The impact of Islamic Events on herding Behaviour in Saudi Arabia financial market

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Abstract

The focus of this study is to look at the impact of social mood on the herd behavior in religious context. Muslims mood associated with Islamic events may encourage herding around these days more than non-event days. We investigate the impact of different religious events using the Saudi equity market setting for the period of October 2005-February 2016. This period includes the events of global financial crisis and the Arab Spring and thus leads comparison of herding results across various subsamples. Our results show a significant effect of Eid-ul-Fitr and Ashoura in Saudi Arabia stock market. In our subsample analysis, evidence of herding around Eid-ul-Fitr and Ashoura is present during the financial crisis period only. Our results support our motivation that investor mood is carried over during the festive months of the Eid-ul-Fitar, Ashoura and Eid-ul-Adha instead of earlier reported evidence of herding in Ramadan.

Keywords: Eid-ul-Fitr, Eid-ul-Adha, Ramadan, social mood

Jel Classification: G1

Introduction

The development of behavioral finance occurs after the traditional finance assumptions come under attack from a number of quarters (Lo 2005). Under the traditional form of finance, investors behavior assume to be rational[1]. But, investors are not always rational, sometimes act in irrational manner when they suffer from cognitive and emotional biases (Aduda, Oduor and Omwonga 2012). Under uncertainty investors decision making may deviate from the market rationality in the form of specific behavioral biases (Lo 2005). This behavior when the stocks deviate from the assumptions of the efficient market hypotheses called a financial market anomaly[2] (Latif et al., 2011).

Herding[3] is an example of the most common behavioral biases in the financial market. Herding happens when investors blindly and irrationally follow the other players in the market, instead of their knowledge, beliefs, and analysis. The Efficient Market Hypothesis is not able to explain such irrationality, and the relatively new discipline of behavioral finance has become very popular as a basis for investment decisions in many stock markets (Christie and Huang, 1995; Saxena et al., 2016). Prior research finds that investors behavior may disturb the market equilibrium due to their impact on the stock prices and returns.

Therefore, behavioral Finance has received the major attention from the growing body of recent research. For example, Shu (2010) argues that investors attitude disturbs the asset prices and returns. Higher asset prices correlated with better mood and vice versa. In fact, investors are willing to undertake riskier investors when their mood is positive. Because being in positive

[1] Fama (1970) describes investors under the efficient market theory as a profit maximizing individuals. They compete each other to predict the future market values of individual securities. Also, information is available freely to all investors and the current price reflect all the publically available information

[2] There are many examples of these anomalies and they have been investigated by previous research (Kiymaz and Berument, 2003; Rasugu, 2005 Marrett and Worthington, 2007; Osman, 2007; Migiro, 2010; Dodd and Gakhovich, 2011; Oyori 2012; Ray 2012; Kulavi 2013; Waithaka 2013; Sultan and Malik 2013). These examples include the day of the week effect, holiday effect, turn of the month effect among others and the Islamic calendar anomalies.

[3] Heuristics, Pattern seeking/ representative heuristic and herding an example of how human react when there is a lack of information about the future.

mood meaning that investors are more optimistic and more willing to exposure higher risk investment decisions (Shu, 2010).

Relevant studies in behavioral finance also investigate the relationship between mood and investment decision (see, e.g., the reviews of Hirshleifer, 2001; Daniel et al., 2002; Nofsinger, 2005; and Dowling and Lucey, 2005). They conclude that mood plays a significant role in changing investors preference, risk assessments and rational cogitations and, eventually, their investment decisions making. Investors mood may influence by different factors such as religion. This factor uses as a proxy variable in previous research (e.g., Frieder & Subrahmanyam,2004; Pantzalis & Ucar, 2014).

For instance, Frieder & Subrahmanyam (2004) find a significant impact of Jewish High Holy days (i.e., Rosh Hashanah and Yom Kippur) on the US investors mood. Dollar volume is determined to be declined in both holy days. There is also a significant impact of both days on the stock returns. Around Rosh Hashanah, stock returns are found to be significantly positive. Also, it is found to be significantly negative around Yom Kippur. Also, Pantzalis & Ucar (2014) look at the impact of Easter week holiday on the US investors mood as well. Their study concludes that investors may be distracted by the religious practice which may lead to delayed reaction upon the firm news.

Since the late 1990s, Islamic finance has also received strong growth, and Islamic calendar anomalies have received attention from many researchers in the Islamic context. Muslims during festive months become more sociable, healthy and spiritually oriented. Moreover, the level of social support Muslims receive during Ramadan and Eids, and the close relationship they form with Allah may encourage optimistic beliefs as Muslims become more satisfied and happy. This optimistic belief may, in turn, extend to the investment decisions of the followers (Beit-Hallahmi and Argyle, 1997).

But during Ramadan Muslims paid more attention performing religious practices such as fasting and performing special prayers such as Tarawih and Qiyam. Muslims feel thirsty and hungry when fasting, and that may have an adverse influence on investor mood and health. Previous research finds that although fasting respite the digestive tract and eliminate the superfluous tissue, there is a reduction in body weight and waist circumference of Muslims (Böck et al., 1978; Perk et al., 2001; Saleh et al., 2005; Bouhlel et al., 2008). There is also a reduction in the working hours in all sectors and that in turn lead the business activities to slow down during Ramadan.

For instance, Shah and Ahmed (2014) investigate the consequences of Ramadan in Karachi Stock Exchange. Their study assumes that Islamic Calendar, specifically, Muharram and Ramadan, may impact the business life due to its influence on Muslims. Because during these months Muslims may pay more attention towards rituals and faith and pay less attention to the Business activities. Their results show that the Karachi financial market remains the same during Ramadan as any other month of the year. However, Seyyed, Abraham, and Al-Hajji (2005) find that volatility and trading activity disappear during Ramadan in Saudi Arabia stock market when analysing several sector indices.

Also, Al-Ississ (2010) research shows a significant decline in the trading volume, significant positive returns during the five holy days of Ramadan, and significant negative returns during Ashura. The study investigates the impact of Ramadan and Ashura (the tenth day of Muharram in the Islamic calendar) using a sample from 17 Muslim countries from 1988-2009. Halari et al. (2015) results show weak evidence of a monthly seasonal anomaly in average returns, but there is evidence of monthly patterns in the volatility of returns. Their study looks at the impact of Islamic calendar anomalies in Pakistani firms from 1995 to 2011.

Also, Many Muslims consider speculative trading in securities is a form of gambling which is prohibited by Islam. Thus, trading in securities may decline. Husain (1998) finds that there is

no significant change in mean return during Ramadan but return volatility declines significantly.

Islamic events in Muslims countries are identified by previous literature as a potential creation of herding behavior. Investors during Islamic events face the same set of stimuli and social mood correlated with combined level optimism or pessimism which may affect investors decision-making toward herding (Prechter, 1985, 1999; Al-Hajieh et al., 2011). Many studies have investigated the Impact of Islamic Calendar on the stock market as a seasonal anomaly only in various Islamic context such as Saudi Arabia, Turkey, Pakistan (e.g., Husain, 1998; Alper and Aruoba 2001; Seyyed, Abraham, and Al-Hajji, 2005; Ramezain, 2013).

Rare studies look at the impact of Islamic calendar from behavioral perspective specifically on herding behavior. One research has linked the social mood during Ramadan with herding is conducted by Gavriilidis et al., (2016). The study draws a sample of seven majority Muslim countries (Bangladesh, Egypt, Indonesia, Malaysia, Morocco, Pakistan, and Turkey). Their finding shows that the positive mood associated with Ramadan lead to higher herding in most of the sample markets compared to non-Ramadan days. But their study focuses only on Ramadan as a main contributor to herding.

But, they do not account for other important events such as Eid-ul-Fitr, Eid-ul-Adha, and Ashoura. Moreover, Saudi Arabia stock market one of the major Islamic country in the world does not include in their research sample. The results also are not robust as their herding measure may contain spurious herding and prior research has wrongly estimated as investor pure herding. Moreover, they do not include different investment style such as the liquid sample to check the robustness of their results. So, our paper aims to investigate whether social mood associated with Islamic events lead to herding behavior in Saudi Arabia stock market.

Saudi Arabia which is regarded as a "home of Islam,"[4] one of the major Islamic country in the world. Also, 100%[5] of Saudi citizens are Muslims and religion is an essential part of everyday life. It is also adopted the most austerely puritanical form of Islam, so, it is a conservative society.

Moreover, Saudi Arabia bourse has non Shariah-compliant stocks listed. Although Islamic finance services industry is expanding in Saudi Arabia, there is no restriction legally when it comes to the portfolio selection. The portfolio selection based on the ethical attitude of investors. Saudi Arabia economy depends on Oil and has numerous characteristics which make it unique among emerging market bourses. Thus, we expect an impact of Islamic events on investors behavior in Saudi Arabia.

We relate to Gavriilidis et al., (2016) research in which we use the cross-sectional absolute deviation of returns (CSAD) to estimate herding behavior. But, we have also included the part of dispersion induced by similar information and investors' decisions only. The market co-movement due to risk factors is eliminated as it may be wrongly construed as herding. Moreover, we have also related to Gavriilidis et al., (2016) research in which we investigate the impact of Ramadan on herding. However, we are different in which we include other Islamic events in the Islamic calendar such as Eid-ul-Fitr, Eid-ul-Adha, and Ashoura.

These events correlated with high level of social interaction in most Muslim countries and previous literature proof that such events impact investors mood which we think it may facilitate herding. Thus, we expect to observe herding during Eids and Ashoura days more than Ramadan. Prior research investigates these events as a seasonal anomaly only (Wong et al., 1990; Mcgowan and Jakob, 2010; Al-Ississ, 2010; Chowdhury and Mostari, 2015). To the best

[4] Bradley, John R. (2005). Saudi Arabia Exposed: Inside a Kingdom in Crisis. Palgrave. p. 145. 'home of Islam' as the 1930s-geopolitical construct of Saudi Arabia is ... referred to "

[5] https://nosharia.wordpress.com/list-of-muslim-majority-countries-with-sectstategovernment/

of our knowledge, our study is the first that covers all Muslim holy events and study their impact on herding behavior in Saudi Arabia stock market. Moreover, our study uses three sub-samples that account for the Arab Spring and the major 2008/2010 financial crisis period. The Arab Spring and the financial crisis period cause a political instability in the Middle East.

There are a stock returns and Price volatility as a result. So, there is a need to investigate if these periods overshadow the impact of Islamic events on stock returns and volatility in Muslims countries such as Saudi Arabia. Also, Muslims moods and emotions also may change over the three sub-periods due to the uncertainty in the economy. Thus, herding may be observed more during periods correlated with high level of uncertainty such as the financial crisis period and the Arab Spring period.

Our finding does not support Gavriilidis et al., (2016) research. We fail to find evidence of herding during Ramadan days for the whole and sub-samples but it matches our expectation. Herding behavior is observed during Eid-ul-Fitr and when we use the sub-samples it is observed during the financial crisis period. Herding also occur around Ashoura days.

Moreover, when using the sub-samples, it is observed during the 2008 financial crisis period. Herding around Eid-ul-Adha days is found when using the highly liquid sample only. It is also found when using the sub-samples during the Arab Spring period. The results match our hypotheses that herding is more pronounced during Eids and Ashoura than Ramadan days. Our finding is important in understanding the role of Islamic events on Islamic stock markets behavior.

Also, it is may be of interest to market regulators to look at the main contributor to the market instability in Saudi Arabia the major Islamic country in the world. Thus, they could form their expectation about the market direction during these Islamic events days and then build the right decision. Also, by considering the consequences of the Islamic calendar in Saudi Arabia equity

market, thus, would help investors in Saudi Arabia with forming the effective investment decisions and create the optimal portfolio.

The reminder of the paper is organized as follows: in Section 2 we provide an overview of Muslims Mood during Ramadan, Eids and Ashoura days and Herding Behavior. Section 3 presents the relevant literature. Section 4 illustrates the methodology uses and the Data set. Section 5 presents and discuss the results. Finally, Section 6 the conclusion.

Muslims Mood during Ramadan, Eids and Ashoura days and herding behavior

Islamic Calendar consists of twelve months[6] in a year of 354 or 355 days. It is a lunar Calendar and used by many Muslim countries such as Saudi Arabia. Muslims depend on Islamic calendar to determine days of Islamic holidays and rituals such as the annual period of fasting and Hajj. The study specifically focuses on four crucial Muslim holy days: Ashoura, Ramadan, Eid-ul-Fitr and Eid-ul-Adha.

Ashoura day located on the tenth[7]day of the first Hijri month of Muharram. Sunni and Shi'a Muslims commemorate Ashoura but in different ways. For Sunni Muslims, they fast and celebrate Ashoura because of the Prophet Moses (Moosa) fast this day. Mouses and the Israelites are saved by Allah from the Pharaoh and his army in this day. Muslims usually fast the 9th and 10thof Muharram[8]. However, Shi'a Muslims consider this day as a day of sorrow. Hussein Ibn Ali, the grandson of Prophet, martyred this day at the Battle of Karbala. So, Shi'a

[6] The twelve months of the Islamic calendar are: Muharram, Safar, Rabi al-awwal, Rabi ath-thani, Jumada al-ula, Jumada-al-akhirah, Rajab, Shaban, Ramadan, Shawwal, Dhu al-Qadah, Dhu al-Hijjah. Islamic calendar often used alongside the Gregorian calendar.

[7] Ashra in the Arabic language is ten. Ashoura named in this way because of the tenth of Muharram.

[8] Different ways to fast 'Ashoura'. Muslims can fast the tenth only. But it is mustahabb to fast the ninth and the tenth of Muharram because the Prophet (peace and blessings of Allah be upon him) fasted the tenth and intended to fast the ninth.

Muslims refine music and all joyous events such as weddings. They also listen to sorrowful poetic recitations and wear mourning attire.

Ramadan is number nine in the Islamic calendar and it is number four of the five pillars of Islam. Ramadan dates are not fixed. Muslims are observing the moon movements to determine the dates. It is described as "better than a thousand months" in Qur'an[9]. Eating, drinking, smoking and having other sensual pleasure are prevented during Ramadan days from dawn till sunset. Muslims behavior during Ramadan days correlated with low-level of anxiety, increased levels of euphoria and social interactions (Daradkeh ,1992; Knerr & Pearl,2008).

In Ramadan, there are two meals, Muslims break their fast with Iftar and before Imsak (start fasting) they have another meal called Shoor. Muslims are motivated to do special prayers such as Tarawih and Qiyam in the mosques almost every night in Ramadan. Also, reading Qur'an and performing right actions are popular in Ramadan month. Thus, Muslims believe that performing good activities during Ramadan days can get you rewarded twice than they typically can achieve in non-Ramadan days.

After a holy month of fasting and performing the religious practices, Eid-ul-Fitr comes to break the fast period. The concept Eid is Arabic and meaning "festivity," while Fiṭr means "to break-fast." Muslims celebrate Eid-ul-Fitr three days in Shwal. Shwal month follows Ramadan month. Muslims often celebrate Eid-ul-Fitr with family and friends, and it is also a time to give in charity to those in need (Al-Hajieh et al., 2011). Dhu al-Hijjah is number twelve in the Islamic calendar. Many Muslims around the world come to Saudi Arabia to perform Hajj which is one of the five pillars of Islam.

In the 10th of Dhu al-Hijjah, Eid-ul-Adha starts and it is one of the crucial festival in the Islamic

[9] Muslim holy book (Surah al-Qadr: 3)

calender. Other names of Eid-ul-Adha are a festival of sacrifice day or Eid of Qurbani. Muslims during this month seek to imbibe piety and self-righteousness by sacrificed[10] (Chowdhury and Mostari, 2015).

We assume herding behavior to be noticed during Islamic events because the level of social interaction increases compared to the non-Islamic events days. Many researchers have argued that social interaction in general and social mood, in particular, are important factors in driving herding behavior in the financial market (see Prechter, 2001; Hong et al. 2004; Parker & Prechter, 2005; Olsen,2006; Liao et al., 2011; Blasco et al. 2012). But, it is difficult to determine Muslims mood during Ramadan and Ashoura days as it is positive for some Muslims and harmful to others. But, for Eid's we expect Muslims mood to be positive.

Moreover, the level of herding behavior could change based on the holy day's type. Thus, we expect herding during Eid's and Ashoura festivals more than Ramadan holy month. Muslims during Eid's months are optimistic and feel a sense of social identity and solidarity which may impact their decision-making and facilitate herding. Whereas, during Ramadan, investors may get distracted by forming the religious practices such as fasting and doing the special prayers at certain times and there is also a decreasing of the working hours for employers. Thus, the market activities may slow down as a result which may lead to anti-herding during Ramadan.

Literature Review

Islamic events have investigated in several studies in finance. Thus, Islamic events may influence the social mood which may transfer into the investment decisions. Ramadan in the Islamic calendar has received much attention from researchers. For example, Husain (1998),

[10] This is an act of obedience to God. Allah appear to Ibrahim in a dream and asked him to sacrifice his son Ismael and when he tempted to kill his son Allah asked him to kill a lamb instead.

investigates the impact of Ramadan on the Pakistan's stock exchange. The study reports evidence of the influence of Ramadan on the stock's volatility as it is seen to be declined during the weeks of Ramadan. Their fining cannot report any substantial evidence of the impact of Ramadan on the normal returns and average returns.

Alper and Aruoba (2001) also, fail to find any significant evidence of the impact of Ramadan in Istanbul stock market. Seyyed, Abraham, and Al-Hajji (2005) noted that Ramadan does not affect the mean returns when examining the stock market behavior in Saudi Arabia. But, they find evidence of low volatility during Ramadan month. They perform their analysis over the period 1985-2000. Al- -Ississ (2010) argues that Ramadan month provide a positive effect on returns, but Ashura gives a negative one. The study investigates the impact of Ramadan and Ashura (Ten days of Islamic calendar Muharram) on trading volume and daily returns of 17 Muslim countries.

Also, Al-Hajieh et al. (2011) find that positive mood associated with Ramadan month have an impact on the abnormal returns. They report positive abnormal returns during Ramadan in most Middle Eastern countries during the period from 1992-2007. Moreover, Bialkowski et al. (2012) investigate the impact of Ramadan in 14 Muslim countries stock returns. The finding report evidence of higher stock returns during Ramadan month compared to non-Ramadan months.

Al-Khazali (2014) research also provides evidence on the impact of Ramadan in 15 Muslim countries stock returns for various time periods. The finding also reports an effect of Ramadan month through higher returns. But, following the outbreak of financial crisis period, the result shows a dissipating. Also, Ali et al. (2015) find an impact of Ramadan in the Karachi Stock Exchange of Pakistan.

Another stream of research looks at the impact of different Islamic events such as Eids festivals

and Ashoura holy days in various Muslim's countries. For instance, Wong et al., (1990) study look at the impact of multiple types of seasonality in the Malaysian-stock market and the Eid-ul-Fitr effect is one of them. The finding shows a negative effect of Eid-ul-Fitr in the Malaysian-stock market. Similarly, Chan et al., (1996) do not find any impact of Eid-ul-Fitr in the Malaysian-stock market as well. Mcgowan and Jakob (2010) also cannot see an effect of Eid-ul-Fitr in Syariah Index of the Kuala Lumpur Stock Exchange when investigating kits effects over the period from 2000 to 2003.

Ali et al., (2017) fail to find any significant influence of holy days such as Ashoura, Eid Milad-un-Nabi (SAW), Ramadan, and Eid-ul-Adha on Asian financial markets. However, Eid-ul-Fitr is the only religious day has the significant positive impact on stock returns of Asian markets. In addition to Eid-ul-Fitr, Previous research (e.g., Chowdhury and Mostari, 2015) look if Eid-ul-Adha affects Dhaka market return. The finding shows that before and after Eid-ul-Adha, there is higher mean index return.

It also indicates a presence of anomaly index return before and after Eid-ul-Adha. Akhter et al. (2015) study examine Eid-ul-Adha in stock markets of six Islamic countries. Their finding illustrates a negative impact of Eid-ul-Adha in Malaysian stock market return. Eid-ul-Adha does not affect other sample countries' equity markets return. Moreover, there is a negative effect of Eid-ul-Adha on Turkish, Morocco and Egyptian stock market volatility

But, no impact on the market's volatility for the rest samples. Majeed et al. (2015) do not find an effect of Eid-ul-Adha on Pakistani stock market index returns. The study investigates the impact of five Islamic calendar events using daily data of KSE-100 Index from 2001 to 2012. Their finding also shows a significant effect of Ramadan, Ashuora, Rabiul Awal and Eid-ul-Fitr on the stock return. The studies above look at the impact of Islamic calendar on various Muslim countries as a seasonal anomaly. None of these studies look at it from the behavioral

finance perspective. Gavriillidis et al. (2015) is the first study that looks at the influence of Islamic events from a behavioral perspective in seven majority Muslim countries (Bangladesh, Egypt, Indonesia, Malaysia, Morocco, Pakistan, and Turkey).

The study attempts to find a link between herding and Ramadan. Their objective is whether herding is higher during Ramadan days compared to non-Ramadan days. They report evidence of herding in most of the sample markets during Ramadan days. Herding also found to be stronger during Ramadan days rather than non-Ramadan days. But, Gavriillidis et al. (2014) research focused solely on Ramadan in the Islamic calendar. But, they do not include Eids and Ashoura festivals.

As has been reported from previous literature (Wong et al., 1990; Akhter et al. 2015; Chowdhury and Mostari, 2015) Eids and Ashoura festivals which are one of the crucial events in the Islamic calendar effect investors decision-making in the Islamic countries. Most of the studies above study their impact as a seasonal anomaly only on stock returns and trading volume. None of these studies look at their effect from behavioral finance perspective specifically investigate their effects on herding and in Saudi Arabia stock market. Our research will fill the gap in the literature§ by studying the impact of Ramadan, Ashoura, and Eids on herding behavior and in Saudi Arabia stock market.

We will investigate our research objective after eliminating the part of dispersion due to fundamentals. Previous research (e.g., Gavriillidis et al. 2014) may be wrongly considered the market moves due fundamentals as herding. But we believe that the market moves due to market sentiment are the leading cause of herding.

Methodology

To calculate herding, our study applies Change et al. (2000) (CCK) methodology, who has improved Christie and Huang (1995) (CH) approach. This method is simple and is commonly used in previous literature. They measure herding based on returns dispersion in a portfolio of assets with similar characteristics. Christies and Huang (1995) estimate herding by the Cross-Sectional Standard Deviation of returns (CSSD). They argue that dispersion of returns will be low when herding behavior exists around the market consensus.

Chang et al. (2000) measure herding by the cross-Sectional Absolute Deviation of returns (CSAD). They argue that during period of market stress, the increasing association between dispersion and market return may no longer hold if investors choose to follow the aggregate market. Thus, non-linearly increasing or decreasing between dispersion and market return may occur. CSAD is calculated using the following formula:

$$\mathrm{CSAD_t} = \frac{1}{\mathrm{N}} \sum_{\mathrm{i}=1}^{\mathrm{N}} |\mathrm{R_{i,t}} - \mathrm{R_{m,t}}|$$

Where:

$\mathrm{CSAD_t}$	the Cross-Sectional Absolute Deviation of returns
N	Total number of stocks at time t
i	Individual stock
t	Refer to the day
$\mathrm{R_{i,t}}$	Stock's return
$\mathrm{R_{m,t}}$	Market return

The study calculates the difference of the stock's return and the market exchange of each individual stock i of the N stocks and for each day t. The stock and the market index return is calculated using the continuously compounded returns as follows:

$\mathrm{R_t} = \log\ (\mathrm{p_t}/\mathrm{p_{t-1}})$, Where $\mathrm{p_t}$ is the log of daily price

According to Bikhchandani and Sharma (2000), investors may follow each other's behaviors for two reasons. First, they might react to similar changes in fundamentals. Also, investors may intentionally copy each other actions. The study follows Galariotis et al. (2015) methodology

to investigate "Spurious" and "Intentional" herding in the GCC markets, total $CSAD_t$ measure is divided into two important measures, $\mathrm{CSAD}_{\mathrm{FUND,t}}$ is the cross- sectional absolute deviation of returns due to investors responding to fundamentals.

Moreover, $\mathrm{CSAD}_{\mathrm{NONFUND,t}}$ is the cross -sectional absolute deviation of returns due to non-fundamentals reasons. The study uses Fama and French (1995,1996) and Carhart (1997) factors in the return form to find the crucial fundamental information that influences investor decisions on a market level. The study estimates model (1) to find the appropriate measure of the cross-sectional absolute deviation with the effect of non-fundamental information as follows:

$$\mathrm{CSAD_t} = \beta_0 + \beta_1(\mathrm{R_{m,t}} - \mathrm{R_F}) + \beta_2\mathrm{HML_t} + \beta_3\mathrm{SMB_t} + \beta_4\mathrm{MOM_t} + \mathrm{e_t} \quad \textbf{(1)}$$

where:

HML_t	Is the High Minus Low return factor
SMB_t	Is the Small Minus Big return factor
MOM_t	Is the Momentum factor

Then, the study uses the error term in the model (1) as a measure of non-fundamental herding as follows:

$$\mathrm{CSAD_{NONFUND,t}} = \mathrm{e_t}$$

Next, the study then estimates the "Spurious" herding by deducting herding due to non-fundamental information $\mathrm{CSAD_{NONFUND,t}}$ from total herding $CSAD_t$ as follows:

$$\mathrm{CSAD_{FUND,t}} = CSAD_t - \mathrm{CSAD_{NONFUND,t}}$$

We eliminate the part that is corresponding to the fundamental herding and uses only the part the is related to the non-fundamental herding.

The study applies the methodology that is suggested by Gavriilidis at.al (2016) to test if Muslim holy days have an impact on the herd behavior, as follows:

$$CSAD_t = a_0 + a_1 D_{Holy\_Day_{i,t}} |r_{m,t}| + a_2 (1 - D_{Holy\_Day_{i,t}}) R_{m,t} + a_3 D_{Holy\_Day_{i,t}} r_{m,t}^2 +$$

$$a_4 (1 - D_{Holy\_Day_{i,t}}) r_{m,t}^2 + \varepsilon_3 \quad \textbf{(2)}$$

Then, the study uses the same formula but with herding measure that is corresponded to the non-fundamental information as follows:

$$CSAD_{NONFUND,t} = a_0 + a_1 D_{Holy\_Day_{i,t}} |r_{m,t}| + a_2 (1 - D_{Holy\_Day_{i,t}}) |R_{m,t}| + a_3 D_{Holy\_Day_{i,t}} r_{m,t}^2 +$$

$$a_4 (1 - D_{Holy\_Day_{i,t}}) r_{m,t}^2 + \varepsilon_3 \quad \textbf{(3)}$$

Where:

$r_{m,t}$	The market return
$D_{Holy\_Day_{i,t}}$	is dummy variable that takes the value of 1 during the holy days and zeroes otherwise

We test each event separately using the same formulas as follows:

$D_{Ramadan\_1-30_{i,t}}$	is dummy variable that takes the value 1 if day t part of the month of Ramadan and zero otherwise.
$D_{Eid-ul-Fitr\_1-14_{i,t}}$	is dummy variable that takes the value 1 if the day t fell on days 1-14 of Shawal and zeroes otherwise.
$D_{Eid-ul-Adha\_8-20_{i,t}}$	is dummy variable that takes the value 1 if the day t fell on days 8-20 of Dhu al-Hijjah and zeroes otherwise
$D_{Ashoura\_1-14_{i,t}}$	is dummy variable that takes the value 1 if the day t fell on days 1-14 of Muharram and zeroes otherwise.

The negative and significant value of $a_3 (a_4)$ indicates herding behavior during (outside) Holy days.

Data Set and Factor Construction

We consider Saudi Arabia financial market as a useful research setting for this study for the following reasons: First, no study has examined the impact of Islamic events on herding behavior in Saudi Arabia context. Second, Saudi Arabia is one of the major Islamic countries in the world. Thus, there is a strong connection between Saudi Arabia and Islam, especially in Hejaz region. Hejaz region includes Mecca and Medina the places that attract a lot of Muslims all over the world to perform the rituals of Islam such as Hajj pilgrimage and Umrah. It is also the place where the prophet Muhammed, the Messenger of Islamic faith, lived and died.

Also, the king of Saudi Arabia official title is "Custodian of the Two Holy Mosques." The two holy Mosques are Al-Masjid al-Haram in Mecca and Al-Masjid al-Nabawi in Medina which is

regarded as the holiest in Islam[11]. We test our hypotheses on the all listed equities[12] in the Saudi Tadawul all-share index[13]. The Ashoura, Ramadan, Eid-ul-Fitr[14] and Eid-ul-Adha[15] dummies created manually using data from the Islamic calendar[16] website: https://calendar.zoznam.sk. To determine the exact Gregorian date for the holy days, we convert the Hijri dates to Gregorian equivalents for the time period under investigation[17].

The daily equities data is obtained in Dollars from Thomson-Reuters DataStream database. The data is started from the 5th of October 2005 and lasted until the completion of our data collection on the 25th of February 2016. This data includes 2667 days. The sample accounts for the 2008/2010 financial crisis period and the Arab spring period that starts on the 17th of December 2010. So, we divided our samples into three sub-samples to investigate herding in various time periods.

The first sample is regarded as a pre-global financial crisis sample. It extends from the 5th of October 2005 to the 1st of January 2008 for a total of 574 days. The 2008 global financial crisis but pre-Arab spring sample. It covers the period from the 2nd of January 2008 to the 17th of December 2010 and contains 760 days. Finally, a post-global financial crisis and Arab spring sample includes 1332 days and runs from the 20th of December 2010 to the 25th of February 2016.

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11 Rodenbeck, Max, "Unloved in Arabia: A Review Essay," New York Review of Books, Volume 51, #16, October 21, 2004 http:// www.nybooks.com/articles/17477. This is after the born of prophet Muhammed, Saudi Arabia is the birthplace of the official Arabic language and the place of Muslims holy cities. It is also the root of tribal Arab trees. Saudi Arabia, historically, is the only Muslim state that formed by Jihad. The rules in Saudi Arabia is governed by Koran and it is the only Muslim country that escape European imperialism.

12 To avoid any potential survivorship bias, the Saudi companies include all active, dead and suspended companies.

13 The Saudi Tadawul all-share index symbol in Datastream is TDWTASI.

14 In the Islamic calendar Eid-ul-Fitr days is in Shawal month; we include the first two weeks of Shawal starting from 1st of Shwal to the 14th.

15 In the Islamic calendar Eid-ul-Adha is in Dhu al hijjah month, we include two weeks from Dhu al hijjah month starting from 8th to 20th. Muslims performing Hajj during this month which is one of the five pillars of Islam.

16 We depend on the Islamic calendar dates for the Ramadan, Eid-ul-Fitr and Eid-ul-Adha data which is also a Lunar Calendar. The Islamic Calendar involve twelve Lunar Months in a year, and it is used to locate the Islamic events concurrently with the Gregorian calendar. Islamic events are not fixed in the Gregorian calendar. Muslims determine the Islamic events by looking at the Moon movements (Lee and Hamzah, 2010).

17 This information available on https://calendar.zoznam.sk.

The factors used to compute the conditional CSAD and to extract the herding dispersion are constructed by pooling all companies listed in the Gulf Cooperation Council countries.[18] The computation based on regional factors increases the reliability of these factors' returns as it will be based on a larger number of companies operating in the same economic block.[19]

In the construction of factors, we include dead firms in the universe of regional stocks to avoid survivorship bias. But we exclude non-common equity companies and companies with unreported dollar capitalization. Out of the 623 companies in the sample, 25 non-equity firms are removed.[20]

For the remaining companies, we correct for extreme return reversals in DataStream by setting daily returns for day t and t+1 to be missing when daily returns is more than 100% but reversed the following day. Daily returns are also considered missing if the return of the two subsequent days is less than 0.5 and/or the daily gross return is greater than 2.21 From the filtered data of the rest of companies we construct three factors: size (SMB: small minus big), value (HML: high minus low) and momentum (MOM).

The returns on the factors are computed as averages of value weighted returns of the relevant company portfolios. Specifically, to construct the size and value factors we divide companies into big and small using the median capitalization firm. The two groups are further divided into high, medium, and low book to market using the third and the seventh decile firm of book to market value. These portfolios are constructed and rebalanced at the end of June every year. As a result, six portfolios are established: small low book to market (SL), small medium book to market (SM), small high book to market (SH), big low book to market (BL), big medium

18 The Gulf Cooperation Council is an economic block that includes a group of oil producing countries in the Arab peninsula. These countries are: Saudi Arabia, Oman, United Arab Emirates, Kuwait, Qatar and Bahrain.

19 The number of companies listed in the Saudi market is only 175, while the number of companies listed in the financial markets of the Gulf Cooperation Council countries is 623. Therefore, we opted to compute regional factors to get accurate estimates of factor returns. Since all companies run in the same economic block these factors are expected to be informative for all countries including Saudi Arabia.

20 The number of listed companies in the Gulf Cooperation Councils countries is 175 in Saudi Arabia, 150 in Oman, 68 in Kuwait, 47 in Bahrain, 46 Qatar, 69 in Dubai, and 68 in Abu Dhabi.

21 We follow Inci and Porter (2006) and Griffith (2010) in their industry codes to remove non-equity securities and to filter the returns series

book to market (BM), and big high book to market (BH). The size risk factor (small-minus-big SMB) is then generated by subtracting the average value weighted returns of the big portfolios (BL, BM, BH) from the average returns of the small portfolios (SL, SM, SH). Similarly, the HML factor is computed by offsetting returns of the average of the two value portfolios (SL, BL) and the two growth portfolios (SH, BH).

A similar procedure is adopted to build the momentum factor. For that purpose, we form three momentum portfolios: momentum winner (high returns, W), average (normal returns, A) and loser (low or negative returns, L) portfolios. These portfolios are rebalanced monthly on the basis of the previous year performance of companies. The WML factor is then calculated as the difference between the averages of the two winner portfolios (SW, BW) and the two loser portfolios (SL, BL).

Results and Discussion

The idea guiding this study is to test if Saudi equity market cross herd with Ashoura, Ramadan, Eid-ul-Fitr, and Eid-ul-Adha Muslim holy days. The study first check if there is herding during Ramadan (non-Ramadan) days using equation (2) and (3). We run a regression on the multiplication of the squared returns and a dummy that take the value 1 on the day of Ramadan (non-Ramadan) days and zero otherwise. Table 1 presents regression results of the full CSAD (the all deviation row) as well as those when we regress that part of the CSAD that is unrelated to common market information (the non-fundamental row).

[Insert Table 1]

Every Panel in Table 1 represents the different period that uses in our study. Panel A shows the results when we run the regressions using the full period sample that ranges from 2005 to 2016. As can be seen in the Panel, the linear parameter of absolute market return is positive. Also, the parameter associated with squared returns for Ramadan days is negative but not significant. But it is negative and statistically significant for the parameter associated with

squared returns outside the Ramadan days.

This finding is inconsistent with Gavriilidis et al., (2016) research as their findings show evidence of strong herding results during Ramadan. We expect these results as during Ramadan the trading activities may slow down as a result of Muslim investors may influence by Islamic judgments on some trading activities. They could also be distracted by forming religious practices such as fasting and praying and strengthen their relationship with Allah. Alper and Aruba (2001) and Al Hajji (2005) finding also shows no significant impact of Ramadan on their sample stock exchange. Also, Seyyed et al. (2005) finding fails to find sufficient evidence when investigating Ramadan as a seasonal anomaly in Saudi financial market.

Their results show that there is no influence of Ramadan on the mean return, but there is a little impact of Ramadan on the market volatility. Our results do not change even when we use the subsamples. We still cannot find evidence of herding during the holy days of Ramadan (See Panel B, C and D). But when we look at Panel C of Table 2, there is a significant and robust herding behavior outside Ramadan days using all deviation CSAD measure for the sample that covers the global financial crisis in 2008. Also, herding occurs during the Arab Spring period sample by using the all deviation measure of CSAD but the result is not strong (See Panel D).

We then carry on more research using large[22] stocks sample to check the robustness of the results. Table 2 presents results from regression (2) ($CSAD_t$), and (3) ($CSAD_{NONFUN,t}$), for the large stocks portfolio. The coefficient of interest here is β_3 . Our finding cannot find any evidence of herding during the holy days of Ramadan for the whole and sub-samples (see Panel A, B, C). But when we use the non-fundamentals driven deviations, the only statically significant and negative coefficient β_3 is during the Arab Spring period (see Panel D). For the

[22] Liquidity is an essential aspect for investors. We include large stocks in our research based on the fact that large stocks have greater liquidity compared to small stocks. We assume they will be more active in the market and that may affect our results.

financial and the Arab crisis periods, the coefficient that capture herding outside Ramadan days are negative and strongly significant at the %1 level (see Panel C and D).

[Insert Table 2]

We next investigate if herding behavior occurs around (outside) Eid-ul-Fitr days. Table 3 presents the results using equations (2) ($CSAD_t$), and (3) ($CSAD_{NONFUN,t}$), but with Eid-ul-Fitr dummy for the whole and subsamples. Panel A presents results using the full period for all stocks. As can be seen from Table 3, the coefficient that capture herding behavior around Eid-ul-Fitr days β_3 is negative and significant at 1% level. This results the same when using the all and non-fundamentals driven deviations (see all deviation and non-fundamental deviation rows in Table 3).

Also, the parameters associated with the dummy β_3 and β_4 are negative and statically significant over the 2008 financial crisis period (see Panel C in Table 3). This result when using the full CSAD measure only. Furthermore, there is herding outside Eid-ul-Fitr days when using the 2008 financial crisis and the Arab Spring sub-samples at 0.1% and 5% level respectively. But the value of the parameter increases from −6.354 to −27.124 and become more significant around Eid-ul-Fitr days. This illustrates strong evidence of herding around and not outside Eid-ul-Fitr days. These results when we regress using the full CSAD measure only (see all deviation rows in Panel C).

[Insert Table 3]

We also test if there is any different using Large stocks portfolio around and outside Eid-ul-Fitr days (see Table 4 for more details). The results stay almost the same as when using the whole stocks portfolio in Table 3 for the whole period sample. There is still strong evidence of herding when using the full and non-fundamental CSAD measures over the full-period

sample (see Panel A in Table 4). But the results become stronger during the 2008 financial crisis period sample compared to the whole sample results in Table 3. The non-linearity parameter is negative and significant at 1% level using both CSAD measures (see all deviation and non-fundamental deviation rows in Panel A). Panel C shows that there is herding outside Eid-ul-Fitr days during the 2008 financial crisis and the Arab spring subsamples period. But the parameter becomes negative and more significant around Eid-ul-Fitr days.

[Insert Table 4]

To check if there is herding around Eid-ul-Adha days, we regress on the multiplication of the squared returns of the market and a dummy that takes a value 1 on the days of Eid-ul-Adha days and zero otherwise. Table 5 provides results from equation (3), ($CSAD_t$) and (4) ($CSAD_{NONFUN,t}$). The parameters associated with the dummy around and outside Eid-ul-Adha days with its t-statistic for the whole stocks portfolio are presented in Table 5 (see column 8,9, 10 and 11 of Table 5 for more details).

[Insert Table 5]

The finding shows anti-herding around Eid-ul-Adha days when using the whole period sample from 2005 to 2016 for the all and non-fundamental driven deviations (see Panel A). But the coefficient on the non-linear term outside Eid-ul-Adha days is consistently significant and negative at 0.1% level over the whole period sample over the 2005 – 2016 period. This result by using $CSAD_t$, $CSAD_{NONFUN,t}$ measures. For the different crisis periods, the results show evidence of herding outside Eid-ul-Adha days during the 2008 financial crisis period and the Arab Spring period by using the all deviation CSAD measure only (see Panel C and D in Table 5).

The study then uses the large stocks portfolio, interestingly, we find evidence of herding around

Eid-ul-Adha days when using the whole period sample (see Panel A in Table 6). As the non-linear coefficient is negative and statistically significant around Eid-ul-Adha days at 5% level for all deviation CSAD measure and 1% level by using the non-fundamental CSAD measure (see all deviation and non-fundamental rows in Table 6, Panel A). Then, when using the subsamples, there is evidence of herding during the Arab Spring period.

The coefficient that is associated with Eid-ul-Adha dummy is negative and statically significant at 5% level using the all deviation measure. It is negative and statically significant at 1% level using the non-fundamental CSAD measure (see Panel D in Table 6 for more details). Also during the Arab Spring period, there is evidence of herding outside Eid-ul-Adha days at 5% level of significance. This is the case using the all deviation measure and at 1% level of significance using the non-fundamental measure of CSAD. We also find that during the 2008 financial crisis period, there is herding outside Eid-ul-Adha days when using the all and non-fundamental deviation measures at 1% level (see Panel C in Table 6).

[Insert Table 6]

We then examine the impact of Ashoura days on investors herding by using the same equations (3) $CSAD_t$ and equation (4) $CSAD_{NONFUN,t,}$ but with Ashoura dummy that takes the value of 1 around Ashoura days and zeroes otherwise. Table 7 displays regression results for investors herding during (outside) Ashoura days for the whole and different crisis periods. The coefficient of interest here is β_3 and by looking at Panel A, the non-linear term associated with Ashoura days is consistently significant and negative when using the whole period sample. This result indicates strong herding around Ashoura days when using both all deviation and the non-fundamental measures of CSAD.

The finding also shows herding around Ashoura days when using the 2008 financial crisis

period sample. The coefficient β_3 is negative and statically significant at 1% level when using the all deviation measure only (see all deviation raw, Panel C). Table 7 also shows herding outside Ashoura days for the whole period sample (see Panel A all deviation row). The coefficient β_4 also negative and statically significant in two cases: During the 2008 financial crisis period at the 1% level and the Arab Spring period at 5% level (see Panel C and D).

These results when using the all deviation CSAD measure to estimate equation (4) only, since no herding results by using the non-fundamental CSAD outside Ashoura's days. Although Saudi investors herd during and outside Ashoura days but by looking at the coefficient associated with Ashoura dummy, it has increased from −6.638 to −14.229 when using the whole period sample (see Panel A). It has also increased from −10.210 to −18.859 when using the 2008 financial crisis period (see Panel C). The increase in the value of the coefficients means that herding during Ashoura days is stronger than outside Ashoura days.

[Insert Table 7]

The study then estimates equations (3) $CSAD_t$ and equation (4) $CSAD_{NONFUN,t,}$ to capture herding around Ashoura days for the large stocks portfolio. Table 8 presents results for regressions (3) and (4) for the all driven CSAD measure and the non-fundamental driven CSAD using the full and subsamples periods. The coefficients that capture investors herding around (outside) Ashoura days are β_3 and (β_4).

According to the results, the coefficient β_3 is negative and statically significant at 1% level when using the full and the 2008 financial crisis periods (see Panel A and Panel C). This is the case when we use both the all and non-fundamental driven deviations. Table 8 also shows that Saudi investors herd outside Ashoura days during the 2008 financial crisis and the Arab Spring periods when using all deviation and the non-fundamental CSAD measures. But during the

2008 crisis period herding is stronger inside and not outside Ashoura days (see Panel C and Panel D).

[Insert Table 8]

In summary, our results show that Saudi investors behavior deviates from rationality during the 2008 financial crisis and the Arab Spring periods. These periods correlated with high level of uncertainty and political instability and the lack of information about the future lead investors in Saudi to herd on others information. Our finding contradicts Gavriilidis et al., (2016) research as their research based on the fact that Ramadan is crucial driving of herding in Muslims countries. But we fail to find evidence of herding during Ramadan.

However, when investigating the impact of other holy days on herding, we find substantial evidence of Saudi investors herds around Eid-ul-Fitr days. The results also show significant proof of herding around Eid-ul-Fitr days compared to outside Eid-ul-Fitr days. Moreover, when using the large stocks portfolio, the results almost the same for Eid-ul-Fitr. Our study is the first study that tests the impact of Eid-ul-Fitr on herding behavior in Saudi Arabia. Previous research examines the effects of Eid-ul-Fitr on Muslims countries as a seasonal anomaly (e.g., Wong et al., 1990; Ali et al., 2017) and find evidence of the impact of Eid-ul-Fitr on some Islamic countries stock markets.

Inconsistent with prior research (e.g., Chan et al., 1996; Mcgowan and Jakob, 2010), they cannot find any evidence of the influence of Eid-ul-Fitr on some Muslim's stock markets. Unlike Eid-ul-Fitr holy days, further results reveal anti-herding around Eid-ul-Adha days when using the whole stocks portfolio even when we account the part of deviation due to non-fundamental driven deviations. Eid-ul-Adha is regarded as Eid Qurbani, Muslims sacrifice and slaughter cattle like lambs. Moreover, it is the month where Muslims go to Mecca to perform Hajj. Thus, investors in Saudi Arabia may spend more money during this month compared to Eid-ul-Fitr month which may impact the trading activities.

Our finding consistent with prior research (e.g., Akhter et al., 2015; Majeed et al., 2015) as some of them find a negative impact of Eid-ul-Adha on some Muslims stock exchange and some of them find no effects of Eid-ul-Adha on some Muslims stock exchanges. However, Chowdhury and Mostari (2015) see a positive impact of Eid-ul-Adha in Dhaka market. On the other hand, the results are different when we use the large stocks portfolio. Substantial evidence of herding around Eid-ul-Adha especially when using the non-fundamental driven deviations for the whole period sample. This finding is another impressive result of the paper.

Also, Saudi investors herd around Eid-ul-Adha holy days during the Arab Spring period. Finally, Ashoura event also influences Saudi investors in Saudi Arabia. There is substantial evidence of herding around Ashoura days for the full period sample. Furthermore, herding around Ashoura days is found when using the 2008 financial crisis period sample but for the part of CSAD corresponded to non-fundamental factors only. We cannot see any study relate Ashoura holy days to herding behavior in Saudi Arabia or any Islamic country.

There are some papers investigate Ashoura holy days on Muslim stock exchange as a seasonal anomaly only. One of them is the paper conducted by Al-Ississ (2010). He finds that the sadness associated with Ashoura days lead to negative returns when investigating the impact of Ramadan and Ashoura holy days on seventeen Muslim countries. However, Majeed et al., (2015) find abnormal returns in the pre-period of Ashoura when investigating the influence of Islamic calendar events in Pakistani stock market. The results do not change that much when using the large stocks portfolio. Compared to the full stocks portfolio results, herding occurs during the 2008 financial crisis period using both measures of CSAD all deviation and the non-fundamental driven deviations.

Conclusion

Festive months in the Islamic calendar are identified by previous literature (e.g., Prechter, 1999 and Al-Hajieh et al., 2011) as a potential environment that may facilitate herding behavior in the market. The main idea behind this assumption is that, investors behavior during such events associated with optimism or pessimism which may extend to their investment decision making. Prior research mostly looks at the impact of the Islamic calendar on the stocks returns and volume as a seasonal anomaly (e.g., Husain, 1998; Alper and Aruoba 2001; Seyyed, Abraham, and Al-Hajji, 2005; Ramezain, 2013).

Our study is the first study that considers Islamic events from the behavioral perspective in Saudi Arabia. Saudi Arabia may be well known as a family-oriented environment as during the Islamic events the level of social interaction increases, people mood may be positive or negative which may facilitate herding. The study looks explicitly at if Ramadan, Eid-ul-Fitr, Eid-ul-Adha and Asoura holy days impact Saudi investors behavior and encourage herding in the stock market.

We contradict Gavriilidis et al., (2014) research because we expect to observe herding during Eid-ul-Fitr, Eid-ul-Adha and Ashoura holy days more than Ramadan. The results match our expectation; we cannot find any proof of herding during Ramadan. Evidence of herding observes during Eid-ul-Fitr and Ashoura days. However, there are some results on investors herd during Eid-ul-Adha days when using the large stocks portfolio only.

We also find that herding is period specific. Saudi investors also herd outside the Islamic events especially during the period correlated with high level of uncertainty such as the 2008 financial crisis and the Arab Spring periods. We first use the all deviation driven deviations to investigate the research objective. Then, we take off the part of deviation correspond to fundamental herding which wrongly estimates as investors herding by previous research and We include the

part of deviation due to non-fundamental factors only and rerun the test to see if there is any difference in the results. This procedure provides inconsistent results.

Our finding has significant implications for the market regulators and Saudi investors to form their expectation about the direction of the market during the Islamic events, and then building the right decision. Future research could use other financial anomalies such as the week effect, holiday effect and turn of the month and study their influence on herding. It would also include other major Islamic countries such as the GCC countries in which most of their citizens are Muslims. Moreover, it may compare different investment style portfolios results (small vs. big, value vs. growth).

Table (1): Cross-herding with Ramadan Testing Results ($)

	β_0	t-statistics	β_1	t-statistics	β_2	t-statistics	β_3	t-statistics	β_4	t-statistic
Panel A: 2005-2016										
All Deviation	0.004***	18.66	0.441***	3.021	0.556***	6.433	−4.907	−0.887	−7.13**	-1.980
Non-Fundamental	−0.001***	-6.615	0.431***	2.842	0.527***	5.370	−6.651	−1.162	−6.874*	−1.679
Panel B: 2005-2008										
All Deviation	0.008***	11.40	0.110	0.446	0.383***	2.773	9.966	0.905	−3.496	−0.895
Non-Fundamental	0.002***	2.731	0.123	0.478	0.333**	2.147	4.886	0.425	−2.793	−0.611
Panel C: 2008-2010										
All Deviation	0.004***	18.24	0.280**	2.119	0.615***	11.39	0.649	0.125	−11.66***	−4.719
Non-Fundamental	0.000	1.164	−0.043	−0.367	0.162**	2.443	2.134	0.492	−2.368	−1.340
Panel D: 2010-2016										
All Deviation	0.004***	30.84	0.259***	2.597	0.442***	8.805	2.882	0.727	−5.889*	−2.387
Non-Fundamental	−0.000***	−8.682	−0.133**	−2.061	0.031	0.899	4.340	1.394	0.152	0.108

Dependent variable is $CSAD_t$, $CSAD_{NONFUN,t}$

*, **, *** indicates significance at 0.1, 0.05, and 0.01, respectively

Notes: This table presents results for the following equation: $CSAD_t = \beta_0 + \beta_1 \mathrm{D}|R_{m,t}| + \beta_2 (1-\mathrm{D})|R_{m,t}| + \beta_3 D R^2_{m,t} + \beta_4 (1-D) R^2_{m,t} + e_t$ CSAD refers to the cro ectional absolute deviation of returns for Saudi Arabia market. The dummy presents the value of one for the days falling within Ramadan each year and zero otherwise. tatistics values is reported in parentheses; the difference in significance between the within- versus outside-Ramadan values of each coefficient is tested using t-test statistics. R efers to the market's average return. The study also test the formula using $\mathrm{CSAD}_{\mathrm{NONFUND,t}}$ measure. The formula applies for each dummy separately over the period starts fro 05/10/2005 to 25/02/2016 and the sub-samples (05/10/2005 to 01/01/2008-02/01/2008 to 17/12/2010 and 20/12/2010 to 25/02/2016). The negative and significant coefficient (β_4) indicate herding behavior during (outside) Ramadan days.

Table (2): Cross-herding with Ramadan Testing Results (Large Sample) ($)

	β_0	t-statistics	β_1	t-statistics	β_2	t-statistics	β_3	t-statistics	β_4	t-statisti
Panel A: 2005-2016										
All Deviation	0.003***	17.60	0.322***	3.470	0.447***	5.771	−1.924	−0.548	−4.257	−1.298
Non-Fundamental	−0.001***	−6.490	0.311***	3.117	0.421***	4.768	−3.266	−0.859	−4.014	−1.080
Panel B: 2005-2008										
All Deviation	0.006***	11.05	−0.040	−0.222	0.294**	2.566	13.082	1.507	−0.492	−0.158
Non-Fundamental	0.001**	2.185	−0.031	−0.162	0.247*	1.906	8.651	0.949	0.162	0.044
Panel C: 2008-2010										
All Deviation	0.003***	18.52	0.258***	2.620	0.562***	10.12	0.756	0.192	−10.297***	−3.713
Non-Fundamental	−0.001***	−10.29	0.225**	1.997	0.556***	9.756	1.148	0.256	−10.508***	−3.569
Panel D: 2010-2016										
All Deviation	0.003***	31.03	0.313***	4.250	0.383***	9.880	−4.077	−1.457	−5.078**	−2.319
Non-Fundamental	−0.002***	−22.13	0.337***	4.318	0.369***	11.38	−8.489***	−2.798	−5.593***	−3.157

Dependent variable is $CSAD_t$, $CSAD_{NONFUN,t}$

*, **, *** indicates significance at 0.1, 0.05, and 0.01, respectively

Notes: This table presents results for the following equation: $CSAD_t = \beta_0 + \beta_1 \mathrm{D}|R_{m,t}| + \beta_2 (1-\mathrm{D})|R_{m,t}| + \beta_3 D R^2_{m,t} + \beta_4 (1-D) R^2_{m,t} + e_t$ CSAD refers to the cro ectional absolute deviation of returns for Saudi Arabia market. The dummy presents the value of one for the days falling around Ramadan each year and zero otherwise. tatistics values is reported in parentheses; the difference in significance between the round- versus outside-Ramadan values of each coefficient is tested using t-test statistics. R efers to the market's average return. The study also test the formula using $\mathrm{CSAD}_{\mathrm{NONFUND,t}}$ measure. The formula applies for each dummy separately over the period starts fro 05/10/2005 to 25/02/2016 and the sub-samples (05/10/2005 to 01/01/2008-02/01/2008 to 17/12/2010 and 20/12/2010 to 25/02/2016). The negative and significant coefficient (β_4) indicate herding behavior during (outside) Ramadan days.

Table (3): Cross-herding with Eid-ul-Fitr Testing Results ($)

	β_0	t-statistics	β_1	t-statistics	β_2	t-statistics	β_3	t-statistics	β_4	t-statisti
Panel A: 2005-2016										
All Deviation	0.005***	23.17	0.348*	1.706	0.459***	7.366	−18.925***	−3.482	−3.837	−1.57
Non-Fundamental	−0.001***	−6.747	0.336*	1.824	0.431***	6.074	−18.403***	−3.781	−3.652	−1.26
Panel B: 2005-2008										
All Deviation	0.009***	13.56	0.033	0.066	0.308***	2.598	−1.268	−0.057	−1.770	−0.56
Non-Fundamental	0.002***	3.627	0.069	0.149	0.262**	1.990	−5.495	−0.267	−1.171	−0.31
Panel C: 2008-2010										
All Deviation	0.004***	16.93	0.648***	3.043	0.475***	6.671	−27.124***	−5.066	−6.354*	−1.81
Non-Fundamental	0.000	1.412	0.048	0.252	0.143**	2.259	−1.755	−0.376	−2.456	−1.41
Panel D: 2010-2016										
All Deviation	0.004***	30.43	0.319***	3.407	0.440***	8.459	−2.528	−0.754	−5.674**	−2.17
Non-Fundamental	0.004***	28.80	−0.325***	−3.133	0.341***	4.831	25.279***	3.182	−1.164	−0.31

Dependent variable is $CSAD_t$, $CSAD_{NONFUN,t}$

*, **, *** indicates significance at 0.1, 0.05, and 0.01, respectively

Notes: This table presents results for the following equation: $CSAD_t = \beta_0 + \beta_1 \, \mathrm{D}|R_{m,t}| + \beta_2 \, (1-\mathrm{D})|R_{m,t}| + \beta_3 \; D\, R^{\,2}_{m,t} + \beta_4 \; (1-D)\, R^{\,2}_{m,t} + e_t$ CSAD refers to the cro ectional absolute deviation of returns for Saudi Arabia market. The dummy presents the value of one for the days falling within Eid-ul-Fitr each year and zero otherwise. tatistics values is reported in parentheses; the difference in significance between the around- versus outside-Eid-ul-Fitr values of each coefficient is tested using t-test statisti $_{m,t}$ refers to the market's average return. The study also test the formula using $\mathrm{CSAD}_{\mathrm{NONFUND,t}}$ measure. The formula applies for each dummy separately over the period sta rom 05/10/2005 to 25/02/2016 and the sub-samples (05/10/2005 to 01/01/2008-02/01/2008 to 17/12/2010 and 20/12/2010 to 25/02/2016). The negative and significant coefficie $_3$ (β_4) indicate herding behavior around (outside) Ramadan days.

Table (4): Cross-herding with Eid-ul-Fitr Testing Results (Large Stocks) ($)

	β_0	t-statistics	β_1	t-statistics	β_2	t-statistics	β_3	t-statistics	β_4	t-stat
Panel A: 2005-2016										
All Deviation	0.003***	18.77	0.705***	4.181	0.429***	6.173	−16.208***	−3.483	−3.347	−1.
Non-Fundamental	−0.001***	−6.883	0.669***	4.099	0.402***	4.985	−15.715***	−3.554	−3.110	−0.9
Panel B: 2005-2008										
All Deviation	0.003**	2.002	0.269	0.666	0.786**	2.228	15.510***	3.914	5.527***	6.0
Non-Fundamental	0.003**	2.275	−0.730*	−1.940	−0.213	−0.735	15.510**	1.972	5.527***	7.1
Panel C: 2008-2010										
All Deviation	0.003***	17.01	1.240***	7.340	0.493***	7.476	−29.970***	−6.399	−7.458**	−1.9
Non-Fundamental	−0.001***	−8.866	1.269***	8.810	0.485***	7.010	−30.927***	−7.870	−7.693*	−1.
Panel D: 2010-2016										
All Deviation	0.003***	31.01	0.076	0.532	0.384	9.941	13.854	1.182	−5.159**	−2.
Non-Fundamental	−0.002***	-22.12	0.185	1.327	0.370	11.52	1.026	0.091	−5.741***	−3.

Dependent variable is $CSAD_t$, $CSAD_{NONFUN,t}$

*, **, *** indicates significance at 0.1, 0.05, and 0.01, respectively

Notes: This table presents results for the following equation: $CSAD_t = \beta_0 + \beta_1 \, \mathrm{D}|R_{m,t}| + \beta_2 \, (1-\mathrm{D})|R_{m,t}| + \beta_3 \; D\, R^{\,2}_{m,t} + \beta_4 \; (1-D)\, R^{\,2}_{m,t} + e_t$ CSAD refers to the sectional absolute deviation of returns for Saudi Arabia market. The dummy presents the value of one for the days falling around Ramadan each year and zero otherwis statistics values is reported in parentheses; the difference in significance between the around- versus outside-Ramadan values of each coefficient is tested using t-test statistics refers to the market's average return. The study also test the formula using $\mathrm{CSAD}_{\mathrm{NONFUND,t}}$ measure. The formula applies for each dummy separately over the period starts 05/10/2005 to 25/02/2016 and the sub-samples (05/10/2005 to 01/01/2008-02/01/2008 to 17/12/2010 and 20/12/2010 to 25/02/2016). The negative and significant coefficie (β_4) indicate herding behavior during (outside) Ramadan days.

Table (5): Cross-herding with Eid-ul-Adha Testing Results ($)

	β_0	t-statistics	β_1	t-statistics	β_2	t-statistics	β_3	t-statistics	β_4	t-statistic
Panel A: 2005-2016										
All Deviation	0.004***	18.84	0.395***	3.853	0.548***	6.454	0.103	1.391	−6.933*	−1.958
Non-Fundamental	−0.001***	−6.629	0.403***	3.921	0.517***	5.351	0.173***	2.297	−6.640*	-1.649
Panel B: 2005-2008										
All Deviation	0.008***	11.60	0.323*	1.906	0.383***	2.817	−0.014	-0.141	−3.437	−0.892
Non-Fundamental	0.002***	2.736	0.295*	1.807	0.330**	2.160	0.081	0.863	−2.696	-0.596
Panel C: 2008-2010										
All Deviation	0.004***	18.36	0.313***	4.901	0.605***	11.24	0.031	0.593	−11.346***	−4.598
Non-Fundamental	0.000	1.170	−0.020	−0.277	0.152**	2.327	0.031	0.589	−2.220	−1.266
Panel D: 2010-2016										
All Deviation	0.004***	30.43	0.210***	4.479	0.440	8.441	0.011	0.262	−5.580**	−2.111
Non-Fundamental	−0.000***	−8.769	0.023	0.288	0.017	0.516	0.074	0.921	0.783	0.556

Dependent variable is $CSAD_t$, $CSAD_{NONFUN,t}$

*, **, *** indicates significance at 0.1, 0.05, and 0.01, respectively

Notes: This table presents results for the following equation: $CSAD_t = \beta_0 + \beta_1 \mathrm{D}|R_{m,t}| + \beta_2 (1-\mathrm{D})|R_{m,t}| + \beta_3 D R^2_{m,t} + \beta_4 (1-D) R^2_{m,t} + e_t$ CSAD refers to the cro ectional absolute deviation of returns for Saudi Arabia market. The dummy presents the value of one for the days falling within Eid-ul-Adha each year and zero otherwise. tatistics values is reported in parentheses; the difference in significance between the around- versus outside-Eid-ul-Adha values of each coefficient is tested using t-test statistic $R_{m,t}$ refers to the market's average return. The study also test the formula using $\mathrm{CSAD}_{\mathrm{NONFUND,t}}$ measure. The formula applies for each dummy separately over the period sta rom 05/10/2005 to 25/02/2016 and the sub-samples (05/10/2005 to 01/01/2008-02/01/2008 to 17/12/2010 and 20/12/2010 to 25/02/2016). The negative and significant coefficie β_3 (β_4) indicate herding behavior during (outside) Eid-ul-Adha days.

Table (6): Cross-herding with Eid-ul-Adha Testing Results (Large Stocks) ($)

	β_0	t-statistics	β_1	t-statistics	β_2	t-statistics	β_3	t-statistics	β_4	t-statistic
Panel A: 2005-2016										
All Deviation	0.003***	17.55	0.463***	(3.935)	0.442***	5.766	−10.909**	−2.317	−4.134	−1.273
Non-Fundamental	−0.001***	−6.511	0.497***	3.992	0.414***	4.734	−13.858***	−2.824	−3.864	−1.050
Panel B: 2005-2008										
All Deviation	0.003**	2.099	0.122	0.336	0.783**	2.298	52.607***	2.990	5.498***	6.050
Non-Fundamental	0.003**	2.099	−0.877**	−2.415	−0.216	−0.635	52.607***	2.990	5.498***	6.050
Panel C: 2008-2010										
All Deviation	0.003***	18.40	0.256	1.510	0.554***	9.996	−0.323	−0.033	−10.060***	−3.644
Non-Fundamental	−0.001***	−10.29	0.308	1.409	0.545***	9.509	−2.964	−0.227	−10.192***	-3.484
Panel D: 2010-2016										
All Deviation	0.003***	30.77	0.268***	6.978	0.380***	9.472	−2.778**	−2.108	−4.924**	−2.135
Non-Fundamental	−0.002***	−22.10	0.297***	7.565	0.365***	10.92	−5.687***	−4.264	−5.408***	−2.914

Dependent variable is $CSAD_t$, $CSAD_{NONFUN,t}$

*, **, *** indicates significance at 0.1, 0.05, and 0.01, respectively

Notes: This table presents results for the following equation: $CSAD_t = \beta_0 + \beta_1 \mathrm{D}|R_{m,t}| + \beta_2 (1-\mathrm{D})|R_{m,t}| + \beta_3 D R^2_{m,t} + \beta_4 (1-D) R^2_{m,t} + e_t$ CSAD refers to the cro ectional absolute deviation of returns for Saudi Arabia market. The dummy presents the value of one for the days falling within Eid-ul-Adha each year and zero otherwise. tatistics values is reported in parentheses; the difference in significance between the within- versus outside-Eid-ul-Adha values of each coefficient is tested using t-test statistic $R_{m,t}$ refers to the market's average return. The study also test the formula using $\mathrm{CSAD}_{\mathrm{NONFUND,t}}$ measure. The formula applies for each dummy separately over the period sta rom 05/10/2005 to 25/02/2016 and the sub-samples (05/10/2005 to 01/01/2008-02/01/2008 to 17/12/2010 and 20/12/2010 to 25/02/2016). The negative and significant coefficie β_3 (β_4) indicate herding behavior during (outside) Eid-ul-Adha days.

Table (4): Cross-herding with Ashoura Testing Results ($)

	β_0	t-statistics	β_1	t-statistics	β_2	t-statistics	β_3	t-statistics	β_4	t-statisti
Panel A: 2005-2016										
All Deviation	0.004***	19.11	0.642***	5.404	0.544***	6.521	-14.229***	-4.718	-6.638*	-1.896
Non-Fundamental	-0.001***	-6.771	0.607***	4.856	0.514***	5.407	-14.458***	-4.580	-6.349	-1.591
Panel B: 2005-2008										
All Deviation	0.008***	11.40	0.517	1.318	0.385***	2.811	-23.998	-0.916	-3.478	-0.897
Non-Fundamental	0.002***	2.683	0.469	1.106	0.332**	2.158	-24.377	-0.764	-2.746	-0.604
Panel C: 2008-2010										
All Deviation	0.004***	17.64	0.843***	8.041	0.574***	9.133	-18.859***	-7.040	-10.210***	-3.339
Non-Fundamental	0.000	1.254	-0.10	-0.804	0.148**	2.183	1.651	0.484	-1.691	-0.897
Panel D: 2010-2016										
All Deviation	0.004***	30.59	0.413***	3.600	0.438***	8.553	-7.606	-0.690	-5.665**	-2.265
Non-Fundamental	-0.000***	-8.805	-0.171*	-1.666	0.038	1.139	1.453	0.0200	-.105	-0.076

Dependent variable is $CSAD_t$, $CSAD_{NONFUN,t}$

*, **, *** indicates significance at 0.1, 0.05, and 0.01, respectively

Notes: This table presents results for the following equation: $CSAD_t = \beta_0 + \beta_1 \, D|R_{m,t}| + \beta_2 \, (1 - D)|R_{m,t}| + \beta_3 \, D \, R^2_{m,t} + \beta_4 \, (1 - D) \, R^2_{m,t} + e_t$ CSAD refers to the cro ectional absolute deviation of returns for Saudi Arabia market. The dummy presents the value of one for the days falling around Ramadan each year and zero otherwise. tatistics values is reported in parentheses; the difference in significance between the around- versus outside-Ashoura values of each coefficient is tested using t-test statistics. R efers to the market's average return. The study also test the formula using $CSAD_{NONFUND,t}$ measure. The formula applies for each dummy separately over the period starts fro 05/10/2005 to 25/02/2016 and the sub-samples (05/10/2005 to 01/01/2008-02/01/2008 to 17/12/2010 and 20/12/2010 to 25/02/2016). The negative and significant coefficient (β_4) indicate herding behavior during (outside) Ramadan days.

Table (4): Cross-herding with Ashoura Testing Results (Large Stocks) ($)

	β_0	t-statistics	β_1	t-statistics	β_2	t-statistics	β_3	t-statistics	β_4	t-statisti
Panel A: 2005-2016										
All Deviation	0.003***	18.10	0.470***	5.648	0.437***	5.875	−10.051***	−4.638	−3.795	−1.195
Non-Fundamental	−0.001***	−6.667	0.439***	4.921	0.410***	4.816	−10.208***	−4.434	−3.526	−0.977
Panel B: 2005-2008										
All Deviation	0.006***	11.03	0.204	0.760	0.294***	2.594	−6.120	-0.356	−0.432	−0.140
Non-Fundamental	0.001**	2.119	0.157	0.509	0.244*	1.902	−5.884	−0.257	0.247	0.067
Panel C: 2008-2010										
All Deviation	0.003***	17.47	0.648***	8.850	0.530***	7.993	−14.305***	-7.526	−9.044***	−2.637
Non-Fundamental	−0.001***	9.479	0.637***	7.986	0.519***	7.552	−14.899***	−7.210	−9.048**	−2.501
Panel D: 2010-2016										
All Deviation	0.003***	31.05	0.328***	3.654	0.383***	9.843	−4.993	-0.810	−5.110**	−2.368
Non-Fundamental	−0.002***	−22.32	0.326***	3.489	0.371***	11.52	−9.234	−1.613	−5.763***	−3.348

Dependent variable is $CSAD_t$, $CSAD_{NONFUN,t}$

*, **, *** indicates significance at 0.1, 0.05, and 0.01, respectively

Notes: This table presents results for the following equation: $CSAD_t = \beta_0 + \beta_1 \, D|R_{m,t}| + \beta_2 \, (1 - D)|R_{m,t}| + \beta_3 \, D \, R^2_{m,t} + \beta_4 \, (1 - D) \, R^2_{m,t} + e_t$ CSAD refers to the cro ectional absolute deviation of returns for Saudi Arabia market. The dummy presents the value of one for the days falling around Ramadan each year and zero otherwise. tatistics values is reported in parentheses; the difference in significance between the around- versus outside-Ashoura values of each coefficient is tested using t-test statistics. R efers to the market's average return. The study also test the formula using $CSAD_{NONFUND,t}$ measure. The formula applies for each dummy separately over the period starts fro 05/10/2005 to 25/02/2016 and the sub-samples (05/10/2005 to 01/01/2008-02/01/2008 to 17/12/2010 and 20/12/2010 to 25/02/2016). The negative and significant coefficient (β_4) indicate herding behavior during (outside) Ramadan days.

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