

THE IMPACT OF RELIGIOUS EXPERIENCE ON FINANCIAL MARKETS

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Abstract

In spite of the important role religion plays in peoples' lives, its impact on financial markets is seldom researched. This study examines the effect of religious experience during the Muslim holy days of Ramadan and Ashoura on the daily returns and trading volumes of 17 Muslim financial markets. Muslim holy days are especially conducive to isolating the elusive effect of faith and decoupling it from potential contaminants. The study documents statistically significant drops in the trading volume and changes in daily stock returns associated with religious experiences on these holy days. The effect on returns is not unidirectional as Ramadan yields a positive impact on daily returns while Ashoura is associated with a negative effect. Ramadan's more sacred days are associated with a higher magnitude effect culminating on its holiest day, Ramadan 27th. The study utilizes the heterogeneity of worship intensity within the month of Ramadan to validate that the documented effect is indeed a result of religious experience rather than non-faith aspects of the holy days.

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“Discovery commences with the awareness of anomaly, i.e., with the recognition that nature has somehow violated the paradigm-induced expectations that govern normal science.”

Thomas Kuhn

1. Introduction

Religious faith plays an important role in peoples’ lives, behavior, and decision making. Weber (1930) argued that religious beliefs and practice have a significant effect on economic development. Yet until recently economists have all but ignored this relationship. This trend has reversed with an emerging interest in the study of religion both as a dependent and independent variable. Still, this research is yet to address the relationship between religious faith and financial markets. This study sets out to explore this relationship. Specifically, it investigates how religious faith impacts stock market returns and trading volume around religious holy days in Muslim countries.

The study focuses on two Muslim holy days, Ramadan and Ashoura. Both occasions are broadly observed by a majority of Muslim populations. The study benefits from three naturally occurring factors to isolate the elusive faith effect on financial markets from other contaminants. These are: the annual shift of the Muslim *Hijri* calendar *vis-à-vis* the Gregorian one; the different methods Muslim countries use to determine the beginning of lunar *Hijri* months; and the built-in alternating worship intensity within the month of Ramadan.

This research explores the effect of faith on the financial markets of seventeen Muslim countries over the period 1988-2008. It finds that religious experience during Ramadan has a statistically significant positive effect on the returns of Muslim financial markets. This effect on returns ranges from 0.16% during the holiest five days of Ramadan to 0.37% on the holiest day. Interestingly, the effect of holy days on market

returns is not monotonically positive as these markets experience a negative and significant drop of 0.26 percentage points during the holy day of Ashoura. Religious experience also affects the trading volume which drops on holy days. The volume effect is uniformly negative across all the holy days we investigated. Furthermore, the drop is larger on the holiest of days reaching over 50% of the daily change in volume on Ashoura and on Ramadan's holiest day.

The remainder of the paper is organized as follows: Section 2 presents an overview of relevant literature, section 3 demonstrates the attributes of the Muslim *Hijri* calendar that are especially conducive for this research, section 4 describes the methodology and data, section 5 presents the results, section 6 discusses the results and their potential drivers, and section 6 concludes.

2. Relevant Literature

The literature examining the impact of religious experience on financial markets is quite minimal. One of the few studies on this topic is Frieder and Subrahmanyam (2004) which examines the impact of the Jewish holy days of Rosh Hashanah and Yom Kippur and the Catholic Irish one of St. Patrick's on the S&P500 index. They report significant positive returns on Rosh Hashanah and the days that precede it and on the days that precede St. Patrick's Day. They also report a significant impact on trading volumes. Husain (1998) and (Seyyed, Abraham, and Al-Hajji, 2005) investigate the effect of Ramadan on the Karachi Stock Exchange and the Saudi one, respectively. While both studies find lower volatility during the month of Ramadan, neither was able to detect an effect on mean returns.

Although the literature specific to religion and financial markets is sparse, three other strands of literature are of interest to this study. The first explores the relationship between religion and economics, which has recently grown and evolved. This research can be divided into two classifications; the first treats religion as a dependent variable while the second treats it as an independent variable. With religion as a dependent variable, demand and supply side economic factors are used to explain religious participation and beliefs. The religion as an independent variable research evaluates how religion impacts economic performance through its effect on networking and social capital and on personal attributes such as work ethics. For thorough surveys of both classifications please refer to (Barro and McCleary, 2006) and Iannaccone (1998). Empirical analyses of the two classifications of the relationship between religion and economics rely on survey data that is aggregated at country level. This study breaks this reliance on survey data as it directly measures the revealed effect of faith on financial markets during sacred times in the Muslim calendar.

The second relevant strand of literature explores and explains the existence of stock markets anomalies. Past research has documented a number of regularities in stock market returns on the turn of the year, month, week, and day, and around holidays (for a thorough review see Thaler (1987) and (Jacobs and Levy, 1988). The leading explanation for the holiday anomaly focuses on limiting risk exposure while the market is closed (Amihud and Mendelson, 1987). However, little has been done to explore whether psychological reasons associated with the nature of these holidays *per se*, not the closure of the market, are causing these anomalies. (Jacobs and Levy, 1988) point out that “while no fully satisfactory explanation of the holiday effect has yet surfaced, psychological

reasons appear to be the most promising”. This explanation is especially plausible in light of the increasing literature linking the mood of investors to changes in stock returns. Yet the task of separating the effect of widely observed religious and cultural holidays from market closure is a challenging one given that the two often coincide. This study achieves exactly that; it studies widely observed religious holy days during which stock markets remain open. Consequently its results contribute to explaining the holiday anomaly.

The third strand of literature relevant to our study investigates the role of mood on stock returns. Emotions and moods have been documented to effect the decision making of individuals (Bagozzi, Gopinath, and Nyer, 1999). Moods influence judgment regarding uncertain future events, with positive mood leading to a more positive evaluation in a number of situations (Wright and Bower, 1992). Of special relevance to financial markets is the finding that moods influence peoples’ judgment of risk (Johnson and Tversky, 1983). For a review of the impact of mood on decision making see (Loewenstein et al., 2001) and (Hirshleifer and Shumway, 2003).

A number of studies have linked mood effects to returns of financial markets. Saunders (1993) reports negative NYSE index returns when it is cloudy in New York. Kamstra, Kramer, and Levi (2000) report negative returns following daylight savings time changes. Hirshleifer and Shumway (2003) find a strong statistical relationship between morning sunshine and stock exchange returns. Kamstra, Kramer, and Levi (2003) document the effect of seasonal affective disorder (SAD) and stock market returns. This study contributes to this body of literature.

3. Isolating the Elusive Faith Using the *Hijri* Calendar

We use Muslim holy days to investigate the impact of religious experience on the returns of Muslim financial markets. Specifically, the study focuses on two important Muslim holy days: Ramadan and Ashoura. Ramadan is the ninth month of the Muslim *Hijri* calendar during which the Quran was revealed to the prophet Mohamad, observed by both Sunni and Shi'a Muslims. Fasting during Ramadan is mandatory for Muslims and one of Islam's five pillars. During the fast, Muslims do not eat or drink anything from dawn until sunset. It is a month of heightened religiosity and faith. In addition to fasting, Muslims put more emphasis on praying, reciting the Quran and giving charity in anticipation of capturing the month's promised wealth of blessings.

Ashoura occurs on the tenth day of the first *Hijri* month of Muharram. It is commemorated by both Sunni and Shi'a Muslims, although for different reasons. Sunni Muslims mark that day to commemorate the liberation of Moses and the Israelites from the Pharaoh and his army. Sunnis fast the day, following the example of the prophet Mohamad. On the other hand, Shi'a mourn the martyrdom of Hussein ibn Ali, the grandson of the prophet Mohamad at the Battle of Karbala on Ashoura.

While Ramadan and Ashoura are both holy occasions that are widely observed by Muslims, they differ in "valence" from each other. The month of Ramadan is dominated by positive valence as Muslims exercise their faith in anticipation of reaping the blessings of the month and forgiveness of their past sins. Conversely, Ashoura is associated with negative valence resulting from the anger and sadness of mourning, especially for Shi'a Muslims. This makes studying the impact of religious experience on financial markets during these occasions especially interesting. If mood effects from the exercise of faith is

impacting financial markets, then one would expect each occasion to generate a different mood and hence a potentially different impact.

The use of Muslim holy days is particularly well suited for investigating the relationship between faith and financial market returns for a number of reasons. First, these holy days are widely observed on a religious and cultural level by an overwhelming proportion of the population in the countries under investigation. Their salience within these societies allows for a more measured impact. Additionally, most financial markets remain open during these holy days.

Second, unlike secular and Christian holidays, Islamic holy days follow a purely lunar Islamic (*Hijri*) calendar, not the solar Gregorian calendar. The Muslim *Hijri* year is about 11 days shorter than the Gregorian year. This means that while Muslim holy days fall on the same day of the *Hijri* calendar, they actually shift days and months each year on the Gregorian calendar. For example, the first day of Ramadan as declared by Saudi Arabia shifted backwards by about nine months over twenty-two years, beginning on April 28th in 1987 and commencing on September 1st in 2008. Given that the majority of businesses in these countries follow a Gregorian, not *Hijri*, fiscal calendar, this enables us to isolate the faith effect from the fiscal calendar which is used to explain the turn of the year, month, and week anomalies. It further allows us to remove other noises that are cyclical in nature in the Gregorian calendar such as the seasonal and weather effects mentioned in the aforementioned mood literature.

Third, each Muslim country follows an independent and often different method to determine the start of the lunar month. Countries ascertain the beginning of lunar months using a variety of methods that range from rudimentary eyewitness observations of the

new crescent to advanced astronomical calculations. Even those countries that employ the same method use different parameters to determine the beginning of new months. For example, countries that base their decisions on astronomical calculations differ in the required parameters to proclaim the beginning of the new lunar month such as the crescent's minimum angle above the horizon and its minimum time of appearance after sunset. Thus, Islamic holy days fall on different days within the same *Hijri* year across Muslim countries. This enables us to lessen the impact of other contemporaneous effects and cross market linkages. Table 1 below displays the official first day of Ramadan for the *Hijri* year 1427 which was distributed over a three day period across Muslim countries.

Table 1 First Day of Ramadan 1427 Across Muslim Countries

September 2006		
Sat	Sun	Mon
23	24	25
Bahrain Kuwait Lebanon Palestine Qatar Saudi Arabia UAE	Egypt Indonesia Jordan Malaysia Oman Singapore Tunisia Turkey	Iran Pakistan

Fourth, the study utilizes the inherent heterogeneous intensity of religious experience within Ramadan to isolate faith from other non-faith aspects of this holy month. While some of the studies mentioned above were unsuccessful in their attempt to document a Ramadan effect on financial markets, our study is the first to utilize this unique attribute of heterogeneity. The month of Ramadan is perceived as consisting of three parts, equal in length but different in promised rewards, characteristics, and

intensity of worship. The following *Hadith* (saying of the prophet Mohamad) documents that:

“The first part [of Ramadan] brings God’s Mercy, the middle of which brings God’s forgiveness and the last part of which brings emancipation from hellfire.” (Ibn Khuzaymah, 3: 191)

From a physical point of view, the first days of Ramadan are the hardest on those fasting as their bodies have to adjust to a new dietary schedule and to nutritional deprivation during the day. Therefore, it is expected that the early days of Ramadan are dominated by the physical impact of fasting rather than the spiritual. Dividing our study of Ramadan over its three parts enables us to isolate the impact of spiritual and religious experience from the physical effects of fasting.

Additionally, the last third of Ramadan is perceived as the most blessed part during which Muslims increase their worship and experience of faith. The last ten days of Ramadan contain the holiest night in the Islamic calendar, *Laylat Al-Qadr*, the Night of Destiny, when the Quran was first revealed to the prophet Mohamad. The following Quran verses document the sanctity of this night:

“97:1 We revealed it [the Quran] on the Night of Destiny.
97:2 And what will explain to thee what the Night of Destiny is?
97:3 The Night of Destiny is better than a thousand months.
97:4 The angels and the Spirit descend therein, by the permission of their Lord,
with all decrees.
97:5 (The night is) Peace until the rising of the dawn.”
(The Holy Quran, 97:1-5)

Muslims believe that it has not been revealed on which of the last ten days of Ramadan the Night of Destiny falls. Many Muslim scholars and certainly an overwhelming majority of Muslims believe that the Night of Destiny occurs on one of last five odd numbered nights of Ramadan, i.e. the 21st, 23rd, 25th, 27th or 29th of

Ramadan. The following *Hadith* supports this argument: "Search for the Night of Destiny in the odd nights of the last ten days of Ramadan" (Bukhari, 3(32): 234). Muslims experience heightened religious fervor on the eve of these five odd days which they spend in dedicated worship.

Of these five days, the Night of Destiny is believed by most Muslims to occur on the eve of Ramadan 27th. This night witnesses the culmination of faith practice in the Islamic calendar as Muslims spend it in prayer and Quran recitation in mosques until the break of dawn. It is also on this night that the gradual daily recital of the whole Quran over the month of Ramadan concludes. Most television and radio stations in Muslim countries suspend their usual programming to air live broadcasts of the conclusion of this recitation from the Grand Mosque in Mecca. Religious experience, and therefore its impact on financial markets, will be amplified on the more sacred odd days at the end of Ramadan and culminate on its 27th day.

Additionally, the differences in the intensity of worship between the last five odd and even days of Ramadan serve as a natural experiment to isolate the faith effect from non-faith aspects of Ramadan. The end of Ramadan marks the festival of *Eid Al-Fitr* which is one of the two main festivals that Muslims celebrate annually. It is associated with increased consumer spending, similar to the shopping frenzy during Christmas in Western countries. If religious experience is indeed affecting financial markets, this effect should be different in magnitude between the last odd and even five days of Ramadan, and should culminate on Ramadan 27th. If, however, the documented effect is resulting from the increased commercial and economic activity in anticipation of the festival of *Eid Al-Fitr*, then it should be equal across the last odd and even five days.

4. Methodology and Data

We estimate the impact of faith on financial markets through running a pooled fixed effects panel regression across all the examined financial markets. As per Saunders (1993), we include lagged return variables to account for nonsynchronous trading effects (see Akgiray, 1989), and day of the week and month of the year dummies to control for calendar and seasonal regularities. The following regression is estimated to capture the effect on daily returns:

$$Ret_{i,t} = \beta_0 + \beta_1 Holy_Day_{i,t} + \beta_2 Ret_{i,t-1} + \beta_3 Ret_{i,t-2} + \beta_4 \sum_{j=2}^6 D_t + \beta_5 \sum_{j=2}^{12} M_t + \varepsilon$$

where:

$Ret_{i,t}$	=	the arithmetic return of stock exchange i on day t from the trading day before
$Holy_Day_{i,t}$	=	a dummy variable that takes the value 1 if day t was a holy day in country i
$Ret_{i,t-1}$	=	one day lagged return of stock exchange index i
$Ret_{i,t-2}$	=	two day lagged return of stock exchange index i
D_t	=	day of the week dummy variable with Tuesday omitted
M_t	=	month of the year dummy variable with June omitted

Similarly, we examined the impact on trading volume using this regression:

$$Vol_{i,t} = \beta_0 + \beta_1 Holy_Day_{i,t} + \beta_2 Vol_{i,t-1} + \beta_3 Vol_{i,t-2} + \beta_4 \sum_{j=2}^6 D_t + \beta_5 \sum_{j=2}^{12} M_t + \varepsilon$$

where:

$Vol_{i,t}$	=	the percentage change in trading volume of stock exchange i on day t from the trading day before
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We examine the effect of eight classifications of holy days as explained in the previous section:

$Ramadan_{i,t}$	=	a dummy variable that takes the value 1 if day t was part of the month of Ramadan in country i
$Ashoura_{i,t}$	=	a dummy variable that takes the value 1 if day t was Ashoura in country i
$Ramadan_1-10_{i,t}$	=	a dummy variable that takes the value 1 if day t fell on days 1-10 of Ramadan in country i
$Ramadan_11-20_{i,t}$	=	a dummy variable that takes the value 1 if day t fell on days 11-20 of Ramadan in country i
$Ramadan_21-30_{i,t}$	=	a dummy variable that takes the value 1 if day t fell on days 21-30 of Ramadan in country i
$Odd_Days_{i,t}$	=	a dummy variable that takes the value 1 if day t was on the 21 st , 23 rd , 25 th , 27 th , or 29 th day of Ramadan in country i
$Even_Days_{i,t}$	=	a dummy variable that takes the value 1 if day t was on the 22 nd , 24 th , 26 th , 28 th , or 30 th day of Ramadan in country i
$Ramadan_27^{th}_{i,t}$	=	a dummy variable that takes the value 1 if day t was on the 27 th day of Ramadan in country i

This study covers financial market indices in seventeen Muslim countries between 1988 -2009. Due to the fact that not all of the financial markets used in the returns study report volume data, our sample for trading volume is not identical to that of market returns (Tables 4 and 5 in Appendix A). Where possible, we used the same index for each country over the same time period for both the trading volume and return data, when the volume data was not available; we used alternative indices that report volume data for that country. Financial figures are obtained from the databases of Global Financial Data and Datastream.

The key challenge to conducting this study is converting the *Hijri* dates for each country to Gregorian equivalents in order to determine the exact Gregorian date for the holy days within each country for the time period under investigation. As mentioned in the previous section, each Muslim country declares the beginning of lunar months and

hence the dates of holy days independently. Moreover, countries generally do not keep official records of their past lunar month proclamations. Thus, finding each country's *Hijri*/Gregorian date equivalent is labor intensive and challenging. We used microfilms of official newspapers archives, and formal legislations and decrees from these countries which often report both *Hijri* and Gregorian dates to establish the exact *Hijri* calendar for each included country. The only holy day data that was included in this analysis was that for which we were able to verify the exact Gregorian equivalent. In total, the study established data spanning 374 individual country holy day data of which: 229 cover both Ramadan and Ashoura, 130 cover Ramadan only, and 15 cover Ashoura only. Table 6 in Appendix A lists the specific holy day data obtained for each country.

5. Results

Figure 1 below depicts the mean of daily returns on holy days and all other days across the pooled financial markets. Table 7 in Appendix A reports these means along with their descriptive statistics. Consistent with our predictions, returns on holy days differ from those on all other days. Furthermore, returns during Ramadan (0.12%) differ in direction from those on Ashoura (-0.17%), and both differ from mean returns on all other days (0.07%). Additionally, holier days within Ramadan are consistently associated with higher returns. The last ten days of Ramadan have a higher return than the first ten, 0.18% vs. 0.07%. The mean return during the last five odd days of Ramadan is 0.24% which is 3.6 times the mean return on all other days. The mean return during Ramadan's last five even days is 0.11%, less than half that of odd days. Mean returns culminate at the climax of worship on Ramadan's 27th day at 0.46%, which is around 7 times the average return on all other days. The t-tests report that mean returns during all of

Ramadan, its second and last third, its last five odd days and 27th day are statistically different from those on all other days.

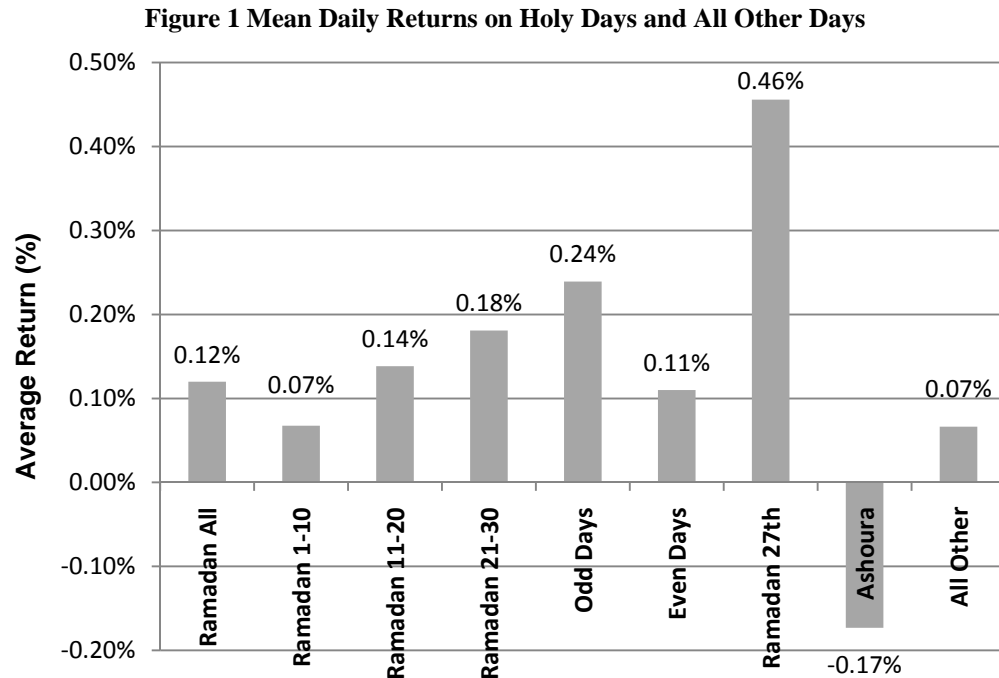


Table 2 below reports regression results for markets returns on holy days, controlling for lagged returns, day of the week, and month of the year¹. Ashoura is associated with a drop of 0.26 percentage points in daily returns (Columns 1-4). This result is statistically significant at the 5-percent level. The month of Ramadan is associated with 0.05% increase in daily returns (Column 1) which is statistically significant at the 5-percent level. The second third and last third of Ramadan are associated with 0.08% and 0.11% increase in returns and are both statistically significant at the 5-percent level (Columns 2). It is worth noting that the coefficient for Ramadan's first ten days is not significant. This is consistent with our argument that the spiritual aspects of fasting are countered by its physical hardship during the earlier days of the

¹ Refer to Table 6 for complete regression results including controls' coefficients.

Table 2 Returns Regression Results Controlling for Lagged Returns, Day of the Week and Month of the Year

	(1) Daily Return	(2) Daily Return	(3) Daily Return	(4) Daily Return
Ashoura	-0.2609** (-2.430)	-0.2619** (-2.262)	-0.2631** (-2.268)	-0.2635** (-2.400)
Ramadan	0.0509** (2.537)			
Ramadan 1-10		0.0048 (0.081)		
Ramadan 11-20		0.0750** (2.209)		
Ramadan 21-30		0.1061** (2.047)		
Odd Days			0.1618*** (3.199)	
Even Days			0.0247 (0.409)	
Ramadan 27 th				0.3720*** (3.024)
Constant	0.0295 (1.460)	0.0289 (1.363)	0.0291 (1.383)	0.0297 (1.450)
Observations	61828	61675	61760	61684
Panels	17	17	17	17

*** p<0.01, ** p<0.05, * p<0.1

Daily and lagged returns are in percentage form (multiplied by 100). Figures in brackets under the coefficients are z statistics from nonparametric bootstrapping with 1000 repetitions in parentheses. Refer to Table 9 for complete regression results including coefficients on controls.

month, thus reducing the religious capital experienced during these first days of fast. The positive impact of Ramadan increases on the days with higher worship intensity. The daily returns during the last five odd days of Ramadan are 0.16% higher than other days (Columns 3). This result is highly statistically significant at the 1-percent level. Interestingly, returns on the last five even days of Ramadan are not statistically significant (Columns 3). This confirms that the Odd-Days effect is a result of religious experience, not non-faith aspects of the end of Ramadan, such as increased consumer spending. The latter would have triggered an equal effect across odd and even days. Finally, and consistent with our prediction, the holy day effect with the highest

magnitude is the 27th day of Ramadan which witnesses an increase of 0.37 percentage points (Columns 4). This result is statistically significant at the 5-percent level.

Figure 2 below shows the mean of change in trading volume on holy days and all other days across the pooled financial markets. Table 8 in Appendix A reports these means along with their descriptive statistics. The graph shows that mean changes in trading volume are less on holy days than all other days, with the exception of Ramadan 27th. However, the t-test reflects that none of these means is statistically different from the mean change in trading volume on all other days.

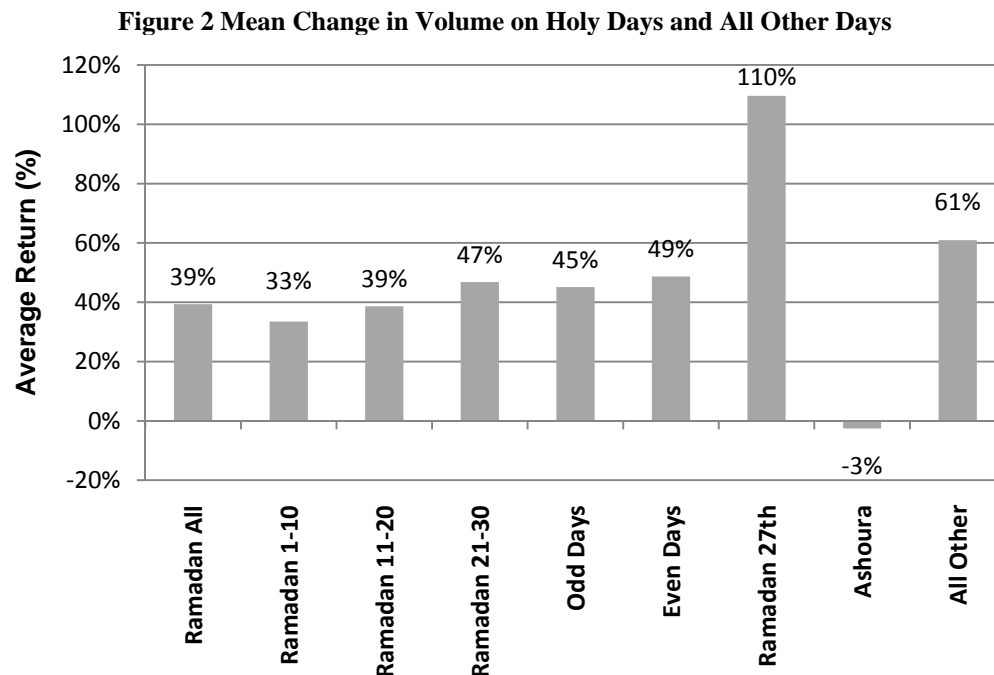


Table 3 below reports regression results for the change in trading volume on holy days, controlling for lagged returns, day of the week, and month of the year². Ashoura is associated with a drop of 53% in change in trading volume (Columns 1-4).

² Refer to Table 10 for complete regression results including controls' coefficients.

Table 3 Change in Volume Regression Results Controlling for Lagged Volume Changes, Day of the Week and Month of the Year

	(1)	(2)	(3)	(4)
	Volume Change	Volume Change	Volume Change	Volume Change
Ashoura	-52.50** (-2.32)	-52.50** (-2.44)	-51.29** (-2.35)	-50.80** (-2.26)
Ramadan	-33.20** (-2.42)			
Ramadan 1-10		-33.60** (-2.04)		
Ramadan 11-20		-30.79** (-2.32)		
Ramadan 21-30		-35.50** (-2.35)		
Odd Days			-43.62*** (-2.84)	
Even Days			-18.75 (-1.23)	
Ramadan 27 th				-52.89*** (-2.95)
Constant	71.20*** (2.65)	71.20*** (2.79)	71.18** (2.57)	71.12*** (2.64)
Observations	32982	32982	32982	32982
Panels	13	13	13	13

*** p<0.01, ** p<0.05, * p<0.1

Daily and lagged changes in volume are in percentage form (multiplied by 100). Figures in brackets under the coefficients are z statistics from nonparametric bootstrapping with 1000 repetitions in parentheses. Refer to Table 10 for complete regression results including coefficients on controls.

This result is statistically significant at the 5-percent level. The month of Ramadan is associated with 33% drop in the daily volume change (Column 1) which is statistically significant at the 5-percent level. Ramadan's first, second, and last thirds are consecutively associated with 34%, 31% and 36% drops in volume change which are significant at the 5-percent level. (Columns 2). The change in trading volume during the last five odd days of Ramadan is 44% lower than all other days (Columns 3). This result is highly statistically significant at the 1-percent level. Interestingly, change in trading volume on the last five even days of Ramadan are not statistically significant (Columns 3). This is consistent with our finding in the returns' regression, thus confirming that the underlying driver of these results on holy days is religious experience. Finally, the change

in trading volume decreases 53% on Ramadan's holiest day, Ramadan 27th (Columns 4). This result is statistically significant at the 1-percent level.

6. Discussion of the Results and their Underlying Processes:

This study has focused on the outcome of faith experience on financial markets not the processes through which this outcome is achieved. Yet, a discussion of potential processes using the insights drawn from the above results is in order. Aside from a divine intervention, which is clearly well beyond the earthly confines of this paper, two channels can lead to the statistically significant impact of holy days on market returns. The first channel is that holy days alter the composition of stock market participants due to potentially reduced trading activity by religiously observant investors on holy days. The second channel is that the heightened faith experience on holy days affects the mood of investors, thus affecting their decision making process and risk assessment. This mood explanation is consistent with a number of studies that have linked mood to changes in stock market returns. These studies are presented in the literature review section of this paper.

The first channel predicts that, on average, trading volume would decrease as a result of the absence of religiously observant investors on holy days. Furthermore, it would predict that the absence of these investors would either cause a unidirectional impact on returns across the different holy days if religious investors share a common risk assessment, or that their absence would not affect market returns if they do not share a common risk perception that is different from other investors. Consistent with the first

prediction, our results show a decrease in trading volume on holy days, which lends support to the first cause.

However, while there is a statistically significant impact on returns on holy days, the impact is not unidirectional across different holy days. The returns increase on Ramadan holy days, and decrease on Ashoura. This finding lends support to the second channel in which faith experience affects market returns through its impact on the mood of investors and therefore their risk assessment. Previous research on emotions documented the influence of emotional states on cognitive processes such as information processing (Tiedens & Linton, 2001) and risk perceptions (Lerner and Keltner, 2001; Isen, Nygren & Ashby, 1988). Furthermore, research has gone beyond the valence of the emotions to study the impact of the appraisal content of those emotions. The Appraisal-tendency-Framework, (ATF) posits that “specific emotions give rise to specific cognitive and motivational processes, which account for the effects of each emotion upon judgment and decision making” (Han, Lerner, & Keltner, 2007). Given that Ramadan and Ashoura differ from each other in the emotions they evoke in religious observers, our results can be driven by the underlying process highlighted by the ATF.

Ashoura is dominated by negative emotion such as sadness. It is well established that negative mood distorts peoples’ perceptions and judgments towards greater negativity (e.g., Carson & Adams, 1980; Cunningham, 1988; Gorn, Goldberg, & Basu, 1993; Johnson & Tversky, 1983; Mayer, Gaschke, Braverman, & Evans, 1992; Wright & Bower, 1992).³ Studies have documented that subjects that were induced with negative

³ Raghunathan, R., & Pham, M. T. (1999). All negative moods are not equal: Motivational influences of anxiety and sadness on decision making. *Organizational Behavior and Human Decision Processes*, 79, 57.

emotions made more accurate judgments without consideration to whether the outcomes were desired or not (e.g., Alloy and Abramson, 1979, Alloy, Abramson, and Viscusi, 1981; Alloy and Abramson, 1982), and were less likely to underestimate the probability of negative events, or to overestimate the possibility of positive ones (Alloy and Ahrens, 1987). Such subjects were also less likely to perceive the world as under their control when it is, instead, subject to exogenous forces (Golin, Terrell, and Johnson, 1977), and were less likely to overestimate their own abilities in ambiguous task situations (Tabachnik, Crocker, and Alloy, 1983)⁴.

Conversely, Ramadan is associated with positive emotions such as purity and happiness for observing the fast and intensified worship requirements especially during its holiest days. Johnson and Tversky (1983) found that inducing subjects with positive affect led them to believe that positive events will occur more frequently, and that negative events will occur less frequently than a control group. Happiness is associated with appraisals of elevated certainty and individual control (Smith & Ellsworth, 1985). Happy subjects are more optimistic in their risk assessment (Lerner and Keltner, 2001), and felt more certain in subsequent situations (Tiedens and Linton, 2001).

Therefore, there is evidence supporting both the changing market composition channel and the moods one. The decreased volume on Ashoura and Ramdan supports the changed market composition hypothesis, while the finding that returns move in different directions on these two holy days backs the moods channel. It is our hope that by

⁴ Staw, B., Barsade, S., (1993). Affect and Managerial Performance: A Test of the Sadder-but-Wiser vs. Happier-and-Smarter Hypotheses. *Administrative Science Quarterly*, 38, pp. 304-331.

illuminating this faith experience effect, future research will be conducted to disentangle the channels through which it operates.

7. Conclusion

This study examines the impact of religious experience on financial markets. It investigates the effect of the Muslim holy days of Ramadan and Ashoura on the daily returns of seventeen Muslim financial markets over a period of twenty one years. While both are important religious occasions, they differ from each other in the valence of emotions that worshippers experience. Additionally, these holy days are designated using the Muslim *Hijri* lunar calendar which enables us to avoid potential seasonal effects. The fact that Muslim countries differ from each other in the methods used to establish the beginnings of lunar months enables us to lessen the impact of contemporaneous events and cross market linkages. The study utilizes the heterogeneity of worship intensity within the month of Ramadan, such as the special religious significance of its last five odd days, to validate that the measured effects are a result of the religious experiences not material commercial effects. The latter would trigger an equal effect during Ramadan's last five even days.

The study finds that religious experiences are associated with a statistically significant change in mean daily returns. The effect of religious experience is not unidirectional as Ramadan's most sacred days yield a positive impact on returns, while Ashoura is associated with a negative one. Ramadan's more sacred days are associated with a higher magnitude effect culminating on the most sacred day in the Islamic calendar, Ramadan 27th. Our results show that while Ramadan's last five odd days have a positive significant impact, their even counterparts do not attain significance. This

reinforces our argument that the documented effect is a result of religious experience, not other non-religious aspects of the holy day. The latter would have resulted in non-differentiated results across Ramadan's last ten days which are only different from each other in their religious significance.

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Appendix A

Table 4 Summary of the Financial Markets' Returns Data

Country	Index	# of Obs	date		Mean	Return (%)		
			First	Last		Std. Dev.	Min	Max
Bahrain	Bahrain	3443	2-Jan-1991	30-Dec-2004	0.0326	0.5521	-5.2058	6.4997
Egypt	Cairo SE EFG General Index	4268	31-Dec-1992	31-Dec-2009	0.0673	2.1549	-98.9782	14.5471
Indonesia	Jakarta SE Composite Index	5889	2-Jan-1986	30-Dec-2009	0.0772	1.7866	-20.1695	49.6449
Iran	Tehran SE Price Index (TEPIX)	3591	1-Jan-1995	6-Jan-2010	0.0787	0.7294	-9.5271	14.9518
Jordan	Jordan AFM General Index	4402	31-Dec-1991	30-Dec-2009	0.0439	1.0084	-4.7358	5.2220
Kuwait	Kuwait SE Index	2872	10-Mar-1998	31-Dec-2009	0.0404	0.9072	-4.6649	5.1764
Lebanon	Beirut Stock Exchange Index	3243	22-Jan-1996	30-Dec-2009	0.0291	1.6039	-10.1366	23.4456
Malaysia	Malaysia KLSE Composite	5912	2-Jan-1986	31-Dec-2009	0.0409	1.5271	-21.4578	23.1427
Morocco	Casablanca SE General Index	1669	1-Feb-1995	31-Dec-2001	0.0362	0.5477	-3.1984	4.5598
Oman	Muscat Stock Market General Index	3946	1-Jan-1994	31-Dec-2009	0.0500	1.1209	-12.6810	16.4422
Pakistan	Pakistan Karachi SE-100 Index	4874	2-Jan-1989	31-Dec-2009	0.0711	1.6148	-12.3775	13.6124
Palestine	Palestine Al-Quds Index	2208	12-Apr-1999	25-Nov-2009	0.1002	2.9637	-49.7949	89.9490
Qatar	Qatar SE Index	2422	12-Sep-1999	31-Dec-2009	0.0792	1.5274	-8.9346	9.8801
Saudi Arabia	Saudi Arabia Tadawul SE Index	4481	29-Jan-1994	30-Dec-2009	0.0330	1.3357	-9.8130	9.8459
Tunisia	Tunisia Indice BVM	2694	12-Jan-1998	6-Jan-2009	0.0587	0.8107	-4.6235	5.2725
Turkey	Istanbul SE IMKB-100 Price Index	5526	2-Nov-1987	31-Dec-2009	0.2028	2.9336	-18.1093	35.6044
UAE	United Arab Emirates SE Index	1198	28-Apr-2003	2-Sep-2008	0.1584	2.9584	-36.9123	59.1919

Table 5 Summary of the Financial Markets' Change in Volume Data

Country	Index	# of Obs	date		Volume Change (%)			
			First	Last	Mean	Std. Dev.	Min	Max
Egypt	Egypt EFG	3034	2-Jun-1997	31-Dec-2009	18.76	198.63	-98.99	10007.10
Indonesia	Jakarta SE Composite Index	4933	2-Jan-1986	15-Jan-2010	94.93	1087.28	-99.97	39900.00
Jordan	Jordan AFM General Index	2808	3-May-1998	30-Dec-2009	21.29	175.89	-96.87	5887.27
Kuwait	Kuwait SE Index	2176	17-Jun-2001	30-Dec-2009	12.01	309.41	-99.17	14319.71
Lebanon	Lebanon BLOM	2824	22-Jan-1996	5-Mar-2008	163.25	1469.10	-99.94	52000.00
Malaysia	Malaysia KLSE Composite	2351	27-Apr-1998	15-Jan-2010	10.48	74.94	-92.93	1405.31
Morocco	Casablanca SE General Index	2484	3-Jan-2000	31-Dec-2009	168.53	1197.80	-99.85	29206.72
Pakistan	Pakistan General Index	886	1-Jan-2004	3-Aug-2007	5.55	40.21	-68.14	435.60
Palestine	Palestine Al-Quds Index	1866	4-Jan-2000	30-Dec-2009	132.67	730.32	-99.88	16340.96
Saudi Arabia	Tadawul All Share Index (TASI)	748	6-Jan-2007	30-Dec-2009	3.78	33.28	-71.45	360.16
Tunisia	Sum of volume of all traded companies	3238	2-Jan-1997	31-Dec-2009	46.21	246.97	-97.75	7174.77
Turkey	Istanbul SE IMKB-100 Price Index	4869	13-Nov-1987	15-Jan-2010	6.65	64.04	-96.15	2500.00
UAE	Dubai Financial Market Bank Index	1483	31-Dec-2003	31-Dec-2009	26.05	113.38	-93.75	1577.12

Table 6 Holy Days Data

R: Ramadan data only

A: Ashoura data only

B: Both Ramadan and Ashoura data

Gregorian	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2009
<i>Hijri</i>	1408	1409	1410	1411	1412	1413	1414	1415	1416	1417	1418	1419	1420	1421	1422	1423	1424	1425	1426	1427	1428	1429	1430	1431
Saudi Arabia	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A
Lebanon	R	R	R	R	R	R	R	R	R	B	R	R	B	R	R	B	B	B	B	B	B	B	B	A
Egypt	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A
Morocco	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B	B	B	A
Turkey	A	A	B	B	B	B	B	R	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A
Jordan	R	R	R	R	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A
Kuwait	R	R	R	B	R	R	B	R	R	R	R	R	B	R	B	R	B	B	R	B	B	B	B	A
Bahrain	R	B	R	R	B	R	R	R	B	B	R	B	B	R	B	B	B	R	R	R	B	B	B	A
Iran										R		R	B	B	B	B	R	B	B	R	B	B	B	
Malaysia				R			R	R	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
Oman	R	R	R	R	R	R			R		R	R	R		B	R	R	B	B	B	B	B	R	
UAE	R	R	R	R	R	R	R	R	R	R	R	R	B	B	B	R	R	R	R	B	B	R	R	A
Pakistan	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A
Palestine	B	B	B	B	B	B	R	R	B	B	B	R	B	B	B	B	B	B	B	B	B	B	R	
Qatar	R	R	R	R	R	R	R	R	R	R	R	R	B	R	R	R	R	R	R	B	R	B	B	A
Tunisia		R										R	R	R	R	R	R	R	R	B	B	B	B	A
Indonesia	R	R	R	R	R	R	R	R	R	R	R	R	R	R	B	R	R	R	R	B	B	B	B	

Table 7 Mean of Daily Returns on Holy Days and All Other Days

	Obs	Mean (%)	Std. Dev. (%)	Min (%)	Max (%)	t-test
Ramadan All	4978	0.120	1.803	-32.305	49.702	2.1173** (0.0342)
Ramadan 1-10	1743	0.059	1.693	-12.326	19.451	0.0238 (0.9810)
Ramadan 11-20	1748	0.133	2.183	-32.305	49.702	1.7136* (0.0866)
Ramadan 21-30	1490	0.178	1.386	-8.727	16.190	2.5633** (0.0104)
Odd_Days	788	0.239	1.474	-8.256	16.190	2.7869*** (.0053)
Even_Days	702	0.110	1.279	-8.727	8.017	0.7957 (0.4262)
Ramadan_27 th	162	0.456	1.509	-2.830	15.145	2.9497*** (0.0032)
Ashoura	99	-0.173	1.684	-6.583	4.792	1.4025 (0.1608)
All Other Days	56821	0.066	1.697	-98.978	89.949	

Notes: “Obs” denote the number of observations used to compute the mean and other statistics. “Ramadan All” refers to the mean daily return during the whole month of Ramadan, “Ramadan 1-10” refers to the mean daily return during the first ten days of Ramadan, “Ramadan 11-20” refers to the mean daily return during the middle ten days of Ramadan, “Ramadan 21-30” refers to the mean daily return during the last ten days of Ramadan, “Odd Days” refers to the mean daily return during the odd last ten days of Ramadan, “Even Days” refers to the mean daily return during the even last ten days of Ramadan, “Ramadan 27th” refers to the mean daily return on the 27th day of Ramadan, “Ashoura” refers to the mean daily return on the day of Ashoura, “All Other” refers to the mean daily return on all day other than Ramadan and Ashoura. “t-test” refers to the t-test that the mean of returns on the specific holy day are not different from the mean of returns on all other days other than Ashoura and Ramadan. Figures in brackets under the “t-test” denote the two sided p-value for the t-test.

Table 8 Mean of Change in Volume on Holy Days and All Other Days

	Obs	Mean (%)	Std. Dev. (%)	Min (%)	Max (%)	t-test
Ramadan All	2730	39.35	267.82	-99.60	8774.40	1.5027 (0.1329)
Ramadan 1-10	945	33.50	188.15	-98.54	3102.41	1.1292 (0.2588)
Ramadan 11-20	959	38.64	244.32	-99.60	6175.00	0.9239 (0.3555)
Ramadan 21-30	827	46.82	356.64	-99.24	8774.40	0.5427 (0.5874)
Odd_Days	435	45.14	445.74	-99.24	8774.40	0.4406 (0.6595)
Even_Days	392	48.68	219.46	-98.08	2138.07	0.3252 (0.7450)
Ramadan_27 th	95	109.60	902.00	-98.20	8774.40	0.6392 (0.5227)
Ashoura	60	-2.54	48.36	-93.27	240.13	0.6586 (0.5101)
All Other Days	30564	60.95	746.73	-99.97	52000.00	

Notes: "Obs" denote the number of observations used to compute the mean and other statistics. "Ramadan All" refers to the mean daily change in volume during the whole month of Ramadan, "Ramadan 1-10" refers to the mean daily change in volume during the first ten days of Ramadan, "Ramadan 11-20" refers to the mean daily change in volume during the middle ten days of Ramadan, "Ramadan 21-30" refers to the mean daily change in volume during the last ten days of Ramadan, "Odd Days" refers to the mean daily change in volume during the odd last ten days of Ramadan, "Even Days" refers to the mean daily change in volume during the even last ten days of Ramadan, "Ramadan 27th" refers to the mean daily change in volume on the 27th day of Ramadan, "Ashoura" refers to the mean daily change in volume on the day of Ashoura, "All Other" refers to the mean daily change in volume on all day other than Ramadan and Ashoura. "t-test" refers to the t-test that the mean of change in volume on the specific holy day are not different from the mean of change in volume on all other days. Figures in brackets under the "t-test" denote the two sided p-value for the t-test.

Table 9 Returns Regression Results

	(1) Daily Return	(2) Daily Return	(3) Daily Return	(4) Daily Return
Ashoura	-0.2609** (-2.430)	-0.2619** (-2.262)	-0.2631** (-2.268)	-0.2635** (-2.400)
Ramadan	0.0509** (2.537)			
Ramadan 1-10		0.0048 (0.081)		
Ramadan 11-20		0.0750** (2.209)		
Ramadan 21-30		0.1061** (2.047)		
Odd Days			0.1618*** (3.199)	
Even Days			0.0247 (0.409)	
Ramadan 27 th				0.3720*** (3.024)
Lagged Return _{t-1}	0.0731* (1.775)	0.0726* (1.745)	0.0729* (1.748)	0.0730* (1.753)
Lagged Return _{t-2}	0.0143 (1.245)	0.0154 (1.304)	0.0147 (1.230)	0.0155 (1.349)
Sunday	0.0174 (0.430)	0.0177 (0.436)	0.0176 (0.438)	0.0164 (0.410)
Monday	-0.0284 (-1.094)	-0.0267 (-0.966)	-0.0273 (-1.053)	-0.0298 (-1.144)
Wednesday	0.0743*** (3.532)	0.0731*** (3.371)	0.0739*** (3.477)	0.0729*** (3.530)
Thursday	0.1029*** (3.517)	0.1041*** (3.399)	0.1036*** (3.299)	0.1043*** (3.302)
Friday	0.1394*** (2.708)	0.1405*** (2.592)	0.1399*** (2.662)	0.1407*** (2.630)
Saturday	0.1369* (1.801)	0.1372* (1.767)	0.1373* (1.689)	0.1347* (1.870)
January	0.0539 (1.157)	0.0528 (1.142)	0.0564 (1.202)	0.0550 (1.223)
February	-0.0341 (-0.877)	-0.0335 (-0.874)	-0.0321 (-0.804)	-0.0306 (-0.798)
March	-0.0438 (-1.499)	-0.0426 (-1.509)	-0.0412 (-1.503)	-0.0388 (-1.367)
April	0.0637*** (2.706)	0.0665*** (2.874)	0.0662*** (2.736)	0.0668*** (2.779)
May	-0.0164 (-0.449)	-0.0165 (-0.436)	-0.0164 (-0.444)	-0.0163 (-0.446)
July	-0.0379* (-1.687)	-0.0378* (-1.743)	-0.0378* (-1.740)	-0.0378* (-1.757)
August	-0.0519 (-1.578)	-0.0512 (-1.466)	-0.0511 (-1.509)	-0.0511 (-1.496)
September	-0.0430 (-1.624)	-0.0424 (-1.518)	-0.0391 (-1.518)	-0.0378 (-1.453)

October	-0.0635*** (-2.875)	-0.0651*** (-2.882)	-0.0597*** (-2.672)	-0.0583*** (-2.816)
November	-0.0507* (-1.712)	-0.0525* (-1.754)	-0.0470 (-1.559)	-0.0431 (-1.563)
December	0.0464 (1.228)	0.0443 (1.195)	0.0497 (1.277)	0.0525 (1.418)
Constant	0.0295 (1.460)	0.0289 (1.363)	0.0291 (1.383)	0.0297 (1.450)
Observations	61828	61675	61760	61684
Panels	17	17	17	17

*** p<0.01, ** p<0.05, * p<0.1

Daily returns and lagged ones are in percentage form (multiplied by 100).
Figures in brackets under the coefficients are z statistics from nonparametric bootstrapping with 1000 repetitions in parentheses.

Table 10 Change in Trading Volume Regression Results

	(1) Change in Trading Volume	(2) Change in Trading Volume	(3) Change in Trading Volume	(4) Change in Trading Volume
Ashoura	-52.4962** (-2.318)	-52.5028** (-2.441)	-51.2933** (-2.350)	-50.7951** (-2.264)
Ramadan	-33.1970** (-2.418)			
Ramadan 1-10		-33.6044** (-2.042)		
Ramadan 11-20		-30.7934** (-2.323)		
Ramadan 21-30		-35.4992** (-2.352)		
Odd Days			-43.6169*** (-2.844)	
Even Days			-18.7483 (-1.231)	
Ramadan 27 th				-52.8898*** (-2.954)
Lagged Change in Volume _{t-1}	-0.0183** (-2.023)	-0.0183** (-2.191)	-0.0182* (-1.888)	-0.0182** (-1.988)
Lagged Change in Volume _{t-2}	0.0072 (1.614)	0.0072* (1.831)	0.0073 (1.526)	0.0073 (1.619)
Sunday	-27.2446 (-1.236)	-27.2342 (-1.399)	-27.1930 (-1.431)	-27.2507 (-1.247)
Monday	-35.3679* (-1.796)	-35.3695* (-1.827)	-35.4047* (-1.736)	-35.3143* (-1.790)
Wednesday	-25.4546** (-2.184)	-25.4534** (-2.207)	-25.4867** (-2.089)	-25.3542** (-2.180)
Thursday	-39.5876** (-2.146)	-39.5876** (-2.076)	-39.4637** (-2.035)	-39.4860** (-2.142)
Friday	-30.0827** (-2.191)	-30.0790** (-2.207)	-30.0931** (-2.143)	-29.9736** (-2.179)
Saturday	-27.3728 (-0.785)	-27.3570 (-0.758)	-27.3333 (-0.860)	-27.3095 (-0.786)
January	29.5599 (1.310)	29.5761 (1.294)	27.6678 (1.260)	26.7855 (1.245)
February	45.7735 (1.278)	45.7776 (1.264)	44.7067 (1.247)	44.3205 (1.266)
March	12.5510 (0.587)	12.5516 (0.618)	11.5818 (0.558)	11.2307 (0.524)
April	24.8919 (1.635)	24.8902 (1.607)	24.1655 (1.553)	23.9338 (1.598)
May	10.8428 (1.349)	10.8451 (1.356)	10.7746 (1.362)	10.7023 (1.347)
July	-0.9711 (-0.261)	-0.9711 (-0.267)	-0.9702 (-0.267)	-0.9690 (-0.260)

August	-5.2267 (-0.419)	-5.2194 (-0.453)	-5.8290 (-0.473)	-5.8259 (-0.463)
September	21.8155 (1.192)	21.7794 (1.221)	17.3591 (0.972)	16.2274 (0.924)
October	30.2941 (1.223)	30.2781 (1.236)	25.1176 (1.064)	23.6539 (1.037)
November	19.6442 (0.839)	19.6461 (0.891)	14.9928 (0.682)	13.2138 (0.604)
December	23.2416* (1.935)	23.2606* (1.946)	19.8170* (1.814)	18.4203* (1.733)
Constant	71.1993*** (2.653)	71.1982*** (2.792)	71.1811** (2.573)	71.1215*** (2.642)
Observations	32982	32982	32982	32982
Panels	13	13	13	13

*** p<0.01, ** p<0.05, * p<0.1

Daily changes in trading volume and lagged ones are in percentage form (multiplied by 100). Figures in brackets under the coefficients are z statistics from nonparametric bootstrapping with 1000 repetitions in parentheses.