correlation structure of the stock returns around the index revisions should help us shed light on whether religious beliefs influence investment decisions.

3. Data and sample characteristics

Our analysis is based on the DJIMWI, which are considered to be most visible and wide-used Shari'ah compliant benchmark in the world.[3] We obtain data from the Dow Jones Company.[4] We consider all companies that are added to (deleted from) the DJIMWI, from the launch date (24 May 1999) to June 2012. Unlike conventional indexes, the selection process for the DJIMWI entails two phases. The first phase involves the filtering of companies on the basis of industry sector. To be considered for inclusion in the DJIMWI, the company's primary business activity must not be incompatible with Islamic principles, where incompatible activities include pork, tobacco, alcohol, conventional banks and insurance, arms/defence, and leisure (gambling, pornography, hotels, media, etc.). The second phase entails filtering companies on the basis of financial ratios that are incompatible with Shari'ah investment guidelines: both the gearing ratio (total debt / two-year moving average market capitalization) and cash compliance must be less than 33%. Cash compliance is based on two ratios: cash and interest-bearing securities / two-year moving average market capitalization, and accounts receivable / two-year moving average market capitalization. The screening methodology is subject to approval by an independent Shari'ah Supervisory Board. At the end of January 2014, the DJIMWI comprised a total of 2,172 companies with approximate total market capitalization of US$ 19.5 trillion. These companies came from 55 countries and were drawn from ten different sectors (www.djindex.com).

[3] See http://www.djindexes.com/islamicmarket/ for further details.

[4] We are grateful to the Dow Jones Company for providing us with the data and the announcement dates for additions to and deletions from the DJIMWI.

Our initial data set consists of a total of 14,092 revision events - 7,751 additions and 6,341 deletions. For our analysis, we require either DataStream or Sedol codes to be available to obtain data relating to the daily stock prices and volume of trading of firms as well as data regarding the corresponding indexes. This requirement resulted in the exclusion of 852 firms (448 added and 404 deleted firms). To construct portfolio returns at a country level, we require each country to have at least fifteen companies added to and/or deleted from the index. Furthermore, each company must have a complete set of daily stock prices around the index revision events. This restriction resulted in a final usable sample of 8,250 companies (4,378 additions and 3,872 deletions) spread across eighteen countries. We use the US dollar as the base currency for all countries in our sample.

Table 1 reports some descriptive statistics for the added (Panel A) and deleted (Panel B) stocks. It shows that the DJIMWI constituents are dominated by firms from the US, Japan, Taiwan, Canada, Australia, the UK and Hong Kong. Companies from these seven countries make up a total weight of just over 85% of the index. The figures in Table 1 also reveal that, only two of the eighteen countries in our sample are from the Muslim world (Egypt and Indonesia, with a combined weight of about 2%). Recent figures (January 2014) indicate that the total weight of the companies from the eleven Muslim countries that feature in the DJIMWI is about 1.6%. The average market capitalization associated with additions (deletions), which ranges from US$ 0.114 billion (US$ 0.111 billion) for Egyptian firms to US$ 7.31 billion (US$ 6.17 billion) for German firms, indicates that the DJIMWI generally consists of large companies.

[INSERT TABLE 1 HERE]

4. Empirical tests and results

4.1. Univariate analysis

The friction-based theory predicts that a stock's return will comove more (less) with the return of the existing constituents of the DJIMWI following its addition to (deletion from) the index. However, the fundamental-based theory predicts that, since DJIMWI revisions are information-free events, additions or deletions should not alter the comovement between event stocks and the existing DJIMWI constituents. To test these hypotheses, we estimate the following univariate regression:

$$R_{j,i,t} = \alpha_{j,i} + \beta_{j,i,Islamic} R_{DJMWI,j,i,t} + \varepsilon_{j,i,t} \quad (1)$$

where $R_{j,i,t}$ is the return on event stock j of country i in month t, $R_{DJMWI,j,i,t}$ is the monthly return on country j's DJIMWI and $\varepsilon_{j,i,t}$ is the error term.

We estimate Eq. (1) separately before and after each addition and deletion event. The pre-event period runs over twelve months ending one month before the revision announcement date, and the post-event period spans twelve months starting a month after the announcement date.

Table 2 reports the cross-sectional average change in the slope coefficient, $\overline{\Delta\beta}$, and the cross-sectional average change in the regression R^2, $\overline{\Delta R^2}$, for the added stocks. We use the cross-correlation adjusted t-statistic to gauge whether the cross-sectional averages are significantly different from zero[5]. For the full sample of additions, $\overline{\Delta\beta}$ is positive (0.279) and significant at the 1% level. The values $\overline{\Delta\beta}$ observed in the individual countries are also positive and statistically significant at conventional levels, ranging from 0.0689 in the case of Germany to 0.554 in the case of the US. We also find that the R^2 in Eq. (1) increases by 10.71 percentage points after additions and we find a significant increase in the R^2 in all sample countries, except for the case of Egypt. The increase in both the slope coefficient and the R^2 after additions indicates that newly added stocks exhibit stronger comovement with the existing DJIMWI constituents.

Table 3 reports the values of $\overline{\Delta\beta}$ and $\overline{\Delta R^2}$ associated with the sample of deletions. Under the sentiment-based view, changes in the DJIMWI betas would exhibit a significant decline after deletion events, while the fundamental-based view would not expected significant changes in betas (Barberis et al., 2005). The results in Table 3 show that stocks deleted from the DJIMWI experience a significant decline in their betas. In the full sample of deletions, the slope coefficient, $\beta_{j,i,Islamic}$, in Eq. (1) exhibits a significant decrease of -0.1645. The slope coefficient in Eq. (1) declines significantly in all sample countries, with values of $\overline{\Delta\beta}$ ranging from -0.0234 in Chile to -0.3496 in the US. Table 3 also shows $\overline{\Delta R^2}$ of the univariate regressions associated with the full sample of deletions and with the subsamples of individual countries are positive, but insignificant.

Changes in the slope coefficients in Eq. (1) imply that the comovement of a stock's return with the return on the DJIMWI increases after an addition and declines after a deletion, with the changes being larger for additions than for deletions. $\overline{\Delta R^2}$ of the univariate regression (Eq. (1)) shows that the change in the correlation structure of the event stock's return with the DJIMWI is stronger for additions than deletions. The results of the univariate analysis are similar to those of Barberis et al. (2005), who report a strongly significant increase in both the slope coefficients and

[5] We also use the non-parametric Wilcoxon Signed Rank test (WSRT) and the results remain unchanged.

R^2 following additions to the S&P 500, but a weakly significant decline in the slope and an insignificant change in the R^2 for deleted stocks. We attribute this asymmetric change in the comovement structure to the investors' awareness hypothesis of Chen et al. (2004), which predicts that awareness improves after additions to the S&P 500, but does not necessarily diminish after deletions. In any case, despite some quantitative differences across the samples of additions and deletions, the overall results suggest that the comovement of newly added (deleted) stocks with the existing DJIMWI constituents increases (decreases) in periods following the index revision events. Since the DJIMWI revision criteria are publicly available, the comovement structure are likely to be driven by changes in investor sentiment rather than firm fundamentals.

4.2. Bivariate analysis

We estimate bivariate regressions to examine changes in the comovements of event stocks with the DJIMWI and their local indexes following DJIMWI revision events. The friction- or sentiment-based theory predicts that the comovement between added stocks and the existing DJIMWI constituents should increase, and the comovement of these stocks with their local indexes should decline, after they join the DJIMWI. The sentiment-based theory predicts the same patterns but in the opposite directions for deleted stocks. However, the fundamental-based theory would suggest that, since the DJIMWI revisions are based on publicly available information, the revision events should not alter the comovement structure of the event stocks. To distinguish between these conflicting views, we estimate a bivariate regression model similar to that in Barberis et al. (2005). This model is specified as follows:

$$R_{j,i,t} = \alpha_{j,i} + \beta_{j,i,Islamic} R_{DJIMWI,j,i,t} + \beta_{j,i,Local} R_{Local-index,j,i,t} + \varepsilon_{j,i,t} \quad (2)$$

where $R_{Local\_index,j,it}$ is the monthly return on the local index of country j in which stock i is listed, and the remaining variables are as defined earlier. Again, we estimate Eq. (2) separately before and after each addition and deletion event, where the pre-event period runs over twelve months ending one month before the revision announcement date, and the post-event period spans twelve months starting a month after the announcement date.

Tables 2 and 3 report the cross-sectional averages of the slope coefficients on the DJIMWI returns, $\overline{\Delta\beta}_{Islamic}$, as well as the cross-sectional averages of the slope coefficients on the local index, $\overline{\Delta\beta}_{Local}$, for the samples of additions and deletions, respectively. In line with the univariate analysis, we use cross-correlation adjusted t-statistics and the WSRT to assess whether

changes in the slope coefficients, between the pre- and post-index revision periods, are statistically significant.

Table 2 shows a significant increase in comovement of new DJIMWI members with the existing DJIMWI constituents, while their comovement with their local indexes exhibits a significant decline, in the post-addition period. In the full sample of additions, the mean changes in the slopes of the coefficients on the DJIMWI and the local index are 0.4207 and -0.1591, respectively. The cross-correlation adjusted t-test indicates that the changes are significant at the 1% level[6]. The values of $\overline{\Delta\beta}_{Islamic}$ observed for the samples of individual countries are positive and highly significant, while the values of $\overline{\Delta\beta}_{Local}$ associated with the individual countries are significantly negative, except for the cases of Chile and Finland.

Table 3 reports the values of $\overline{\Delta\beta}_{Islamic}$ and $\overline{\Delta\beta}_{Local}$ associated with deletions. For the full sample of deletions, the average of the slope coefficients on the DJIMWI decreases significantly by -0.3781, whereas that on the local index exhibits a significant increase of 0.2619. These results are unlikely to be the outcome of extreme values, as a significant decrease (increase) in $\overline{\Delta\beta}_{Islamic}$ ($\overline{\Delta\beta}_{Local}$) is observed in all of the sample countries.

These results provide strong support for the sentiment-based theory of comovement. Our evidence is consistent with several other studies, including Vijh (1994), Barberis et al. (2005), and Agyei-Ampomah and Mazouz (2011). As we argued earlier, our analysis may provide a cleaner test of the comovement theories, as the DJIMWI revision criteria are based on publicly available information, whereas the S&P 500 revision events and option listing decisions are not known to the public and may carry signals about firm fundamentals (see, e.g., Kaul et al., 2000; Jain, 1987; Mayhew and Mihov, 2004).

[INSERT TABLES 2&3 HERE]

4.3. The determinants of comovement

Barberis et al. (2005) argue that if stock prices are driven merely by fundamentals, then index revision should not alter comovement in stock returns, provided that the revision itself is an information-free event. However, while the DJIMWI revision criteria are unlikely to carry signals about fundamentals, firm characteristics are not constant over time and may change following the revision events. Thus, it may be possible to argue that the earlier reported changes

[6] The Wilcoxon Signed Rank test (WSRT) produces very similar results. Details are available upon request.

in stock return comovement may be caused by contemporaneous changes in firms' fundamentals. To shed some light on this issue, we estimate a model similar to Claessens and Yafeh (2012) and Eun et al. (2015):

$$\Delta Comovement = \gamma_0 + \gamma_1 \Delta Size + \gamma_2 \Delta BTM + \gamma_3 \Delta ROE + \gamma_4 \Delta Investment + \gamma_5 \Delta Leverage + \gamma_6 Market - liq + \gamma_7 LnGDP\ per\ capita + \gamma_8 Tightness + \gamma_9 Individualism + error \quad (3)$$

Here, Δ refers to the change that is the post- minus the pre-index revision value in a given variable. $Comovement$ is measured by the parameter $\beta_{j,i,Islamic}$ in Eq.(2). $Size$ is the log of market capitalization at the fiscal year end. BTM is the log of the book-to-market equity ratio, computed as the book value of equity scaled by the market value at the fiscal year end. ROE is a profitability measure computed as earnings divided by the equity book value. $Investment$ is capital expenditure scaled by total assets. $Leverage$ is the sum of short-term and long-term debts scaled by the total book value of assets. We include the above variables as controls in Eq.(3) because Fama and French (2015) show that size, value, profitability and investment are the main determinants of stock returns. Several other studies also show that leverage affect stock returns (see, e.g., George and Hwang, 2010).

In addition to firm controls, Eq.(3) includes a number of country characteristics that have been shown to affect comovement in stock returns (see, e.g., Claessens and Yafeh, 2012; Eun et al., 2015): $Market - liq$, is the total market capitalization over the gross domestic products (GDP); $LnGDP\ per\ capita$ is the natural logarithm of a country's Gross Domestic Product (GDP) per capita; $Tightness$ measures the strength of a country's social norms tolerance for deviant behavior; $Individualism$ measures the extent to which people attempt to differentiate themselves from others[7]. $Market - liq$ and $LnGDP\ per\ capita$ are respectively used as controls for countries' financial and economic development, while tightness and individualism are used to account for the potential influence of culture on stock return comovement. Data on firm characteristics as well as $Market - liq$ and $LnGDP\ per\ capita$ are obtained from Datastream, while tightness and individualism are from Gelfand et al. (2011) and Hofstede (2001), respectively.

[7] Further details on how tightness and individualism are measured can be found in Eun e al. (2015).

[**INSERT TABLE 4 HERE**]

Eq. (3) is estimated separately for additions and deletions and the results are reported in Table 4. Panel A of Table 4 reports the results for the sample of additions. The coefficients γ_1 through γ_5 are not significantly different from zero, suggesting that changes in comovements are not driven by changes in fundamentals. Similarly, the significantly positive intercept indicates that the post-addition increase in comovements cannot be fully attributed to changes in firms' fundamentals. The coefficient on $Tightness$ is positive and significant, implying that stocks from countries with strong social norms and low tolerance for deviant behavior comove more with the DJIMWI. This finding is consistent with a positive association between Islam and cultural tightness, and is consistent with the evidence from Eun et al. (2015) that stock return comovement is higher in culturally tight countries[8]. The remaining country controls, namely $Market - liq$, $LnGDP\ per\ capita$, and $Individualism$, are not statistically significant.

Panel B of Table 4 presents the results of the OLS estimate of Eq. (3) using the deletions sample. In line with the additions sample, the post-deletion decline in comovement is not significantly related to changes in firm size, value, profitability, investment, and leverage. The intercept of Eq. (3) is negative and highly significant, suggesting that the change in the comovement following deletions cannot be fully explained by changes in fundamentals. Individualism is the only variable that is significant. Its negative sign implies that stocks from individualistic countries comove more negatively with the DJIMWI after deletion. The results for the additions sample suggest that the DJIMWI index tends to comove more strongly with stocks from culturally tight countries. This implies that the DJIMWI constituents tend to be held by investors whose behavior is more homogeneous (Gelfand et al., 2006). A stock from a highly individualistic country which leaves the index is likely to be held by individualistic investors, who tend to herd with other investors (see, e.g., Markus and Kitayama, 1991; Chui et al., 2010).

4.4. Comovement and trading activity

Agyei-Ampomah and Mazouz (2011) argue that, since investor sentiment affects stock prices through trading, the change in the comovement structure is likely to be more pronounced during high trading activity. We test this in the context of DJIMWI revisions by modifying our univariate and bivariate equations (Eqs. (1) and (2)) as follows:

[8] Muslim countries tend to exhibit the tightest national culture according to the tightness measure of Gelfand et al. (2011).

$$R_{j,i,t} = \alpha_{j,i} + \beta_{j,i} R_{DJMWI,j,i,t} + \beta_{j,i.D.vol}(Dvol_{j,i,t} \times R_{DJIMWI,j,i,t}) + \varepsilon_{j,i,t} \quad (4)$$

$$R_{j,i,t} = \alpha_{j,i} + \beta_{j,i,Islamic} R_{DJMWI,j,i,t} + \beta_{j,i,Local} R_{Local-index,j,i,t} + \beta_{j,i,Islamic.D.vol} \times D.vol_{j,i,t} \times R_{DJMWI,j,i,t} + \beta_{j,i,Local.D.vol} \times D.vol_{j,i,t} \times R_{Local-index,j,i,t} + \varepsilon_{j,i,t} \quad (5)$$

where $D.vol_{j,i,t}$ is a dummy variable taking a value of one if the trading volume for stock i of country j on day t belongs to the highest 30% of daily volumes in a given quarter and zero otherwise. We follow Agyei-Ampomah and Mazouz (2011) in using the 30% cut-off[9]. The remaining variables are as defined in Sections 4.1 and 4.2. We estimate Eqs. (4) and (5) using daily returns over a period of one year before the addition (deletion) announcement and one year after the addition (deletion). We focus upon changes in the coefficients of the interaction terms in Eqs. (4) and (5). A positive and significant change in the interaction term would capture post-addition (deletion) excess comovement due to high trading activity. The fundamental-based theory of comovement does not predict any change in the effect of trading activity on the stock comovement subsequent to a revision event. In other words, the fundamental-based view does not predict any significant change, between the pre- and post-index-revision periods, in the parameters$\beta_{j,i,D.vol}$, $\beta_{j,i,Islamic.D.vol}$ and$\beta_{j,i,Local.D.vol}$. However, the sentiment-based view predicts that investor sentiment affects the returns of newly added stocks more strongly during periods of high trading activity. It therefore predicts a significant increase (decrease) in $\beta_{j,i,D.vol}$ and $\beta_{j,i,Islamic.D.vol}$ ($\beta_{j,i,Local.D.vol}$) after additions and a significant decrease (increase) in $\beta_{j,i,D.vol}$ and $\beta_{j,i,Islamic.D.vol}$ ($\beta_{j,i,Local.D.vol}$) after deletions.

Table 5 reports the cross-sectional average changes in the interaction terms in Eqs. (4) and (5) for the samples of additions and deletions. Panel A presents the results for additions. It shows that the change in $\beta_{j,i,D.vol}$ is positive and statistically significant at the 1% level for the overall sample and significantly positive for all countries, except France, Spain and India. The change in $\beta_{j,i,Islamic.D.vol}$ is also positive and statistically significant for both the full sample of additions and the subsamples of individual countries, except for Australia, Egypt and Indonesia. In the full sample of additions, the change in $\beta_{j,i,Local.D.vol}$ is negative, but insignificant. However, we note a

[9] We repeated our analysis using 10% and 20% cut-off points and our conclusions remained unchanged. More details on this is available upon request.

significant decline in $\beta_{j,i,Local.D.vol}$ in ten of the sample countries and no significant change in $\beta_{j,i,Local.D.vol}$ in the remaining eight.

[INSERT TABLE 5 HERE]

Panel B of Table 5 reports the cross-sectional average changes in the interaction terms in Eqs. (4) and (5) for the sample of deletions. The average changes in the $\beta_{j,i,D.vol}$ associated with the full sample of deletions and the subsamples of individual countries are not statistically significant. However, $\beta_{j,i,Islamic.D.vol}$ declines significantly after deletions. We also report a post-deletion average decrease in $\beta_{j,i,Islamic.D.vol}$ in ten of the eighteen sample countries. This decline is statistically significant for Brazil, Canada and Japan. For the full sample of deletions, $\beta_{j,i,Local.D.vol}$ experiences an average post-deletion increase of 0.3123 (t-value = 12.06). All sample countries experience an average increase in $\beta_{j,i,Local.D.vol}$ after deletions and the increase is significant in nine of the eighteen sample countries.

Taken together, the results in Tables 5 indicate that, for newly added stocks, high levels of trading activity are more (less) strongly associated with comovement with the DJIMWI (local index). The reverse is true for newly deleted stocks. This evidence is therefore consistent with the sentiment-based theory and contradicts the fundamental-based theory of comovement.

4.5. The Ramadan effect

So far, we have shown that the change in comovement between the return of event stocks and the return of the DJIMWI after revision events is likely to be driven by investor sentiment rather than changes in firm fundamentals. However, it is not clear whether this sentiment is related to religious practice. Since the DJIMWI selection criteria are bounded by well-defined religious guidelines, the index is an attractive trading venue for Muslim investors. To shed some light on the impact of Muslim sentiment on stock returns, we estimate abnormal returns around Ramadan and the excess comovement between newly added and deleted stocks and the existing constituents of the DJIMWI during the month of Ramadan.

4.5.1. Abnormal returns

To test the relevance of Ramdan, we estimate the daily abnormal returns of each addition and deletion around Ramadan as follows:

$$AR_{j,i,\tau} = R_{j,i,\tau} - \hat{\alpha}_{j,i,history} - \hat{\beta}_{j,i,Islamic,history} R_{DJIMWI,j,i,\tau} - \hat{\beta}_{j,i,local,history} R_{Local-index,j,i,\tau} \quad (6)$$

where $AR_{j,i,\tau}$ is the abnormal return earned by stock i from country j on day τ, $R_{j,i,\tau}$, $R_{DJIMWI,j,i,\tau}$, and $R_{Local-index,j,i,\tau}$ are the continuously compounded daily returns on stock i, the DJMWI index and the local index of country j, respectively. The parameters $\hat{\alpha}_{j,i,history}$, $\hat{\beta}_{j,i,Islamic,history}$, and $\hat{\beta}_{j,i,local,history}$ are the coefficients of the OLS estimates of Eq.(2) using daily returns over the [-200, -51] window prior to the beginning of Ramadan.

The cumulative abnormal return of stock i and the average cumulative abnormal return across N stocks over a window of S days around Ramadan are given as $CAR_{is} = \sum_{t=1}^{S} AR_{it}$ and $\overline{CAR_s} = \frac{1}{N}\sum_{i=1}^{N} CAR_{is}$, respectively. The standard t-test is used to gauge whether $\overline{CAR_s}$ is significantly different from zero.[10]

[INSERT TABLE 6 HERE]

Table 6 reports the CARs of the [-3, +3] window around the beginning of Ramadan for the whole sample and for individual countries following both addition and deletion events[11]. The CARs for the whole sample of additions are significantly positive. This finding is consistent with the view that once a stock joins an Islamic index its price is affected by Muslim sentiment. Significantly positive CARs are also observed in eleven out of the eighteen countries included in our sample. The highest CARs are observed in the countries with the largest Muslim population, namely Indonesia (3.84%) and Egypt (3.12%), while the smallest significant CARs are observed in the UK (0.47%).

Table 6 also shows that the CARs for the entire sample of deleted stocks are not significantly different from zero. We observe significantly negative CARs for Canada, Chile, Egypt and India and significantly positive CARs for Taiwan. However, the CARs associated with the remaining 13 countries are not statistically significant. This might suggest that once a stock exits an Islamic index, it becomes less attractive to Muslim investors.

[10] $T = \frac{\overline{CAR_s}}{\widehat{\sigma_{CAR}}/\sqrt{N}}$, where $\widehat{\sigma_{CAR}}$ is the standard deviations of $CAR_{i,s}$ ($\widehat{\sigma_{CAR}} = \sqrt{\frac{1}{N-1}\sum_{i=1}^{N}(CAR_{i,s} - \overline{CAR_s})^2}$)

[11] Similar results are obtained when CARs are measured over the [-5, +5] window around the beginning of Ramadan. More details are available upon request.

4.5.2. Excess comovement

We estimate the following models to investigate the effect of Ramadan on the stock return comovement around the DJIMWI revision events:

$$R_{j,i,t} = \alpha_{j,i} + \beta_{j,i} R_{DJIMWI,j,i,t} + \beta_{j,i.Ram}(D.Ram_{j,i,t} \times R_{DJIMWI,j,i,t}) + \varepsilon_{j,i,t} \quad (7)$$

$$R_{j,i,t} = \alpha_{j,i} + \beta_{j,i,Islamic} R_{DJMWI,j,i,t} + \beta_{j,i,Local} R_{Local-index,j,i,t} + \beta_{j,i,Islamic.D.Ram} \times D.Ram_{j,i,t} \times R_{DJIMWI,j,i,t} + \beta_{j,i,Local.D.Ram} \times D.Ram_{j,i,t} \times R_{Local-index,j,i,t} + \varepsilon_{j,i,t} \quad (8)$$

where $DRAM_{j,i,t}$ is a dummy variable taking a value of one if trading day t associated with stock i from country j belongs to the month of Ramadan and zero otherwise. The remaining variables are as previously defined. Eqs. (7) and (8) are estimated using daily returns, separately for the one year period before and the one period after each revision event. We are interested in the changes in $\beta_{j,i.D.Ram}$ in Eq. (7) and the changes in $\beta_{j,i,Islamic.D.Ram}$ and $\beta_{j,i,Local.D.Ram}$ in Eq. (8). Since Ramadan does not signal any information about the future performance of the event stocks, the fundamental-based theory of comovement does not predict any change in excess comovement between newly added and deleted stocks and the existing constituents of the DJIMWI during the month of Ramadan. However, if the correlated sentiment of Muslim investors increases during Ramadan, then the sentiment-based theory predicts that newly added (deleted) stocks should comove more (less) strongly with the existing DJIMWI members. Therefore, the average changes in the coefficient $\beta_{j,i,D.Ram}$ in Eq. (7) and $\beta_{j,i,Islamic.D.Ram}$ in Eq. (8) following additions (deletions) are expected to be positive (negative). The sentiment-based theory also predicts that, if more (less) Muslim sentiment is incorporated into the prices of newly added (deleted) stocks during the month of Ramadan, then additions (deletions) should comove less (more) strongly with their local index. In other words, the sentiment-based view predicts a negative (positive) average change in the coefficient $\beta_{j,i,Local.D.Ram}$ following additions (deletions).

Table 7 reports the cross-sectional average changes in the interaction terms in Eqs. (7) and (8) for the samples of additions and deletions. Panel A reports the results from the sample of additions. In line with the previous analysis, we use both cross-correlation adjusted t-statistics and the WSRT to test whether the changes, between the pre- and post-index revision periods, in

$\beta_{j,i,D.Ram}$, $\beta_{j,i,Islamic.D.Ram}$ and $\beta_{j,i,Local.D.Ram}$ are significantly different from zero[12]. Consistent with the sentiment-based view, for the full sample of additions, the coefficient $\beta_{j,i,D.Ram}$ in Eq. (7) exhibits a significant average increase of 0.0814 in the post-addition periods. A significant increase in $\beta_{j,i,D.Ram}$ following additions is also reported in eleven out of the eighteen countries included in the analysis. Eq. (8) yields similar results. Specifically, the average change, between the pre- and post-addition periods, in $\beta_{j,i,Islamic.D.Ram}$ associated with the full sample of additions is positive (0.0643) and significant at the 1% level. A positive average change in $\beta_{j,i,Islamic.D.Ram}$ is observed in all sample countries, but the change is only significant in seven out of the eighteen cases. In the full sample of additions, the average change in $\beta_{j,i,Local.D.Ram}$ is negative, but statistically insignificant. Half of the sample countries exhibit a decrease in average $\beta_{j,i,Local.D.Ram}$ after deletions, but the decrease is only significant in the case of Egypt, India, Indonesia and the US.

[INSERT TABLE 7 HERE]

Panel B of Table 7 presents the changes in the interaction terms in Eqs. (7) and (8) for the sample of deletions. In the full sample of deletions, the mean change in $\beta_{j,i,D.Ram}$ is negative (-0.012) and significant at the 10% level. A significant decline in average $\beta_{j,i,D.Ram}$ is observed in five countries, namely Egypt, Greece, Indonesia, Japan and Spain. Deleted stocks from the remaining thirteen countries experience no significant excess comovement during the month of Ramadan. The average change in $\beta_{j,i,Islamic.D.Ram}$ associated with the full sample of deletions is also negative (-0.032) and significant at the 5% level. We also observe declines in the average $\beta_{j,i,Islamic.D.Ram}$ in sixteen out of the eighteen sample countries. However, the decrease is only significant (at 10%) in the case of Egypt, Finland and the US. The significantly positive average change associated with $\beta_{j,i,Islamic.D.Ram}$ indicates that excess comovement of deleted stocks with their local index increases during Ramadan. However, while a positive change, between the pre- and post-deletion periods, in $\beta_{j,i,Islamic.D.Ram}$ is observed in all of the sample countries, the change is only statistically significant for Egypt.

Overall, the analysis in this section suggests that the effect of Ramadan on the comovement of stock returns is more pronounced for the stocks that are added to the DJIMWI

[12] The t-test and WSRT yield the same conclusion. For the sake of brevity, the WSRT is not reported.

than for those deleted from the index, consistent with the investors' awareness hypothesis of Chen et al. (2004).Our results also suggest that the comovement of additions (deletions) with the existing DJIMWI members increases (decreases) during that month, consistent with the view that religious practice affects stock returns.

5. Summary and conclusions

This study investigates the change in the correlation structure of stock returns following additions to and deletions from the DJIMWI. The fact that DJIMWI revisions are information-free provides us with an ideal setting in which to distinguish between fundamental- and sentiment-based theories of comovement. While these theories have also been tested around other events, such as stock splits, option listing and S&P 500 index revisions, those events may not be entirely information-free. As a robustness check, we show that changes in firm fundamentals and economic factors around DJIMWI revisions do not influence changes in the beta. We also focus our analysis on the DJIMWI revision events so as to investigate the role played by religious practice. Investigating return comovement around Ramadan should provide us with a better understanding of the role played by religious practice.

Our analysis provides several interesting findings. First, consistent with the sentiment-based view, we find that the comovement of newly added stocks with the existing DJIMWI constituents increases following index revisions. We also show that the comovement of stocks with their local indexes decline after their inclusion in the DJIMWI. We observe similar patterns, but in opposite directions, for stocks that are deleted from the DJIMWI. Second, we examine the impact of trading activity on the return comovement of the event stocks. We find that newly added stocks comove more strongly with the DJIMWI and less so with their local indexes during periods of high trading activity. Similar patterns in the opposite directions are observed when stocks are deleted from the DJIMWI. Finally, we examine changes in the return correlation structure associated with DJIMWI revisions during the month of Ramadan. We find that newly added (deleted) stocks comove more (less) strongly with the existing DJIMWI constituents during the month of Ramadan, consistent with the sentiment-based view. This finding is also consistent with the view that religious practice affects asset prices.

Overall, our study adds to the findings of the growing literature in behavioral finance and contributes to the strand of literature that focuses on the effect of religious practice on asset prices.

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Table 1: This table shows the distribution of the sample of additions and deletions by their country of origin. Mark.cap is the market capitalization in US$ of the added (deleted) firms. Market capitalization is calculated as the market price in US$ multiplied by the total number of outstanding shares and the figures are reported in millions.

Panel A: Distribution of added companies by country				
Country	Freq	Proportion	Mark.cap	
		%	Mean	Median
Australia	333	7.6	1220	408
Brazil	44	1	4270	830
Canada	436	10	1610	590
Chile	42	1	1350	699
Egypt	36	0.8	114	84.8
Finland	40	0.9	2350	1520
France	69	1.6	6500	1730
Germany	110	2.5	7310	1250
Greece	44	1	1380	895
Hong Kong	284	6.5	875	256
India	119	2.7	1150	192
Indonesia	52	1.2	691	271
Italy	55	1.3	4370	1350
Japan	756	17.3	2020	588
Spain	32	0.7	3980	1780
Taiwan	474	10.8	583	238
UK	304	6.9	3730	1260
US	1148	26.2	4260	1550
Panel B: Distribution of deleted companies by country				
Australia	263	6.8	1330	438
Brazil	37	1	5720	1160
Canada	338	8.7	1840	565
Chile	34	0.9	1070	628
Egypt	18	0.5	111	73.6
Finland	31	0.8	1550	1160
France	75	1.9	5760	1260
Germany	101	2.6	6170	1180
Greece	46	1.2	917	265
Hong Kong	234	6	826	175
India	29	0.7	586	119
Indonesia	33	0.9	734	156
Italy	58	1.5	4370	1090
Japan	704	18.2	1920	548
Spain	32	0.8	4470	1510
Taiwan	345	8.9	557	191
UK	264	6.8	3720	1070
US	1230	31.8	4160	1420

Table 2: The changes in the return comovement around additions to the DJIMWI.

We estimate Eqs.(1) and (2) using monthly returns over the one year period before and one year after addition. $\overline{\Delta\beta}$ is the cross-sectional average change in the slope coefficient in the univariate regression (Eq. (1)) and $\overline{\Delta R^2}$ is the mean change in the goodness of fit obtained from Eq. (1). For the bivariate regression (Eq. (2)), we report the cross-sectional average changes in the slopes of the DJIMWI ($\overline{\Delta\beta}$Islamic) and the local index ($\overline{\Delta\beta}$Local). The asterisks ***, **, and * indicate significance at the 1, 5 and 10% levels respectively.

Countries	**# of firms**	**Univariate**				**Bivariate**			
		$\Delta\beta$	t-stat	$\overline{\Delta R^2}$	t-stat	$\Delta\beta_{Islamic}$	t-stat	$\Delta\beta_{Local}$	t-stat
Full sample	4378	0.280***	6.42	0.107***	7.84	0.421***	7.83	-0.159***	-4.21
Australia	333	0.479***	16.5	0.083***	20.6	0.724***	5.56	-0.417**	-3.03
Brazil	44	0.225**	2.14	0.033***	5.04	0.270***	3.02	-0.128**	-2.26
Canada	436	0.268***	7.15	0.130***	18.4	0.641***	18.8	-0.143***	-5.94
Chile	42	0.474***	8.45	0.153***	7.23	0.473**	2.75	-0.002	-0.12
Egypt	36	0.187***	7.71	0.028	1.23	0.298**	2.41	-0.125**	-2.15
Finland	40	0.366**	2.95	0.178***	4.72	0.622***	4.77	-0.005	-0.13
France	69	0.168***	2.1	0.134***	4.98	0.493**	2.98	-0.112*	-1.66
Germany	110	0.069*	1.74	0.033*	1.91	0.070***	4.63	-0.210***	-4.4
Greece	44	0.061*	1.68	0.047***	4.75	0.407***	6.44	-0.238**	-2.27
Hong Kong	284	0.195***	10.3	0.027***	11.6	0.225***	7.38	-0.012***	-6.27
India	119	0.103***	5.54	0.058***	17	0.275***	11.72	-0.005	-0.23
Indonesia	52	0.693***	7.31	0.203***	7.17	0.758***	5.18	-0.417***	-3.49
Italy	55	0.149***	5.66	0.084**	2.72	0.178***	4.21	-0.111***	-5.66
Japan	756	0.091***	8.86	0.012***	17.2	0.183***	6.35	-0.078**	-3.27
Spain	32	0.463**	2.29	0.149***	5.76	0.479***	5.53	-0.043**	-2.03
Taiwan	474	0.189***	5.4	0.023**	2.96	0.195***	4	-0.141**	-2.01
UK	304	0.295*	1.9	0.118***	6.94	0.426***	7.67	-0.103*	-1.85
US	1148	0.554***	24.8	0.148***	24.3	0.855***	8.25	-0.572***	-3.82

Table 3: The changes in the return comovement around deletions.
We estimate Eqs.(1) and (2) using monthly returns over the one year period before and one year after deletion. $\overline{\Delta\beta}$ is the cross-sectional average change in the slope coefficient in the univariate regression (Eq. (1)) and $\overline{\Delta R^2}$ is the mean change in the goodness of fit obtained from Eq. (1). For the bivariate regression (Eq. (2)), we report the cross-sectional average changes in the slopes of the DJIMWI ($\overline{\Delta\beta}$Islamic) and the local index ($\overline{\Delta\beta}$Local). The asterisks ***, **, and * indicate significance at the 1, 5 and 10% levels respectively.

Countries	**# of firms**	**Univariate**				**Bivariate**			
		$\Delta\beta$	t-stat	$\overline{\Delta R^2}$	t-stat	$\Delta\beta_{Islamic}$	t-stat	$\Delta\beta_{Local}$	t-stat
Full sample	3872	-0.164***	-4.03	0.014	0.163	-0.378***	-8.89	0.262***	5.7
Australia	263	-0.028**	-2.22	0.013	1.07	-0.320***	-15.2	0.227***	8.1
Brazil	37	-0.642***	-10.2	0.019	1.47	-0.724***	-7.91	0.512***	5
Canada	338	-0.069***	-3.61	0.017	1.37	-0.321***	-10.8	0.206***	5.58
Chile	34	-0.023**	-2.01	0.012	1.31	-0.383***	-5.71	0.140**	1.99
Egypt	18	-0.193**	-2.3	0.006	0.43	-0.236**	-2.02	0.115**	2.09
Finland	31	-0.083**	-2.28	0.016	1.27	-0.641***	-4.87	0.204**	2.46
France	75	-0.063**	-2.09	0.014	1.01	-0.430***	-7.25	0.293***	4.2
Germany	101	-0.062**	-1.98	0.014	1.08	-0.567**	-2.32	0.170**	2.61
Greece	46	-0.068***	-4.92	0.007*	1.76	-0.447***	-8.36	0.379***	4.54
Hong Kong	234	-0.155***	-7.13	0.002	1.39	-0.168***	-4.21	0.355**	2.47
India	29	-0.176**	-2.41	0.004	1.61	-0.195***	-4.46	0.096**	2.18
Indonesia	33	-0.291**	-2.35	0.002	1.1	-0.321**	-2.42	0.102**	2.01
Italy	58	-0.473***	-7.51	0.015*	1.94	-0.573***	-6.41	0.123**	1.99
Japan	704	-0.060***	-5.99	0.001	1.51	-0.078***	-4.81	0.893***	7.5
Spain	32	-0.039*	-1.87	0.016	1.35	-0.441***	-5.44	0.219**	2.58
Taiwan	345	-0.017**	-2.62	0.002	1.01	-0.175***	-11	0.157***	4.87
UK	264	-0.168**	-2.6	0.010	1.6	-0.251***	-5.14	0.157***	4.85
US	1230	-0.350**	-2.87	0.013	1.41	-0.535***	-24.4	0.365***	12.8

Table 4: Changes in the comovement around additions or deletions.
We estimate Eq.(3) separately for additions and deletions. Δ refers to the change that is the post- minus the pre-index revision value in a given variable, Size is the logarithm of market capitalization at the fiscal year end, BMT is the book value of equity scaled by the market value at the fiscal year end. ROE is earnings divided by equity book value. Investment is capital expenditure scaled by total assets, Leverage is the sum of short-term and long-term debts scaled by the total book value of assets, Market_liq is the total market capitalization over the gross domestic product (GDP), Ln GDP per capita is the natural logarithm of a country's GDP per capita, Tightness measures the strength of a country's social norms in terms of its lack of tolerance for deviant behavior, Individualism measures the extent to which people focus on their internal attributes to differentiate themselves from others. The asterisks ***, **, and * show significance at 1%, 5%, and 10% respectively.

Panel A: Additions (N = 4378)	**Panel A: Additions (N=4378)**				**Panel B: Deletions (N = 3872)**			
	Monthly		**Weekly**		**Monthly**		**Weekly**	
	Ceoff.	T-test	Ceoff.	T-test	Ceoff.	T-test	Ceoff.	T-test
Δ Size	0.019	0.850	0.034	1.500	0.018	0.840	0.012	0.530
Δ BTM	0.009	1.360	0.007	1.040	0.001	0.030	0.006	0.850
Δ ROE	0.011	1.740	0.007	1.090	-0.004	-0.570	0.006	0.950
Δ Investment	0.006	0.180	0.021	0.910	0.037	1.630	-0.003	-0.110
Δ Leverage	0.004	0.610	0.013**	2.030	-0.006	-0.920	0.002	0.280
Δ Market_liq	0.011	0.470	0.001	0.020	-0.001	-0.040	0.031	1.350
Ln GDP per capita	0.001	0.210	0.002	0.280	-0.007	-1.040	0.001	0.050
Tightness	0.005**	2.580	0.003*	1.870	0.002	0.840	0.003	1.470
Individualism	-0.002	-0.780	-0.004	-0.020	-0.001	-2.630	-0.001	-0.200
Constant	0.281***	5.380	0.231***	4.520	-0.190***	-4.061	-0.171***	-5.420
Adjusted R^2	0.22		0.21		0.23		0.22	

Table 5: This table presents the results on the effect of trading activity on the return correlation structure of the added and deleted stocks.
We estimate Eqs. (4) and (5) using daily returns over the one year period before and one year after revision. $\overline{\Delta\beta}$, $\overline{\Delta\beta}_{D.vol}$, $\overline{\Delta\beta}_{Islamic}$, $\overline{\Delta\beta}_{Local}$, $\overline{\Delta\beta}_{Islamic.D.vol}$, and $\overline{\Delta\beta}_{Local.D.vol}$ are the cross-sectional average changes in the parameters $\beta_{j,i}$, $\beta_{j,i,D.vol}$, $\beta_{j,i,Islamic}$, $\beta_{j,i,Local}$, $\beta_{j,i,Islamic.D.vol}$ and $\beta_{j,i,Local.D.vol}$, respectively. The asterisks ***,**, and * indicate significance at the 1, 5 and 10% levels respectively.

		Panel A: Additions											
Countries	**# of firms**	**Univariate**				**Bivariate**							
		$\overline{\Delta\beta}$	t-stat	$\overline{\Delta\beta}_{D.vol}$	t-stat	$\overline{\Delta\beta}_{Islamic}$	t-stat	$\overline{\Delta\beta}_{Islamic.D.vol}$	t-stat	$\overline{\Delta\beta}_{Local}$	t-stat	$\overline{\Delta\beta}_{Local.D.vol}$	t-stat
Full sample	4378	0.505***	10.3	0.238***	4.6	0.628***	9.54	0.339***	9.33	-0.397***	-9.87	-0.064	-1.2
Australia	333	0.346	1.47	0.187*	1.87	0.477	1.54	0.396	1.64	-0.120**	-2.36	-0.106**	-2
Brazil	44	0.605***	3.52	0.034*	1.68	0.707***	3.71	0.554	1.58	-0.269	-1.46	0.215	1.4
Canada	436	0.721***	4.56	0.845*	1.69	0.597***	6.78	0.237*	1.7	-0.491*	-1.78	0.174	1.47
Chile	42	0.388***	6.8	0.129*	1.87	0.764***	7.56	0.492**	2.14	-0.334**	-2.66	-0.157	-1.63
Egypt	36	0.818**	2.95	0.098***	4.59	0.631	1.49	0.151**	1.72	-0.568***	-10.7	0.033	1.42
Finland	40	0.483**	2.84	0.472***	3.51	0.766*	1.76	0.207	1.6	-0.560***	-6.04	-0.562*	-1.67
France	69	0.273	1.42	0.135	1.47	0.669**	2.06	0.318*	1.65	-0.234**	-2.19	0.097	1.44
Germany	110	0.899***	6.47	0.648*	1.79	0.705***	3.93	0.316	1.54	-0.566***	-16.6	-0.195*	-1.78
Greece	44	0.275***	3.7	0.179*	1.8	0.770***	14.7	0.305**	2.04	-0.280*	-1.87	-0.163*	-1.75
Hong Kong	284	0.378***	3	0.184*	1.86	0.365*	1.7	0.151*	1.78	-0.283*	-1.69	0.103	1.52
India	119	0.350***	8.11	0.014	1.4	0.529***	13.6	0.267	1.7	-0.309*	-1.92	-0.132*	-1.68
Indonesia	52	0.738***	7.94	0.098***	3.12	0.667	1.54	0.541*	1.76	-0.494*	-1.77	-0.238*	-1.76
Italy	55	0.373***	4.3	0.200*	1.71	0.346*	1.86	0.161*	1.71	-0.271*	-1.78	-0.099*	-1.72
Japan	756	0.670***	4.21	0.078*	1.75	0.711***	2.43	0.562*	1.76	-0.469*	-1.93	-0.389*	-1.68
Spain	32	0.196***	3.73	0.089	1.61	0.599***	11	0.225	1.4	-0.145**	-2.5	0.125	1.54
Taiwan	474	0.501*	1.87	0.272*	1.8	0.723**	2.93	0.250*	1.89	-0.549**	-2.35	0.151	1.43
UK	304	0.396**	2.36	0.269**	2.03	0.492***	4.47	0.337**	2.21	-0.436**	-2.14	0.277	1.54
US	1148	0.687***	6.28	0.353**	1.98	0.786***	3.96	0.624**	1.81	-0.730**	-2.04	-0.290*	-1.76

Table 5 (continued):

Panel B: Deletions													
Countries	**# of firms**	**Univariate**				**Bivariate**							
		$\overline{\Delta\beta}$	t-stat	$\overline{\Delta\beta}_{D.vol}$	t-stat	$\overline{\Delta\beta}_{Islamic}$	t-stat	$\overline{\Delta\beta}_{Islamic.D.vol}$	t-stat	$\overline{\Delta\beta}_{Local}$	t-stat	$\overline{\Delta\beta}_{Local.D.vol}$	t-stat
Full sample	3872	-0.028	-0.91	-0.008	-0.58	-0.039*	-1.63	-0.012	-1.07	0.593***	10.77	0.312***	12.69
Australia	263	-0.118*	-1.9	-0.052	-0.6	-0.102	-1.21	-0.055	-0.78	0.712***	13.16	0.368**	2.11
Brazil	37	0.147	1.05	0.067	0.49	-0.119**	-2.07	-0.055	-0.71	0.600*	1.88	0.340**	1.97
Canada	338	-0.246**	-2.42	-0.110	-0.71	-0.233*	-1.79	-0.090	-1.09	0.554***	11.15	0.277**	2.02
Chile	34	-0.151**	-2.55	-0.056	-0.51	-0.127	-1.08	-0.041	-1.23	0.602***	10.59	0.320**	2.02
Egypt	18	-0.142***	-3.2	-0.038	-0.64	-0.101	-0.92	-0.027	-0.86	0.525***	7.16	0.136**	2.07
Finland	31	0.021	0.53	0.016	0.48	0.013	0.78	0.018	0.82	0.584***	4.46	0.149	1.33
France	75	0.127	0.95	0.048	0.94	0.112	1.26	0.037	0.86	0.599***	7.85	0.319	1.38
Germany	101	-0.179*	-1.69	-0.122	-0.47	-0.123	-1.04	-0.075	-0.76	0.617**	2.74	0.379**	2.25
Greece	46	-0.111	-1.1	-0.059	-0.7	-0.108	-1.19	-0.042	-0.91	0.560***	10.54	0.372	1.58
Hong Kong	234	-0.140**	-2.36	-0.054	-0.86	-0.086	-0.88	-0.048	-0.93	0.264	1.19	0.116*	1.85
India	29	0.074	1.26	0.032	0.36	0.025	1.15	0.0217	0.73	0.608***	8.31	0.248	1.42
Indonesia	33	0.073	1.24	0.045	0.41	0.013	0.9	0.0311	1.01	0.621***	4.38	0.265	1.29
Italy	58	0.055	0.38	0.034	0.38	0.050	1.28	0.0364	1.56	0.465***	11.09	0.371***	15.11
Japan	704	-0.173**	-2.05	-0.024	-0.57	-0.132**	-1.99	-0.0201	-0.9	0.655***	12.07	0.387	1.58
Spain	32	-0.048	-1.02	-0.037	-0.46	-0.042	-1.13	-0.027	-0.76	0.733***	7.75	0.483**	2.94
Taiwan	345	0.101	0.94	0.054	0.38	0.092	0.89	0.0466	0.88	0.676***	5.56	0.395	1.55
UK	264	0.046	1.22	0.031	0.37	0.025	0.74	0.027	1.29	0.561**	2.83	0.244	1.42
US	1230	0.159	0.73	0.073	0.43	0.138	1.15	0.0552	1.46	0.704***	7.87	0.453	1.64

Table 6: This table shows the CAR for (-3,+3) and (-5,+5) windows around the month of Ramadan using daily returns. The results are reported for the added and deleted samples from the Dow-jones and a local index. The CAR is estimated using Dow-jones and local index and the values are reported as percentages. The t-test is based on whether CAR is different from zero. The asterisks ***, **, and * indicate significance at 1, 5 and 10%, respectively.

Country	**%Cumulative abnormal returns (CAR) during Ramadan**							
	Added	**T-test**	Added	**T-test**	Deleted	**T-test**	Deleted	**T-test**
	(-3,+3)		**(-5,+5)**		**(-3,+3)**		**(-5,+5)**	
Full sample	1.210**	1.98	1.020*	1.96	-0.540	-1.61	-0.420	-1.55
Australia	0.090	1.43	0.980	1.34	0.100	1.05	0.090	0.97
Brazil	0.670*	1.90	0.770*	1.77	-0.560	-1.36	-0.600	-1.34
Canada	-1.320**	-2.34	-1.510**	-2.27	-2.320***	-2.69	-2.020	-1.99
Chile	1.300	0.62	0.090	0.61	-1.440	-1.85	-0.090	-0.44
Egypt	3.120***	2.67	2.300***	2.61	-2.610*	-1.95	-0.640	-1.56
Finland	0.470*	1.79	0.980*	1.67	-0.100	-1.22	-0.970	-1.16
France	1.190*	1.92	1.220*	1.83	-1.590	-1.81	-1.900	-1.79
Germany	0.390	1.27	0.530	1.16	-0.190	-0.86	-0.430	-0.85
Greece	0.280	1.34	0.440	1.31	-0.200	-0.92	-0.510	-0.86
Hong Kong	2.400**	2.18	2.460**	2.21	0.290	0.77	0.170	0.74
India	0.370	1.64	1.280**	2.32	-0.560	-1.62	-1.130	-1.58
Indonesia	3.840**	2.57	2.700**	2.34	-2.850*	-1.92	-1.940	-1.75
Italy	0.190	1.36	0.890	1.42	0.180	0.96	1.310	0.90
Japan	0.480*	1.74	0.090	1.34	0.190	1.63	0.090	1.57
Spain	1.220**	1.97	1.190	1.43	0.850	1.07	-1.110	-1.07
Taiwan	1.580**	2.14	1.290	1.38	1.960*	1.75	1.040*	1.66
U.K.	0.470*	1.71	1.310*	1.80	-0.670	-1.47	1.250	1.37
U.S.	0.570*	1.83	0.450*	1.73	-0.180	-1.32	-0.130	-1.40

Table 7: This table presents the results for the effect of the month of Ramadan on the return correlation structure of the added and deleted stocks.
We estimate Eqs. (7) and (8) using daily returns over the one year period before and one year after addition. $\overline{\Delta\beta}$, $\overline{\Delta\beta}_{D.Ram}$, $\overline{\Delta\beta}_{Islamic}$, $\overline{\Delta\beta}_{Local}$, $\overline{\Delta\beta}_{Islamic.D.Ram}$, and $\overline{\Delta\beta}_{Local.D.Ram}$ are the cross-sectional average changes in the parameters $\beta_{j,i}$, $\beta_{j,i,D.Ram}$, $\beta_{j,i,Islamic}$, $\beta_{j,i,Local}$, $\beta_{j,i,Islamic.D.Ram}$ and $\beta_{j,i,Local.D.Ram}$, respectively. The asterisks ***, **, and * indicate significance at the 1, 5 and 10% levels respectively.

		Panel A: Additions											
Countries	**# of firms**	**Univariate**				**Bivariate**							
		$\overline{\Delta\beta}$	t-stat	$\overline{\Delta\beta}_{D.Ram}$	t-stat	$\overline{\Delta\beta}_{Islamic}$	t-stat	$\overline{\Delta\beta}_{Islamic.D.Ram}$	t-stat	$\overline{\Delta\beta}_{Local}$	t-stat	$\overline{\Delta\beta}_{Local.D.Ram}$	t-stat
Full sample	4378	0.203***	10.47	0.081***	7.49	0.411***	11.1	0.063***	6.98	-0.078	-0.96	-0.012	-0.84
Australia	333	0.227**	3.02	0.071**	2.27	0.564**	3.11	0.018	1.40	-0.408	-1.33	-0.015	-1.17
Brazil	44	0.046**	2.11	0.027	1.58	0.664***	4.19	0.022	1.14	-0.477*	-1.73	-0.021	-1.12
Canada	436	0.297**	2.79	0.074**	1.92	0.661***	5.74	0.055**	2.17	-0.508**	-2.40	-0.049	-1.05
Chile	42	0.116	0.77	0.028	0.52	0.320***	5.77	0.024	1.33	0.279	1.32	0.018	1.02
Egypt	36	0.330**	2.13	0.142**	2.19	0.588***	5.64	0.127**	2.31	-0.477**	-2.76	-0.102**	-1.96
Finland	40	0.273**	2.14	0.060	1.52	0.540***	5.39	0.053	1.22	0.478	1.49	0.044	1.03
France	69	0.214**	2.96	0.030	1.56	0.466**	2.74	0.027	1.44	-0.312**	-2.02	0.020	1.07
Germany	110	0.282	1.61	0.083	1.05	0.417***	4.29	0.081**	1.72	-0.309**	-2.58	-0.067	-1.03
Greece	44	0.169**	2.99	0.041**	2.09	0.312***	5.93	0.036	1.29	0.243	1.28	0.028	1.00
Hong Kong	284	0.139	1.31	0.087	0.94	0.266	1.59	0.068	1.35	0.226	1.48	0.066	1.31
India	119	0.213**	2.90	0.105**	2.00	0.393***	6.30	0.060***	3.31	-0.323	-1.26	-0.048**	-2.64
Indonesia	52	0.320**	2.89	0.178**	2.11	0.527***	4.53	0.134**	2.15	-0.368**	-2.48	-0.103**	-1.99
Italy	55	0.187**	2.37	0.027*	1.78	0.352***	4.98	0.021	1.16	0.239	1.33	0.020	1.15
Japan	756	0.076**	2.74	0.131*	1.97	0.116**	2.08	0.105	1.57	-0.082	-1.50	-0.099	-1.48
Spain	32	0.230**	2.93	0.137**	2.19	0.292***	5.20	0.082**	1.81	0.285	1.56	0.068	1.51
Taiwan	474	0.108*	1.78	0.036	1.21	0.185***	4.90	0.030	1.20	0.149	1.44	0.025	1.01
UK	304	0.204**	2.78	0.101*	1.89	0.342***	5.76	0.094	1.41	0.299	1.35	0.084	1.26
US	1148	0.216***	3.72	0.110**	2.49	0.395***	4.23	0.103**	1.84	-0.321*	-1.80	-0.093*	-1.67

Table 7 (continued):

Countries	# of firms	Panel B: Deletions											
		Univariate				Bivariate							
		$\overline{\Delta\beta}$	t-stat	$\overline{\Delta\beta}_{D.Ram}$	t-stat	$\overline{\Delta\beta}_{Islamic}$	t-stat	$\overline{\Delta\beta}_{Islamic.D.Ram}$	t-stat	$\overline{\Delta\beta}_{Local}$	t-stat	$\overline{\Delta\beta}_{Local.D.Ram}$	t-stat
Full sample	3872	-0.088**	-2.88	-0.012*	-1.86	-0.121**	-2.22	-0.031**	-2.89	0.409***	11.94	0.052***	6.43
Australia	263	-0.174**	-2.32	-0.019	-1.45	-0.366	-1.19	-0.014	-1.07	0.577**	3.18	0.015	1.14
Brazil	37	-0.022*	-1.61	0.008	0.35	-0.128	-1.43	-0.015	-0.79	0.642***	4.05	0.018	0.94
Canada	338	0.157	1.47	0.022	0.49	-0.341	-1.13	-0.041	-0.88	0.480***	4.34	0.039	1.53
Chile	34	0.085	0.56	0.008	0.38	0.220	1.54	0.020	1.12	0.360***	6.50	0.020	1.11
Egypt	18	-0.218	-1.41	-0.047*	-1.75	-0.310**	-2.34	-0.098*	-1.65	0.579***	5.55	0.104*	1.65
Finland	31	-0.199	-1.56	-0.015	-0.31	-0.345	-1.48	-0.033*	-1.68	0.536***	5.35	0.036	0.85
France	75	-0.197**	-2.73	-0.029	-0.62	-0.252	-1.64	-0.019	-1.21	0.533**	3.13	0.022	1.21
Germany	101	0.167	0.96	0.028	0.40	-0.280*	-1.80	-0.060	-0.91	0.438***	4.51	0.068	1.04
Greece	46	-0.126**	-2.23	-0.028*	-1.67	0.204	1.08	0.024	0.87	0.377***	7.18	0.030	1.09
Hong Kong	234	-0.114	-1.08	-0.012	-0.48	-0.155	-1.01	-0.050	-0.99	0.231	1.38	0.052	1.03
India	29	-0.124*	-1.69	-0.036	-0.47	0.228	0.89	-0.045	-0.88	0.358***	5.74	0.047	0.91
Indonesia	33	-0.251**	-2.27	-0.051*	-1.74	-0.310**	-2.09	-0.105	-1.34	0.490***	4.21	0.131	1.67
Italy	58	-0.173**	-2.18	0.010	0.47	-0.208	-1.15	-0.019	-1.05	0.391***	5.53	0.020	1.11
Japan	704	-0.052*	-1.89	-0.039*	-1.65	0.076	1.39	0.073	0.99	0.118**	2.12	0.095	1.29
Spain	32	-0.159**	-2.02	-0.042*	-1.65	-0.218	-1.20	-0.061	-1.21	0.280***	4.99	0.059	1.18
Taiwan	345	0.077	1.27	0.009	0.46	0.122	1.18	0.021	0.83	0.173***	4.59	0.022	0.87
UK	264	-0.113	-1.54	-0.021	-0.49	0.229	1.07	-0.068	-1.03	0.342***	5.76	0.069	1.04
US	1230	-0.140**	-2.40	0.039	0.50	-0.348**	-1.95	-0.074*	-1.73	0.441***	4.71	0.080	1.23