East Meets West: When the Islamic and Gregorian Calendars Coincide

Nongnuch Tantisantiwong[a], Anwar Halari[b], Christine Helliar[c,*], David Power[d]

[a] Southampton Business School, Southampton University, UK
[b] Open University Business School, Open University, UK
[c] School of Commerce, University of South Australia, Australia
[d] School of Business, University of Dundee, UK

[*]Corresponding Author: School of Commerce, University of South Australia, GPO Box 2471, Adelaide 5001; Tel: +61 (08) 8302 7025; Email: christine.helliar@unisa.edu.au

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Abstract

Recent research has documented that at the time of religious celebrations in Muslim countries, such as Ramadan, there is a "festival" effect in share returns. In the Gregorian calendar, December is also a time of celebration and festivities which may be associated with patterns in the behaviour of security prices. Further, the first month of the year in the Islamic calendar, Muharram, is a time of sadness and mourning for some believers, and there may be an effect when the Islamic first month of the year overlaps with the first month of the Gregorian year - January. Over a 33-year cycle, each Islamic month falls in a Gregorian month for about 5-6 consecutive years; when this happens, an Islamic (Eastern) calendar effect may interact with a Gregorian (Western) calendar effect. The current paper addresses this issue by examining the behaviour of share returns and volatility for individual companies listed in Muslim countries' stock exchanges when the two calendars coincide for: (i) religious festival effects; (ii) first-month-of-the-year effects; and (iii) the two most common effects reported in the Islamic and Gregorian calendars (Ramadan and January). The results show that the Western and Eastern effects interact more prominently in larger companies and in larger or more developed markets.

JEL classification: G14; G15

Keywords: Ramadan, Muharram, January, festival effects; first-months-of-the-year effects.

1. Introduction

A growing literature has linked investor sentiment to changes in share prices. In this literature, psychological explanations have been advanced to explain predictable behaviour in stock market returns at different times of the Gregorian calendar, challenging the weak form of the Efficient Market Hypothesis (EMH). Recently, the literature reports market inefficiency and Gregorian calendar anomalies in emerging markets (see, for example, Seif et al., 2017). An increasing number of academics are now examining market inefficiency for other calendars, most notably the Islamic calendar.

This paper adds significantly to previous studies in two ways. First, this is the first study to recognise that there may be interaction between Eastern and Western calendar effects when Islamic (Eastern) calendar anomalies coincide from time to time with Gregorian (Western) calendar anomalies. The Islamic calendar moves by about two weeks a year in relation to its Gregorian counterpart[1], so the calendar anomalies only overlap in certain years. To date, Islamic and Gregorian calendar effects have typically been examined in separate investigations, with no consideration of whether an interaction effect[2] may be present. The particular interest of the current paper is when: (i) the main religious festival months from the two calendars coincide (Ramadan and December); (ii) the first months of both calendars coincide (Muharram and January); and (iii) the two most scrutinised months in the literature coincide (Ramadan and January).

Second, the current study recognises that returns and volatility of returns for individual companies' shares from seven Muslim countries during 1995-2016 may be

[1] Other lunar calendars such as the Chinese calendar and Buddhist calendar have leap years with a leap month added every 3 years. By contrast, the Islamic calendar does not have such leap months and always has 12 months. Therefore, unlike the Chinese New Year which always occurs in January/February or any Buddhist holidays which fall in the same Gregorian month, Ramadan can be in any Gregorian month.

[2] Many of the prior studies on the Ramadan effect use data periods that span years when Ramadan coincides with January or December; thus, any Ramadan effect uncovered may have been confounded by a monthly anomaly associated with the Gregorian calendar. The only existing study recognises this problem is Abadir and Spierdijk (2005). They examined the Ramadan and January effects on market returns in Muslim countries such as Jordan, Pakistan and Turkey, but they did not consider the interaction between the two effects in their investigation.

affected by global or political/terrorist related shocks. The sample period covers financial crisis periods such as the Asian financial crisis (AFC), the global financial crisis (GFC) and the Eurozone debt crisis (EDC) as well as periods of war such as the Afghan war, the Iraq war and the Arab Spring. Further, terrorist acts are also considered such as 9/11 and all major political and terrorism-related acts that are documented in the Global Terrorism database. In particular, the first months and the festive months from both the Islamic and Gregorian calendars coincided during some of these events. Unlike prior studies, our model controls for not only financial crises but also the effects of wars and terrorist acts that may be pertinent to Muslim countries.

The Gregorian calendar is the internationally accepted civil calendar and a month-of-the-year effect has been documented as a persistent anomaly for this calendar in both developed and emerging capital markets, especially January (Ogden, 2003; Rozeff and Kinney, 1976). Although the influence of this first month of the year has become less pronounced over more recent years in the US (Gu, 2003; Marquering et al., 2006), the existence of a positive January effect is still reported in a number of stock markets outside the US, especially in developing markets. The first month of the year in other calendars may also give rise to a stock market effect. For example, the first month of the Islamic calendar (Muharram) may be associated with negative stock market returns as the festival of Ashura in that month is associated with sadness and remembrance of the dead by Shia Muslims (Al-Ississ, 2010).

Calendar anomalies have been linked to holidays (e.g. Halloween) (see Zhang and Jacobsen, 2013) and religious festivals (Yuan et al. 2006; Cao and Wei, 2004; Stefanescu and Dumitriu, 2011; Keef and Khaled, 2011; Al-Ississ, 2010). The heightened faith-based experience of individuals on certain holy days during specific months or holidays may affect the mood of investors and their decision-making processes as well as their risk assessments;

these factors can influence equity returns and volatility (Al-Ississ, 2010). The important role played by religion in influencing a country's economic activity dates back to the 1930s (Weber, 1930). More recently, Stulz and Williamson (2003) document that religion can explain cross-country variations in creditor rights and the level of enforcement associated with business debts. Ellison et al. (2009) note that religious beliefs influence individuals' feelings of tranquillity and it is therefore plausible that the actions of stock market participants are influenced by a mood[3] of inner peace and calmness, thus affecting the behaviour of share price changes.

In Western society, religious celebrations take place at Christmas. Indeed, December is often viewed as a season of goodwill, parties and celebrations. In Islamic society, religious celebrations take place in Ramadan which is the ninth month of the Islamic calendar; this ninth month is associated with: (i) positive emotions such as purity, peace and happiness from observing a fast during daylight hours; as well as (ii) enhanced worship requirements, especially during its holiest days (Al-Ississ, 2010). Thus, Ramadan returns may be higher than average due to positive investor sentiment (Al-Ississ, 2010; Bialkowski et al., 2012). Ramadan may also be associated with a decline in trading volume (Abadir and Spierdijk, 2005) and a decrease in the volatility of share returns because trading activity is less intensive while investors pray and fast (Husain, 1998; Seyyed et al., 2005; Mustafa, 2008). For instance, Al-Khazali (2014) found that returns in Ramadan dominated returns in non-Ramadan months throughout many Muslim countries; the degree to which Ramadan returns were different varied with the periods analysed.

Central to this paper is the question of whether Gregorian and Islamic calendar effects interact when the monthly seasonal effects from both calendars coincide. To date, most

[3] For example, Frieder and Subrahmanyam (2004) and Kaplanski and Levy (2012a) have tested for the effect of Jewish sentiment on the US equity markets by examining return and volume data around major Jewish Holy Days. They found that share returns were positive after the New Year day known as Rosh Hashana (which is in September), whereas they became negative after a relatively solemn holiday known as Yom Kippur (which is the ninth day after Rosh Hashana).

researchers have considered these two calendars separately and have focused on the mean returns of stock market indexes. Specifically, using daily data we investigate monthly seasonality[4] for 756 individual firms across seven countries with predominantly Muslim populations: namely, Bangladesh, Indonesia, Jordan, Malaysia, Morocco, Pakistan and Turkey. Employing data for individual firms allows the interaction effects to differ from one firm to another.). Prior studies indicate equity return volatility needs to be modelled when testing for seasonality in share returns as a simple regression model ignores any volatility clustering that may be present in the data (see for example Beller and Nofsinger, 1998; Halari et al., 2015). Therefore, the current study employs an Exponential Generalised Autoregressive Conditional Heteroscedasticity (EGARCH) model to examine calendar anomalies and the coinciding effects of certain Islamic and Gregorian calendar months not only in share returns but also in share return volatility. Our findings on the interactions between Eastern and Western calendar effects may suggest an opportunity for investors to make higher risk-adjusted returns (before transaction costs) in Islamic markets during certain months, especially when these months fall in January or December.

The remainder of this paper is organised as follows. The next section provides a review of prior studies that have examined calendar anomalies focusing, in particular, on religious festival effects and the first-month-of-the-year effects; it develops the research hypotheses to be tested. Section 3 describes the data and supplies a description of the sample while Section 4 reports on the methodology employed. Section 5 outlines the results and discusses the findings while Section 6 concludes.

[4] As the days of an Islamic month can straddle two Gregorian months and the days of a week can sometimes fall in more than one Islamic month, a decision was taken to use daily data for this investigation.

2. Literature review and hypotheses development

The presence of calendar anomalies casts doubt on the EMH since investors may be able to predict the direction of future share price changes. Calendar anomalies include, for example, share prices that exhibit patterns on different days of the week (French, 1980; Gibbons and Hess, 1981; Keim and Stambaugh, 1984; Jaffe and Westerfield, 1985; Board and Sutcliffe, 1988; Lakonishok and Maberly, 1990)[5] and at the turn-of-the-month (Ariel, 1987; Lakonishok and Smidt, 1988). Most relevant to this paper, the prior literature shows that share returns have been predictable for certain months of the year (Rozeff and Kinney, 1976), at specific times of the year (Ariel, 1987; Fiore and Saha, 2015) and on or just before holidays (Lakonishok and Smidt, 1988; Ariel, 1990; Lucey and Pardo, 2005)

According to the Islamic calendar, share return predictability has been documented in Ramadan (a festival month) and Muharram (the first month of the Islamic year) (Al-Khazali, 2014; Halari et al., 2015). In the Gregorian calendar, predictable share price changes in the months of December (a festival month) and January (first month of the year) have also cast doubt on the EMH (Rozeff and Kinney, 1976; Gultekin and Gultekin, 1983; Thaler, 1987; Haugen and Lakonishok, 1988; Zarowin, 1989).

The Islamic month that has been explored the most when testing for a seasonal pattern is Ramadan. In Muslim countries, business activity in the month of Ramadan is generally different from that in other months. People fast during daylight hours, visit mosques frequently, pray regularly and participate more in social activities. Restaurants and shops are closed during the day. Economic activity in all walks of life slows down, as people devote more time to the performance of religious rituals. Working hours, including the trading hours at stock exchanges, are typically reduced (Husain, 1998; Bialkowski et al., 2012). Thus, a

[5] These studies document evidence of irregularities on different days of the week. For example, French (1980) documents significantly lower Monday returns in the US whilst Jaffe and Westerfield (1985) confirm that the 'weekend effect' is present in four other markets; they also find that mean returns are relatively low on Tuesday for the Japanese and Australian stock markets.

number of researchers have investigated whether share returns in this month are different from the price changes that arise in other months of the Islamic calendar.

One of the early investigations to look at the association between specific feast days during certain Islamic months and patterns in share returns was undertaken by Oguzsoy and Guven (2004) who examine data for the Istanbul Stock Exchange (ISE) over the period from 1988 to 1999. Their study confirms that patterns are present on these feast days; the results show a significant change in the average returns of the ISE100 and ISE30 indexes during the periods when specific feasts occurred. More recently, Al-Hajieh, Redhead, and Rodgers (2011) and Almudhaf (2012) test for Islamic calendar anomalies in Middle Eastern and North African stock market returns during the period 1992-2007 and report similar findings. Apart from Turkey, these studies discover a significantly positive Ramadan effect for share returns in Muslim countries such as Jordan and Pakistan.

A Ramadan effect within six nations (Egypt, Jordan, Malaysia, Pakistan, Singapore and Turkey) is documented by Abadir and Spierdijk (2005). According to their results, index returns tend to be negative before Ramadan, as investors liquidate positions in advance of holy days during this month. This underperformance is followed by periods of strong positive gains after the festivities are over and when re-investment in equities takes place. Hence, they conclude that activities associated with the month of Ramadan exert a sizeable impact on equity returns and trading volumes in Muslim countries. Their results are confirmed by Al-Ississ (2010) who examined the impact of religious events (including those in Ramadan and Muharram) on equity prices and trading volumes across 17 financial markets in Islamic countries over a 20-year period from 1988 to 2008. His analysis highlights that the religious period of Ramadan is associated with higher daily returns of 0.05% compared to all other months of the Islamic calendar. However, the time period of these studies covers those years

when Ramadan overlaps with January and December as well as the Asian financial crisis; these concurrences may have confounded their results.

More recently, investigations of the Islamic calendar anomaly have focused on volatility rather than returns in Muslim countries. For example, Husain (1998) and Mustafa (2008) uncover a significant decline in return volatility during the month of Ramadan in Pakistan; in particular, Husain (1998) documents that the biggest decline in return volatility during this month is for the Chemical sector. In addition, Alper and Aruoba (2004) report a reduction in return volatility during religious festivals in Turkey. Bialkowski et al. (2012) study share returns during Ramadan over the years 1989 to 2007 for a broad sample of firms in 14 predominantly Muslim countries. They find that there is a significant decrease in share return volatility during Ramadan for all of the sample countries with the exception of Turkey, contradicting the findings of Alper and Aruoba (2004). Their conflicting results may be due to ignoring any January and December effects at the time when Ramadan overlaps with January and December and the interaction between Eastern and Western effects, which may exist in the period they analysed.

The key festive time of year in the Gregorian calendar, based on Western religious practice, is that of December. The pre-Christmas period is characterised by an increase in consumer purchases leading to higher company profits in December and a rise in demand for shares associated with a pre-Christmas holiday effect (Wachtel, 1942). Some studies (see Al-Ississ, 2010; Keong et al., 2010) document a significant December effect. For example, Al-Ississ (2010) reports that mean returns in his sample are not significant in December but there is a significant reduction in volatility of returns in December. Thus, the heightened faith based experience and increased social activities at festival times seem to result in less focus on markets by investors and hence a reduction in volatility. Therefore, there may be a

December effect, and the Ramadan effect may be magnified when both of these festive months coincide.

To isolate any calendar effects, other factors that could influence the results must be controlled for in the analysis. For example, a study by Al-Khazali (2014) divides the data of 15 Muslim countries into multiple sub-periods to account for two financial crises: the AFC and the GFC. The author reports that the magnitude of the Ramadan effect on stock returns diminishes in Muslim countries during financial crises. Other studies also document that stock returns and volatility shifted in many stock markets during the AFC and the GFC (see, for example, Bekaert and Harvey, 2003; Bekaert et al., 2014; Akhtar and Jahromi, 2017). Along with other studies, Bastos and Caiado (2011) note that Indonesia and Malaysia were severely affected by the AFC and suffered large declines during the GFC; but the burst of 2000 Dot-com bubble had almost no effect on equity returns in these countries.[6] As well as sentiment-related explanations based on religious festivals, global crises, terrorism and political events may also affect stock returns and volatility in our sample markets. Therefore, it is important to control for these effects during the period analysed. In addition, good or bad news shocks may affect stock return volatility differently (Halari et al., 2015). Based on this analysis, we set out our first and second hypotheses (in their alternative form) as:

H_1: Stock returns on trading days in the month of Ramadan increase when they fall in December.

H_2: Stock return volatilities on trading days in the month of Ramadan decrease when they fall in December.

[6] According to the literature, the Dot-com bubble crash occurred between March 2000 (Bastos and Caiado, 2011; Morris and Alam, 2012) and September/October 2002 (Goldfarb et al. 2007; Davison, 2008; Goodnight and Green, 2010), during which only 30 days of Ramadan fall in December (equivalent to 0.53% of total observations in our sample).

In addition to the analysis of months with religious significance, another financial market anomaly focuses on calendar regularities at the beginning of the year: namely, January in the Gregorian calendar and Muharram in the Islamic calendar. Rozeff and Kinney (1976) conducted their seminal investigation of NYSE returns from 1904 to 1974 on a month-by-month basis. They discovered that the average return for January was approximately 3% higher than the average return over the other 11 months of the year. Ogden (2003) finds a similar result using data for NYSE stocks over the period from 1947-2000. Although the January effect seems to be disappearing in the US, it may still exist in other markets (see, for example, Abadir and Spierdijk, 2005; Rafique and Shah, 2012). Gu (2003) notes that the evidence that the January effect has become weaker in the US is linked to the overall economic climate such as when real GDP growth and inflation are high, when the markets are generally rising and when volatility is low. Thus, the economic climate of a country may relate to a January effect and the weakening effect in the US may not be the case in other markets.

Many academics have attributed the positive share returns in January to the tax year; most US investors finalise their tax liabilities in December and January is the start of a new tax year (Dyl, 1977; Roll, 1983; Givoly and Ovadia, 1983; Jacobs and Levy, 1988). They suggest that investors sell shares in December to minimise their capital gains tax liabilities and purchase equities again in January; the excess demand for shares in January leads to higher returns. Despite these suggestions of a close relationship between the tax year-end and the January seasonality effect, this link is not well understood. Studies find evidence for a January effect in countries where a majority of taxpayers have a non-December tax year-end. For example, Brown et al. (1983) provide evidence of above average monthly returns for January in Australia even though the beginning of the tax year in this country is July. Indeed, several researchers have found the January effect in many stock markets with different

taxation systems. For example, Gultekin and Gultekin (1983) and Agrawal and Tandon (1994) find that a monthly seasonal pattern in equity returns is not confined to the US market.[7] Gultekin and Gultekin (1983) discover a significant monthly pattern and a strong positive "January" effect in 12 out of 17 stock markets analysed. Agrawal and Tandon (1994) find a positive January effect in 14 out of 18 stock markets studied and report that the size of these positive returns in January varies from country to country. Boudreaux (1995) arrives at a similar conclusion for seven (mostly European) countries. In their study of 18 emerging markets, Fountas and Segredakis (2002) report a January effect in Turkey and a December effect in Jordan, Malaysia and Pakistan; they note that for Jordan and Malaysia the January effect is significantly smaller than the December effect.[8] However, there was no evidence to support any tax loss explanation for their results. Marquering et al. (2006) suggest that these results could be the effect of the US January effect spilling over into these markets. As well as the taxation explanation of a January effect, sentiment-based justifications are also present in the literature; there may be positive feelings about the coming year and optimism about business activity as Spring approaches (Wachtel, 1942).

Since the fiscal year of most companies ends in December and earnings are often disclosed to the market in January, it is expected that stock prices will be highly volatile during this period (Chien et al., 2002). Supporting this argument, Abadir and Spierdijk (2005) find strong evidence of higher trading volume in January among several Asian countries such as Malaysia, while Li and Gong (2015) report significantly higher volatility in the Japanese stock market at the start of a year.

[7] Gultekin and Gultekin (1983) examined the value weighed equity indices of 17 countries over the period from 1970 to 1979, using both nonparametric and parametric methods. Agrawal and Tandon (1994) also conducted a multi-country investigation of the month-of-the-year effect over the period from 1971 to 1987; the countries examined in their study were drawn from Europe, the Asia-Pacific region, and North as well as South America.
[8] It is worth noting that the authors used weekly and monthly data without taking account for the clustering of volatility and fat-tailed distributions, thus their results may be biased. Furthermore, the authors did not control for other effects; only 11 monthly dummies were included in their model.

Evidence about a January effect in Muslim countries is mixed. For example, Ali and Akbar (2009) document no monthly Gregorian calendar effect in the returns for the Karachi Stock Exchange (KSE) 100 index over the period from 1991 to 2006. However, when analysing data over a different period, Rafique and Shah (2012) discover that the highest average mean return for the KSE occurs in January. In addition, Keong et al. (2010) find a positive January effect in five Asian countries that have relatively open economies and strong trade links with the US, including Indonesia. Only a handful of studies investigate a January effect in return volatility for Muslim countries; for example, Jebran and Chen (2017) report a significant decline in return volatility in the month of January.

For the Islamic calendar, the first month of the year is Muharram and, in contrast to the January effect, stock market returns tend to fall rather than rise in this month. Al-Ississ (2010) reports that stock market returns in 17 countries with sizeable Muslim populations experience a drop of 0.26% during the holy day of Ashura in the first month of the Islamic calendar. In addition, Halari et al. (2015) report that share returns in Pakistan are less volatile in the first month of the Islamic year. The month of Muharram is a time of sadness as exemplified by the holy day of Ashura (Al Ississ, 2010; Halari et al., 2015), thus affecting the mood of Muslim investors. Our third and fourth hypotheses are therefore:

H_3: Stock returns on trading days in the month of Muharram increase when they fall in January.

H_4: Stock return volatilities on trading days in the month of Muharram increase when they fall in January.

As discussed above, the two most common month-of-the-year effects examined in the literature are January in the Gregorian calendar and Ramadan in the Islamic calendar. It is

possible that there is an interaction effect when these two months coincide. Our final hypotheses are therefore:

H_5: Stock returns on trading days in the month of Ramadan increase when they fall in January.

H_6: Stock return volatilities on trading days in the month of Ramadan increase when they fall in January.

The following sections describe the data set analysed and the research method adopted in this study.

3. Data and sample description

This paper employs daily share returns across Islamic and Gregorian calendar months in local currency for companies listed on the stock markets of seven Muslim countries (Bangladesh, Indonesia, Jordan, Malaysia, Morocco, Pakistan and Turkey) to investigate the interaction between Islamic and Gregorian month effects. The analysis covers the period from January 1, 1995 to June 30, 2016.[9] A total of 5,609 observations (258 Gregorian months or 21.5 years) are converted into Islamic dates for each country using a Gregorian-Islamic date convertor.[10] The beginnings and endings of an Islamic calendar month are determined by the sighting of the crescent moon – known as 'Hilal' in Arabic. Respectively, the 12 Islamic months are: Muharram, Safar, Rabiul Awwal, Rabiul Thani, Jamatul Awwal, Jamatul Thani, Rajab, Shaban, Ramadan, Shawwal, Zil Qa'ad and Zil Hajj. The data in this study corresponds to the Islamic calendar period ranging from Shaban 1415 to Ramadan 1437 (266 months). The start date was chosen in order to have a long enough time frame to investigate

[9] Stocks included in the analysis must have been traded over this period. Many companies were dropped because Datastream did not have price data adjusted for stock splits, scrip issues etc. Further, many companies were delisted because they infringed listing requirements such as not paying a dividend on a frequent basis.
[10] The Gregorian-Islamic date convertor used is from the Islamic Finder website (http://www.islamicfinder.org). These results are matched with the results of newspaper archives.

the interaction between the two calendars; notably Ramadan and January coincide during 1996-2000; Ramadan and December coincide during 1998-2002 and Muharram and January coincide from 2007 to 2011.

The seven countries are from different geographic regions: Indonesia and Malaysia from South East Asia, Bangladesh and Pakistan from South Asia, Jordan and Morocco from the Middle East and North Africa (MENA) and Turkey from Europe. A large majority of the populations of these countries are Muslim. Indonesia and Pakistan have the largest Muslim populations; together, these two countries account for 23.5% of all Muslims throughout the world. In Jordan and Turkey, 97.2% and 99.8% of the populations are Muslim, respectively.[11] Malaysia is chosen for this study as the total value of Islamic-compliant securities listed on Bursa Malaysia is the highest in the world. Unlike other Muslim nations, these seven countries have data available from 1996 when Ramadan and January coincide. This study employs individual company data instead of index observations which have been used in most previous investigations (Al-Hajieh et al., 2011; Almudhaf, 2012; Bialkowski et al., 2012; Al-Khazali, 2014), as this may provide a more comprehensive analysis of whether any monthly patterns in share returns are present for certain companies. The share price information for six of the seven countries is obtained from Datastream; in the case of Jordan, the data are obtained directly from the stock exchange of the country as Datastream does not have the data for Jordanian share prices before 2005.

The sample firms are companies listed on the main stock exchange of each country: the Dhaka Stock Exchange for Bangladesh, the Indonesia Stock Exchange for Indonesia, the

[11] Turkey has a higher proportion of Muslims in its population compared with other countries in Europe (See the World Factbook, available at https://www.cia.gov/library/publications/the-world-factbook/geos/tu.html). Jordan was selected over other Middle Eastern countries based on three criteria: the percentage of population which is Muslim, the economic significance of the stock market (measured by the total value of shares traded compared to Gross Domestic Product), and the data availability for the period starting from 1995. The two countries with sizeable Muslim populations that were excluded were Tunisia and Egypt. Data for Tunisian listed companies was only available from Datastream in 2002. Further, most of the price data for Egyptian companies in Datastream was not adjusted for stock splits. Therefore, a decision was taken not to include Egyptian companies in the sample.

Amman Stock Exchange for Jordan, the Karachi Stock Exchange for Pakistan; the Bursa Malaysia for Malaysia; the Casablanca Stock Exchange for Morocco; and the Borsa Istanbul for Turkey. Although all seven countries use the Gregorian calendar for business and government activities, the Islamic calendar is used to date religious events in the country and mark annual holidays, such as Eid.[12] The financial markets are closed or have limited opening hours during Muslim festivities and holy days based on the Islamic calendar.[13] Therefore, Islamic events and religious dates have a significant impact on the societies of the seven sample countries, both economically and financially.

All seven stock exchanges in this study are open to foreign investment although domestic activity in these markets accounts for most of the trading (Standard & Poor's, 2013).[14] Foreign ownership only accounts for a small proportion of total shareholdings across the seven countries (with the exception of Indonesia and Turkey). Among the seven stock markets, Indonesia, Malaysia and Turkey are relatively more developed and integrated with the global market. According to Bialkowski et al. (2012), Indonesia has the highest percentage of foreign ownership (21.20%) while foreign ownership in Pakistan is relatively low (3.7%). Such a finding is not surprising since Indonesia opened its stock market to foreign investors in 1987 while Jordan lifted its restrictions on foreign equity ownership in 1999. The largest proportion of foreign investment in Turkey and Morocco comes from the European Union. For Indonesia, the main nationalities of foreign investors are Singaporean, Japanese and Malaysian. The main sources of capital flowing into Jordan and Pakistan are the US and the UK (See Bureau of Economic and Business Affairs, 2014; and Zakaria, 2008).

[12] Eid is the festival that marks the end of Ramadan.
[13] This information is available on the official stock exchange websites of all the seven markets, for example, www.idx.co.id/en-us/home/newsannouncement/tradingholiday.aspx; www.ase.com.jo/en/holidays; www.kse.com.pk/holidaycalendar; www.borsaistanbul.com/en/products-and-markets/official-holidays
[14] Thus, most of the investors in these markets are local and Muslim.

Not surprisingly, Middle Eastern investors also account for a sizeable amount of foreign investment in Jordan.

The tax years for five of the seven countries are the Gregorian calendar year-end of December 31st, but for Bangladesh and Pakistan the year end is June 30th in the Gregorian calendar (Deloitte 2015; E&Y 2015; Malaysia 2015; PKF 2015a, 2013b, 2013c; Worldwide Tax 2016). Hence, the tax year of all seven countries follows the Gregorian calendar.

Table 1 reports information about the final sample of 756 firms across seven countries. An analysis of such a large sample should help facilitate a comprehensive investigation of the interaction between Gregorian and Islamic calendar effects. Share returns of all sample firms have a non-normal distribution with fat tails (leptokurtic). Share returns are skewed for more than 50% of sample firms in each country with the exception of Morocco, Pakistan and Turkey.

[Insert Table 1 about here]

The sample companies vary in size. For example, the three largest listed Turkish firms in our sample are KOC Holdings, which is an investment holding company, and two of the largest banks in Turkey (Akbank and Garanti Bank) with market capitalisations greater than USD 10 billion in June 2016. Our samples from other countries also include large, listed companies such as British American Tobacco Bangladesh for Bangladesh, PT Hanjaya Mandala Sampoerna for Indonesia and Pakistan Tobacco for Pakistan. The sample also includes small listed companies such as PT Rimau Multi Putra Pratama, a coal trader

company in Indonesia, and Dewan Mushtaq Textile Mills Limited in Pakistan. Thus, a good mix of firm size is present in our sample.[15]

4. Methodology

As the paper aims to examine calendar anomalies using daily data to estimate returns and volatility across Islamic and Gregorian calendar months, a Generalised Autoregressive Conditional Heteroscedasticity (GARCH) model that comprises a mean equation and a variance equation is used instead of a simple regression; most regressions have a mean equation for returns, but a GARCH approach models the pattern in return volatilities as well as the pattern in share returns. Similar to other regression approaches, a GARCH model facilitates an analysis of the calendar effects while controlling for other seasonal influences and the effects of crises and political events. Moreover, as Table 1 provides evidence of fat tails in the distribution of share returns in the seven stock markets with excess kurtosis, a GARCH approach should be used; any regression ignoring this volatility clustering would be inappropriate. Among the GARCH family of models, we choose an Exponential GARCH (EGARCH) model for our analysis as it can capture any asymmetric effects, which may be present if the markets respond differently to good and bad news.

Our paper aims to investigate the effects of: (i) when the two months associated with religious festivities in both calendars coincide (Ramadan and December); (ii) when the first-months-of-the-year in both calendars coincide (Muharram and January); (iii) when Ramadan falls in January. These effects are studied for both the means and volatilities of returns of the 756 sample firms by estimating the following EGARCH (1,1) model for each firm[16]:

[15] The largest listed companies for Malaysia and Pakistan are Malayan Banking Berhad and Nestle Pakistan, respectively. With respect to sectors, in Jordan, the largest firm (Arab Bank) belongs to the financial sector and the smallest firm (Universal Chemical Industries) is drawn from the chemical sector. For Turkey, the largest company is in the financial sector and the smallest company belongs to the consumer sector. Thus, a full range of sectors are included in the sample.

[16] We also estimated other GARCH models such as GARCH (1,1), GARCH-in-mean (1,1) and TGARCH (1,1) models. The results of the four different models are not significantly different. Thus, only the EGARCH findings are reported here.

$$R_{jt} = \mu_j + a_{1j}R_{jt-1} + a_{2j}R_{mt-1} + a_{3j}S_{t-1} + b_{1j}Muh_t + b_{2j}Ram_t + b_{3j}Jan_t +$$

$$b_{4j}Dec_t + c_{1j}Ram_t \times Dec_t + c_{2j}Muh_t \times Jan_t + c_{3j}Ram_t \times Jan_t + D_jZ_t + \varepsilon_{jt} \quad (1)$$

$$\log(h_{jt}) = \theta_j + \alpha_j\left[\frac{|\varepsilon_{jt-1}|}{\sqrt{h_{jt-1}}} - \sqrt{\frac{2}{\pi}}\right] + \beta_j \log(h_{jt-1}) + \gamma_j \frac{\varepsilon_{jt-1}}{\sqrt{h_{jt-1}}} + \psi_{1j}Muh_t +$$

$$\psi_{2j}Ram_t + \psi_{3j}Jan_t + \psi_{4j}Dec_t + \delta_{1j}Ram_t \times Dec_t + \delta_{2j}Muh_t \times Jan_t +$$

$$\delta_{3j}Ram_t \times Jan_t + \Gamma_jZ_t \quad (2)$$

Equation (1) is the mean equation where R_{jt} is the stock return at time t for firm j. The stock returns for this sample are computed as the first differences of the natural logarithm of prices. The lagged stock return (R_{jt-1}) is included in the mean equation as an explanatory variable in case the markets studied are inefficient.[17] R_m is the national market return[18] and S in Equation (1) is the size risk factor which is calculated using the method of Fama and French (1993).[19] ε_{jt} represents shocks where $\varepsilon_{jt} \sim N(0, h_{jt})$. h_{jt} is the conditional variance. Equation (2) is the variance equation that captures the clustering and time-varying volatility in the return series. γ is the coefficient that measures the asymmetric effect of shocks on volatility. If $\gamma \neq 0$, this implies that the impact of shocks is asymmetric; a negative coefficient suggests that investors are more sensitive to negative shocks for a firm than to positive shocks, so return volatility is higher when the firm experiences negative shocks.

[17] Similar studies e.g. Chau et al. (2014) and Kaplanski and Levy (2012b) also included the lagged returns in their regressions.

[18] All share composite index returns (in local currency) are employed for all countries. An exception to this generalisation is Morocco for which the MSCI index return is employed instead due to unavailability of data on the local market index.

[19] This variable is included to control the size effect on share returns as some studies report that January effect tends to be more prominent in small cap stocks (Thaler, 1987). In addition, Figures 2 and 3 in the next section show that the behaviour of share returns varies across firms. It may be that there are different types of investors for small and large companies. Foreign sophisticated investors, investing in larger stocks, may base their valuations more on company fundamentals and Western effects may be more apparent in larger stocks.

Four dummy variables representing observations in Ramadan (Ram_t), Muharram (Muh_t), December (Dec_t) and January (Jan_t) are included in both the mean and variance equations of the EGARCH model. Muh_t has the value of 1 for all Muharram observations and 0 otherwise, while Ram_t has the value of 1 for all Ramadan observations and 0 otherwise. In addition, Jan_t has the value of 1 for all January observations and 0 otherwise, and Dec_t has the value of 1 for all December observations and 0 otherwise. The model also includes an interaction term to capture the months with festival effects ($Ram_t \times Dec_t$), the first-months-of-the-year effects ($Muh_t \times Jan_t$), and the January and Ramadan effects ($Ram_t \times Jan_t$); these interaction terms will facilitate our investigation.

Z_t is the set of control factors. To control for the effect of events such as the financial crises and country shocks, which occurred during the periods investigated (see Table 2), several dummy variables are included in the model. Three dummy variables called AFC_t, GFC_t and EDC_t are introduced into both equations. According to the chronology of the AFC from the International Monetary Fund (IMF), the value of the AFC_t dummy variable is equal to 1 for the period from March 3, 1997 to July 31, 1999 and 0 for other observations.[20] Following the timeframe of the GFC used by Mobarek et al. (2014) and Mollah et al. (2016), the value of GFC_t is equal to 1 for the period from August 9, 2007 to December 31, 2009 and 0 otherwise. The EDC commenced on May 3, 2010 according to Mobarek et al. (2014) and Mollah et al. (2016); the same start date is employed in the current paper for EDC_t. However, both studies set the conclusion of the EDC as the end of the time period covered in their studies. As the data in this investigation finishes in 2016, we have taken an end date for this

[20] The chronology is available at http://www.imf.org/external/pubs/ft/op/opfinsec/. Various sources specify the AFC period differently such as July 1997 - December 1998 (Carson and Clark, 2013), 1997-1998 (Al-Khazali, 2014), May 14, 1997- March 12, 1999 (www.pbs.org/wgbh/pages/frontline/shows/crash/etc/cron.html) and July 2, 1997 – December 31, 1997 (Pasquariello and Vega, 2015). In Thailand, the downturn began in February 1996 when the index was at 1400 and dropped to 460 by June 1997. Page 148 of the NBER Report http://www.nber.org/chapters/c8691.pdf shows that equity markets declined in March 1997.

crisis of December 31, 2014 by examining the macro-economic data for key EU countries.[21] Thus, the value of EDC_t is equal to 1 for the period from May 3, 2010 to December 31, 2014 and 0 otherwise.[22] Table 2 shows the percentage of the sample period when events in our study coincide. For some events, the number of days when they coincide is very small; for example, there are only 8 days when Ramadan fell in December during the AFC period (0.14% of total observations), and only 3 days when the month of Muharram fell in January during the EDC period (0.05% of total observations).

[Insert Table 2 about here]

Our model also captures political events resulting from wars and from terrorist acts globally and within each of the seven countries. Five other dummy variables are introduced in both equations, namely, a 9/11 dummy ($Sep11_t$), an Afghan war dummy (AW_t), an Iraq war dummy (IW_t), an Arab spring dummy (AS_t), and a political shocks and terrorist events dummy (PTE_t). These dummy variables control for the major external and regional incidents that may have affected the equity share returns in our sample countries and their volatilities. A number of authors argue that wars, major political events and terrorist incidents cause shifts in equity markets; authors such as Eldor and Melnick (2004) show empirically that terrorist events have a permanent negative effect on stock markets. Further studies show that

[21] For example, in Germany and France the EDC affected GDP growth until the end of 2014, since when GDP has stabilised at a growth rate of just under 2% per annum in Germany and 1% in France. Productivity has improved since mid-way through 2014 for both countries and the balance of trade improved since 2014. Retail sales have also picked up since 2014. In Italy, GDP declined dramatically in 2012 and 2013 and stabilised in 2014 before growing again in 2015. Italian GDP per capita also declined during 2012, 2013 and 2014 but started to increase again in 2015. The unemployment rate increased rapidly in 2012-2014 and only started to decline in 2015 when retail sales started to grow. In Spain, economic data has varied in a similar fashion, although GDP started to grow slightly earlier than in France, Germany and Italy. GDP per capita saw a small rise in 2014 but a larger increase in 2015. Unemployment started to decrease in 2015 and this rate of change has quickened in 2016; the unemployment rate has decreased from a high of 27% in 2014 to under 19% in 2016. Business confidence has also stabilised since 2014 and retail sales growth picked up remarkably during 2015.

[22] See Rizvi, Arshad and Alam (2015) for a review of crises and contagion in some of these markets.

political events can have significant effects on investor sentiment (Lobo, 1999). Hence, the model takes account of such events. Following Halari et al. (2015), the $Sep11_t$ dummy takes the value of 1 from September 11, 2001 onward and 0 otherwise. This setting follows the fact that the number of terrorist attacks increased significantly after the 9/11 attack while Aslam and Kang (2015) show that that these terrorist attacks affected stock markets. Moreover, since 9/11 South Asian markets have reformed their stock markets (Fernandez, 2006; Ahmed and Farooq, 2008; Nguyen and Enomoto, 2009; Suleman, 2012) and Western countries have sent larger amounts of remittances, leading, for example, to an economic boom over several years in Pakistan**.** The AW_t takes the value of 1 from October 8, 2001 until January 7, 2002 and 0 otherwise while the IW_t takes the value of 1 from March 20, 2003 until May 1, 2003 and 0 otherwise.[23] The AS_t dummy takes the value of 1 from December 18, 2010 until December 31, 2013.[24] The PTE includes short, one-off events (mostly terrorist related) that are believed to have caused shocks and instability in the equity markets.[25] The PTE_t variable takes the value of 1 for all the major political and terrorist incidents that occurred during the sample period for the seven countries and 0 otherwise. These events were identified by the authors based on the number of casualties killed or injured in the respective countries from

[23] The Afghan war and the Iraq war are both part of the broader Global War on Terror, which started after the terrorist attacks of 9/11 on the World Trade Centre in the US. Since the total duration of the conflict of these wars covers almost the entire sample period, we use the beginning of US military operations as our dummy values for these two wars. For the Afghan war, the US military operation began on the October 7, 2001; consistent with the study by Kollias et al. (2013) the Afghan war period is taken to be the first three months when most investor sentiment may have occured. For the Iraq war, March 20, 2003 marks the start of the military operation, which ended on May 1, 2003 when hostilities formally ceased.

[24] Although none of the seven countries being considered in this study experienced significant unrest, revolution or sustained civil disorder during the Arab Spring period, there may have been a spillover effect. According to Burger, Ianchovichina, and Rijkers (2013), Bahrain, Egypt, Libya, Syria, Tunisia, and Yemen experienced such events during 2010 and 2012. Furthermore, Herrala and Turk (2013) identify Arab Spring countries as Egypt, Syria and Tunisia, and countries experiencing continued political unrest as Bahrain, Iraq, Lebanon, Sudan, and West Bank and Gaza. Although our countries are not the prime focus of the Arab Spring revolution, a spillover effect may have occurred on Islamic markets, especially in Africa and the Middle East. The period for the Arab spring set in this paper is consistent with the literature (See Chau, Deesomsak, and Wang, 2014; Abumustafa, 2016).

[25] These events are drawn from the Global Terrorism Database (GTD). The selection criterion was the magnitude in terms of human casualties and headline capturing events; this exceeded 50 for six of the countries but for Pakistan the casualties exceeded 100. Some examples for these events are the Bali 2002 bombings in Indonesia, the 2007 Assassination of former Prime Minster of Pakistan, Benazir Bhutto, the Istanbul 2003 and 2008 bombings, and the Amman 2005 bombing. A full list of these events, including the summary of the events is available from the authors upon request.

the Global Terrorism database. These dummy variables are included in the set of control factors, Z_t.

Equation (1) and Equation (2) are estimated simultaneously using a Quasi Maximum Likelihood approach (QML) (see Bollerslev and Wooldridge, 1992). The Berndt, Hall, Hall and Hausman (BHHH) algorithm is applied (Berndt et al., 1974). The descriptive statistical analysis and the EGARCH model facilitate the tests for the hypotheses stated in Section 2. The results are discussed in the next section.

5. Results

5.1 Descriptive statistics

Figures 1 to 3 show scatter plots of the means and standard deviations of the returns earned by companies in each of the seven countries. The first scatterplot shows the results for the whole period and it is clear from Figure 1 that Turkey performs well while Malaysia and Jordan perform poorly. When Muharram coincides with January, company performance in the month of Muharram in most countries is worse than when the two months do not overlap; the one exception to this generalisation is Malaysia where returns are higher and risk is similar when Muharram and January coincide. For Ramadan and December, Turkey performs much better when the two months coincide; a similar picture emerges for Turkish companies when Ramadan falls in January. However, higher share returns in Turkish companies come with higher risk. At the firm level, rather than the country level, Figure 2 and Figure 3 show differences between performances in coinciding and non-coinciding periods for each of the 756 individual firms' shares across the 7 countries on the x-axis with the differences between the mean values/volatilities of share returns on the y-axis. Positive differences in Figure 2 (Figure 3) would indicate that share returns (return volatilities) are higher when Ramadan falls in January or December or when Muharram falls in January. In general, Figure 2

illustrates higher mean returns in the month of Ramadan when Ramadan coincides with January, but lower mean returns in the month of Muharram when Muharram coincides with January. An inspection of Figure 3 also reveals that return volatilities are higher when Ramadan coincides with December or January, but lower when Muharram falls in January.

[Insert Figures 1, 2 and 3 about here]

Table 3 reports the percentage of firms for which the mean as well as the mean return per unit of risk (MRPUR) is higher and standard deviation (SD) is lower[26] during the years when the three pairs of months coincide relative to when they do not coincide. Consistent with the findings from Figure 1, Table 3 reveals that, in the month of Ramadan, performance in terms of means and MRPUR ratios is greatly improved for Turkish equities when its trading days overlap with December or January. The results show that, apart from Bangladesh, the Ramadan and January anomalies in mean values and MRPUR ratios are stronger than when the days of festive months or the first months of the year coincide. In addition, SD for the days of Ramadan tends to increase when they fall in January or December while SD for the days of Muharram tends to decline when Muharram coincides with January. Jordan is one of the main exceptions to this generalisation; only a minority of firms in Jordan report a lower SD value when the months of Muharram and January coincide. The next section discusses our estimation results.

[Insert Table 3 about here]

[26] In Tables 3-5, in order to group the results by firm size, firms are classified as small (large) if they are ranked in the first (last) quintile of the sample firms by size in more than 13 Gregorian years.

5.2 Estimation results

Table 4 shows the EGARCH results across all companies, small companies and large companies for the mean equation (Equation (1)) while Table 5 shows the results for the variance equation (Equation (2)). Tables 6 and 7 report the results by country. Variability in the coefficients across the firms analysed tends to generate t-statistics which are low for both the mean and variance equations. As the distributions of coefficients are skewed, and there may be some extreme values that disproportionally affect the mean values, a t-test may not yield a reliable test of significance; the one-sample sign test is used instead.[27] The one-sample sign test is used to test our one-tailed null hypotheses that coefficients have an opposite sign from that predicted in hypotheses H_{1a} – H_{6a}.[28] The hypotheses in their alternative form are presented in column H_a in Tables 4-7 which are discussed in the following sections.

[Insert Tables 4-7 about here]

On a trading day when an Islamic month and a Gregorian month coincide, a change in share return or volatility may be caused by individual Islamic or Gregorian calendar effects and the interactions among these effects. Any change may also be due to the effects of specific events that occurred in the period considered (such as the financial crisis and political events). The inclusion of dummies for crises and political incidents in the model allows us to

[27] It is notable that in some cases the sign of the mean value and the sign test statistic of a coefficient may be different. This may be because the mean value across sample firms is affected by some extreme values; such a problem does not exist in the sign test computed as it is based on the signs of the coefficient across sample firms, so the sign of the test-statistic is used to conclude about the direction of a calendar or coinciding effect.

[28] The sign test is more appropriate for this study as it does not require a normal distribution (Fifield et al., 2008). Studies such as Lam et al. (2016) and Ahn et al. (2014) also employ a sign test to investigate the significance of their hypotheses.

control for the effects of these events and separate their influences from the impacts of calendar anomalies.[29]

To find the total calendar anomaly effect on the mean return (volatility of return) when periods coincide, we calculate the sum of the coefficients for the individual effect and its associated interaction term in Equation (1) (Equation (2)). For instance, when Ramadan coincides with December, we consider the Ramadan effect, the December effect and the interaction between these two festival effects. A significant coefficient for the $Ram_t \times Dec_t$ interaction term in Equation (1) or Equation (2) would, *prima facia*, fail to reject the hypothesis that the Ramadan and the December effects coincide with one another. There are three possible interpretations of this interaction term depending upon coefficients for Ram_t and Dec_t in Equation (1) or Equation (2). First, if the sum of the coefficients for Dec_t and $Ram_t \times Dec_t$ has the same sign as the coefficient for Ram_t, the Ramadan effect is enhanced when the months coincide. Hence, we would fail to reject H_1 and H_2. Second, if the coefficients for Dec_t and $Ram_t \times Dec_t$ have the same sign as the coefficient for Ram_t, the Ramadan effect is reinforced by either the December effect or the interaction between Ramadan and December when they coincide. Third, if the signs of the Dec_t and Ram_t coefficients are similar but the coefficient for $Ram_t \times Dec_t$ has the opposite sign, the interaction between Ramadan and December reduces any impact of individual monthly influences.

Our six hypotheses in Section 2 can be rewritten in terms of parameters in Equations (1) and (2) as follows:

- Coinciding of the festival month effects: H_{1a}: $b_4 + c_1 > 0$; H_{2a}: $\psi_4 + \delta_1 < 0$
- Coinciding of the first-months-of-the-year effects: H_{3a}: $b_3 + c_2 > 0$; H_{4a}: $\psi_3 + \delta_2 > 0$

[29] Table 2 shows that the percentages of observations when the days of Muharram fall in January and the days of Ramadan falling in January or December in each of the crisis periods are less than 1% of total observations. Therefore, the interaction between these crisis effects and the periods when our calendar anomalies coincide is not included in our investigation.

- Coinciding of Ramadan and January effects: H_{5a}: $b_3 + c_3 > 0$; H_{6a}: $\psi_3 + \delta_3 > 0$

The average values and the sign test statistics for the above sums of the coefficients are reported in the bottom panel of Tables 4-7. In this paper, we fail to reject our hypotheses when the sign test results support the above hypotheses; in such cases, the null hypotheses that a coefficient has a sign opposite to that predicted in the hypotheses H_{1a} –H_{6a} (column H_a in the bottom panel of Tables 4-7) can be rejected.

As shown in Tables 4 and 6, the coefficients for past returns, market performance and size are significant in many cases, so these markets are fairly inefficient. Table 5 shows that asymmetric shocks impact on small companies more than large corporations, and that small firms are more sensitive to good rather than bad news; these firms' shares may be more susceptible to changes in investors' sentiment as small firms' stocks are normally held by retail investors. In addition, Table 7 highlights the asymmetric effect of good and bad news among variances; investors are more sensitive to good news across all seven countries. Among the seven countries studied, Malaysia and Morocco have a lower percentage of firms with a significant value of γ (33.94% for Malaysia and 35.71% for Morocco).[30] That is, the asymmetric effect of good and bad news among variances is slightly less pronounced in Malaysia where short selling is authorised but strictly regulated[31] and Morocco where short-selling is not practiced (Jain, Jain, McInish and McKenzie, 2013). Table 4 highlights that share returns were positively affected by Sep-11, AW and IW but negatively affected by the three financial crises. The sign test results in Table 5 suggest that return volatility reduced in our sample firms during Sep-11, IW and EDC, but increased during the other events. It is notable that small firms' return volatility increased in the AFC and GFC periods but was not affected by the EDC or any political events. In contrast, large firms' return volatility was affected by all events (except PTE) with a significant reduction in return volatility during

[30] In order to conserve space, the percentages of firms with significant coefficients for all variables across sample countries are not reported in the tables but are available from the authors upon request.
[31] Source: http://asiaetrading.com/equities/adr/malaysia/

Sep-11, IW and EDC. Among all the political and crisis events, the effects of AFC, GFC and AS are more pervasive as there was an increase in return volatility for both small and large markets when these events occurred. Among our sample countries, share returns in Jordan, Malaysia and Turkey (as seen in Table 7) were less volatile during the EDC, but those in South Asia were more volatile. The results in Tables 6 and 7 indicate that the Bangladeshi market is more sensitive to both economic crises and political shocks than other Islamic stock markets analysed while the Moroccan market is less sensitive than the other markets studied.

5.2.1 When East meets West

In this subsection, the discussion is divided into three parts. The first part considers the festival effects (when Ramadan and December coincide), the second part covers the first-months-of-the-year effects (when Muharram and January coincide), and the third part discusses the effect of Ramadan and January coinciding. The findings for each of the coinciding effects are discussed further below.

The festival months: Ramadan and December

The bottom panel of Table 4 shows that when the months of Ramadan and December coincide, the impact (the sum of the Dec_t and the $Ram_t \times Dec_t$ coefficients) is in the opposite direction to our predictions. In non-coinciding periods, we find evidence of a negative Ramadan effect in share returns across all, small and large sample firms. According to this table, the Dec_t coefficient is significantly positive for small firms while the interaction between the Ramadan and December effects (the coefficient for $Ram_t \times Dec_t$) has a negative impact on share returns across all firm sizes. The size of the positive coefficient for Dec_t and the size of the negative coefficient for $Ram_t \times Dec_t$ are about the same for small firms, so the two effects appear to cancel each other out, resulting in the insignificant coinciding effect in

mean returns. For all firm sizes, the sign test statistic for the sum of the Dec_t and the $Ram_t \times Dec_t$ coefficients are negative and lower than the critical value of 1.645. Therefore, we reject H_1 for all firm sizes.

In Table 6, only Pakistan has a significant positive Ram_t coefficient[32] and only Turkey has a significant positive Dec_t coefficient. A comparison of the results across the various markets highlights that Indonesian and Turkish share returns in Ramadan are significantly higher when both Ramadan and December coincide (as seen in the bottom panel of Table 6). The sign test statistic for the sum of the Dec_t and the $Ram_t \times Dec_t$ coefficients is greater than 1.645 for Indonesia and Turkey; thus, we fail to reject hypothesis H_1 for these two countries. The opposite finding is reported for Malaysia where both the Dec_t and the $Ram_t \times Dec_t$ coefficients are negative, thus rejecting our hypothesis. Compared with the findings from Figure 1 and Table 3, the higher return documented earlier for Jordanian firms may be due to the effect of AW, which occurred during the time period when Ramadan and December coincided.

Consistently, we find significant negative festival effects in share return volatility when the festival months do not coincide (coefficients for Ram_t and Dec_t are both negative), possibly due to lower trading volumes in both Ramadan and December (Abadir and Spierdijk, 2005). Tables 5 and 7 report that the Ram_t and Dec_t coefficients are significant and negative for return volatility across all firm sizes and all markets[33], supporting the findings in prior studies (e.g. Halari et al. 2015). The exception to this generalisation is Morocco, which has an insignificant Dec_t coefficient.

[32] Compared with prior studies such as Abadir and Spierdijk (2005), Al-Hajieh, Redhead, and Rodgers (2011) and Almudhaf (2012), our result for Pakistan is consistent with their finding, but our result for Jordan and Malaysia differs from theirs. It suggests that the Ramadan effect in Jordan (Malaysia) found in their studies may be due to the positive effect of factors controlled in our model i.e. Iraq and Afgan wars (the interaction between Ramadan and January effects) which occurred in their sample period.

[33] Although the average value of *Dec* coefficient for Jordan is positive, only 29% of Jordanian firms have a positive coefficient. Thus, the positive average value is, in fact, driven by some extreme positive cases.

However, in Table 5 the volatility reduction in the month of Ramadan is smaller when Ramadan coincides with December because the positive interaction between the festival effects (the coefficient for $Ram_t \times Dec_t$) offsets the negative December effect. The net positive coinciding effect is significant for all sizes of firms. Hence, hypothesis H_2 is rejected for these categories of companies.

The results in Table 7 suggest that interactions between the Ramadan and December effects for return volatility are insignificant in Bangladesh, Jordan, and Pakistan, but significant and positive in the other four countries. The sign test statistics for the sum between the December effect and the *Ram* × *Dec* interaction effect in the bottom panel of Table 7 indicate that a greater volatility reduction only occurs during the days of Ramadan when Ramadan and December coincide in Bangladesh; so, we fail to reject hypothesis H_2 for Bangladesh but not for the other countries studied. Return volatility declines in December for 92% of Bangladeshi firms and the positive interaction between the Ramadan and December effects in return volatility is insignificant, so there is a significant reduction in volatility in the coinciding period. Although the periods of AFC and Sep-11 overlap when the months of Ramadan and December coincide (as shown in Table 2), our regression results and sign test statistics suggest that the decline in return volatility for Bangladeshi firms is due to Ramadan and December coinciding, not economic or political shocks. In Malaysia and Turkey, the effect of months coinciding on return volatility is positive, contradicting our expectations but supporting the earlier findings in Table 3.

Overall, for the festival months, the sign test results in the bottom panel of Table 4 reject hypothesis H_1; that is, share returns during Ramadan do not increase when Ramadan and December coincide. The results in Table 5 reject hypothesis H_2 as the reduction in volatility becomes smaller in the coinciding periods than in the non-coinciding periods. Consequently, the benefit of equity investment in the month of Ramadan is reduced when the

days of Ramadan fall in December. Nevertheless, when the effects in each market are investigated separately, the Ramadan effect in share returns tend to be magnified when Ramadan coincides with December in the two larger and more developed markets of Indonesia and Turkey while a smaller and less developed market like Bangladesh experiences a reduction in volatility when the festival months coincide. The size of the average value of $b_4 + c_1$ in Table 6 is higher than that of $\psi_4 + \delta_1$ in Table 7 for Bangladesh (0.0121>-0.0325), Indonesia (0.1400>0.1006) and Turkey (0.1524>0.0441), suggesting the greater benefit of investment during the month of Ramadan when the festive months coincide.

First months of the year: Muharram and January

Table 4 reports a significant and positive Muh_t coefficient across all sizes of sample firm except for large firms (the sign test statistic is 0.95). When we investigate each market separately, Table 6 shows that, in non-coinciding periods, share returns in the month of Muharram are lower in Indonesia, but higher in Malaysia and Turkey. This finding is inconsistent with the results of prior studies (e.g. Al-Ississ, 2010) and it may be due to the confounding effects of crises and political events ignored in their studies. With regard to January, a significant and positive Jan_t coefficient is found only in Jordan and Pakistan.

When the days of Muharram fall in January, Table 4 reports a negative interaction effect for the all firms sample (the average value of the coefficient for $Muh_t \times Jan_t$ = -0.0328; sign test statistic = -3.35), especially large firms. Table 6 also documents a negative interaction effect for firms in Pakistan and Turkey. As the last rows of Tables 4 and 6 indicate, there is a negative coefficient for all sample groups; the results suggest that share returns on these days are lower than on the days when Muharram falls in other Gregorian months of the year. This result is present for all firm sizes and across different countries, but the coefficient is significant only for all and large firms and firms in Pakistan and Turkey. As we had

hypothesised that the positive January effect would offset or reduce the negative Muharram effect during years when the two months coincide with a smaller decline in share returns in these periods of overlap, our findings reject hypothesis H_3.

Unlike individual festival effects which consistently lead to lower return volatility, the results for the first-months-of-the-year effects are mixed. In the month of Muharram that does not overlap with January, volatility is higher for all sizes of firms, especially for large firms and firms in Turkey. The exception to this generalisation is Bangladesh which sees a lower return volatility in the month of Muharram in non-coinciding periods. Thus, the claim that trading volume should be lower in the month of Muharram, when Shia Muslims in particular are concerned with mourning and sorrow (especially in the first 10 days of Muharram), is only documented in Bangladesh. Likewise, the January effect on return volatility in non-coinciding periods is only significant and positive for large firms and firms in Pakistan as well as Turkey. The opposite finding is reported for the Jordanian and Malaysian firms.

When Muharram and January coincide, there is no significant interaction effect across any firm sizes; indeed, the Muharram effects in non-coinciding and coinciding periods are not significantly different, providing some evidence for the rejection of hypothesis H_4. However, when we consider each market separately, we find a significant and positive interaction effect in Bangladesh and Jordan, so the reduction in return volatility in the month of Muharram becomes smaller when Muharram falls in January (see the second last row of Table 7) in these two countries. For example, in Bangladesh, the negative mean value of Muh_t coefficient in the top panel of Table 7 (b_1 = -0.0277) is smaller than the positive value of the sum between Muh_t coefficient and $Muh_t \times Jan_t$ coefficient in the bottom panel of Table 7 ($b_3 + c_2$ = 0.0460), so return volatility is higher when Muharram and January coincide. For Pakistani firms, although the interaction effect is insignificant, the increase in return volatility in the month of Muharram is reinforced by the January effect (b_1 = 0.0095; b_3 = 0.1317). Hence, we

can conclude that the return volatility in the month of Muharram is higher when Muharram and January coincide for the South Asian countries in our study. Overall, the sign tests in Table 5 and Table 7 suggest that we reject H_4, except for South Asian firms. Although investors in Bangladeshi stocks may benefit from lower risk in the month of Muharram, the benefit disappears when Muharram coincides with January. Furthermore, along with higher risk in the coinciding period, equity returns in the month of Muharram are lower in Pakistan when Muharram falls in January, so investors should avoid equity investment in Pakistan when the months of Muharram and January coincide.

The commonly reported months: Ramadan and January

The sign test for the coefficient of $Ram_t \times Jan_t$ in Table 4 suggests that the Ramadan effect positively interacts with the January effect in these Islamic stock markets, except for small firms. The bottom of Table 4 shows that, on average, mean returns in the month of Ramadan are higher during coinciding years compared to when these months do not coincide. This result is apparent across all companies, so we fail to reject hypothesis H_5. The exception to this generalisation is small firms for which the coinciding effect is insignificant. The sum of the coefficient for Jan_t and the coefficient of $Ram_t \times Jan_t$ at the bottom of Table 6 indicates that most sample countries experience higher share returns when Ramadan and January coincide, apart from Jordan. However, this positive coinciding effect is significant only in two of the larger markets of Malaysia and Turkey. Thus, we fail to reject hypothesis H_5 for Malaysia and Turkey.

As with the coinciding between the Ramadan and January effects in mean share returns, the results indicate that volatility is higher when these months coincide. Tables 5 and 7 report the positive average values for δ_3 and $\psi_3 + \delta_3$ across all firm sizes and most markets (except for Jordan), so the interaction and the coinciding effects are in the same direction.

The sign test suggests that the positive interaction and coinciding effects for return volatility are significant for all firms and large firms, so the evidence supports hypothesis H_6. When considering each individual market, Table 7 shows that the interaction and coinciding effects are significantly positive in Bangladesh and the larger markets of Indonesia, Malaysia and Turkey. Thus, we fail to reject H_6 for Bangladesh, Indonesia, Malaysia and Turkey, but not for the other three countries.[34] The result for Jordan is consistent with the finding from Table 3 and confirms that the reduction in return volatility can be explained by the negative January effect and the negative interaction effect, not economic or political shocks.

The results suggest that share returns and volatility on the days of Ramadan tend to be higher when that day falls in January. Although trading volume and return volatility are normally lowered by shorter trading hours and more frequent prayers in Ramadan, the higher trading activity in January may lead to a smaller reduction or an increase in return volatility when Ramadan falls in January for Bangladesh, Indonesia, Malaysia and Turkey. It is notable that the higher volatility in the coinciding period is due to the interaction between Ramadan and January effects rather than the individual January effect. Nevertheless, the incremental increase in mean returns ($b_3 + c_3$) is greater than the increase in return volatility ($\psi_3 + \delta_3$) in Bangladesh, Malaysia and Turkey; thus, there are greater risk-adjusted returns on investment in the month of Ramadan during the coinciding period.

Our overall findings therefore indicate stronger coinciding effects in return volatility than in share returns. We also find an incremental increase in share returns during the month of Ramadan when Ramadan and January coincide and a greater decline in share returns during the month of Muharram when Muharram and January fall at the same time, especially for large firms. Our hypotheses that the January effect in share returns complement the Ramadan effect are supported especially in the more developed markets (Turkey) while the

[34] Higher return and volatility in the month of Ramadan during when it coincides with January, which is shown in Table 3, for Morocco may be due to the effect of the AFC, which occurred in 1997-1998, or other factors. Shares in these markets might act like safe haven assets during the AFC period.

hypothesis that the January effect in return volatility counteract the Muharram effect is supported in South Asian countries and the Ramadan effect in Bangladesh, Turkey and South East Asia. There is no supporting evidence for all six hypotheses in MENA, which are relatively less developed, less integrated to Western markets and dominated by domestic investors.

5.3 Robustness Check

In order to check on the validity of our findings, we undertook a number of robustness checks. For example, we replaced a size factor (the difference between the daily returns of small and large firms) with a specific size measure (the natural logarithm of each company's market value). As another robustness check, we removed the market and size risk factors from the mean equation. We found that the results remained relatively unaffected by these changes. The results from both models are consistent with the findings above. The findings in Tables 4-7, do not change for the Eastern and Western coinciding effects when this alternative size measure was used. There is even stronger evidence of higher returns when Ramadan and January coincide relative to the other two pairings investigated in this study. The sign test results confirm our previous findings across all firm sizes and markets. The only exception to this generalisation is that, in the model without the market and size risk factors, share returns in Ramadan increase for all and large companies; not only do they increase when the days of Ramadan fall in January, as documented earlier, but also when the days of Ramadan fall in December.

Finally, we estimated Equation (1) with a panel fixed effects model for each sample country.[35] The results are generally consistent with the findings from the EGARCH

[35] The result is available from authors upon request.

approach[36] – that is, the effect on share returns when the days of Ramadan and January coincide is stronger than the effect for the other two coinciding months studied in this investigation.

6. Discussion and Conclusion

The main contribution of this paper is that we examine six hypotheses surrounding the circumstances of East (Ramadan and Muharram) meeting West (December and January) calendar effects in financial markets for seven countries with large Muslim populations. In particular, we investigate whether there is an interaction between: (i) festival-month effects (H_1 and H_2); (ii) first-months-of-the-year effects (H_3 and H_4); and (iii) the Ramadan and January effects (H_5 and H_6) in equity returns and volatilities. Our other contribution is that these effects are analysed for both mean returns and volatilities after controlling for the effects of not only financial crises but also numerous political shocks and acts of terrorism that occurred in the period analysed.

We report stronger support for the coinciding effect between Ramadan and January than between festival-month effects and between first-months-of-the-year effects. In addition, the coinciding effects are more prominent in return volatility than in mean returns. We find that the benefit of equity investment in the month of Ramadan is increased when the days of Ramadan fall in January and in December for Bangladesh and Turkey. Moreover, we report lower return and higher risk in the month of Muharram when Muharram and January coincide, in South Asian countries. Hence, investors may avoid equity investment in these markets in such periods.

Our motivation to investigate coinciding effects at firm level, rather than at market level, is that investors in small and large firms and relatively developed and relatively less-developed markets may be different. For instance, institutional foreign investors tend to

[36] We note that some results from panel models differ slightly from those from GARCH models because panel models do not take into account time-varying variances and non-normal distributions of share returns.

invest in larger firms in markets with greater liquidity; such markets tend to be more developed and integrated with Western stock markets (Gompers and Metrick, 2001; Howard, 2015). Thus, shares in large firms and more developed markets may exhibit significant effects in returns and volatility when the Western and Eastern calendar effects coincide.

Our findings show that this may be the case. For example, we find support for H_5 and H_6 for large firms while all six hypotheses can be rejected for small firms. At country level, we find some support for H_1 and H_6 for Indonesia and Turkey. In these markets, non-Muslim investors may dominate security trading which may explain why we find support for our hypotheses. Indonesia allows full ownership for foreign investors in a number of sectors; more than 50% of publicly traded shares listed on Indonesian Stock Exchanges are owned by foreign investors.[37] The OECD calculates the foreign direct investment regulatory restrictiveness index for all OECD countries. The index is 0.06 for Turkey but only 0.24 for Jordan. Among sample countries, Turkey had the highest absolute value of foreign equity flows over the period analysed. That is, while Jordan is relatively less open to foreign investors, Turkey is more open. We find no support for our six hypotheses in the MENA countries where institutional investment plays a much smaller role than in developed markets (Abadir and Spierdijk, 2005). Our results indicate, therefore, that the effects of an overlap in Eastern and Western monthly anomalies may depend on the stage of development of the country; the countries in the sample that are most developed and integrated into the global financial system have the more pronounced interactions.

Our results agree with the findings of Eiling and Gerard (2015) who show that although emerging markets co-move with the rest of the world, there is heterogeneity across regions. A number of factors may explain this finding: the presence of domestic and international institutional investors within each market, geographic and regional influences,

[37] Source: "IDX unveils ways to be SE Asia's largest stock market". 13 February 2012. http://www.thejakartapost.com/news/2012/02/13/idx-unveils-ways-be-se-asia-s-largest-stock-market.html Accessed 05/01/2017

the economic and political situation, and the historical and cultural setting of a society. These variations in institutional arrangements make a rich and diverse area of study, and future research should investigate the extent to which wider institutional frameworks influence the interactions between the Islamic and Gregorian calendar effects found in this paper. Further work is warranted in this area.

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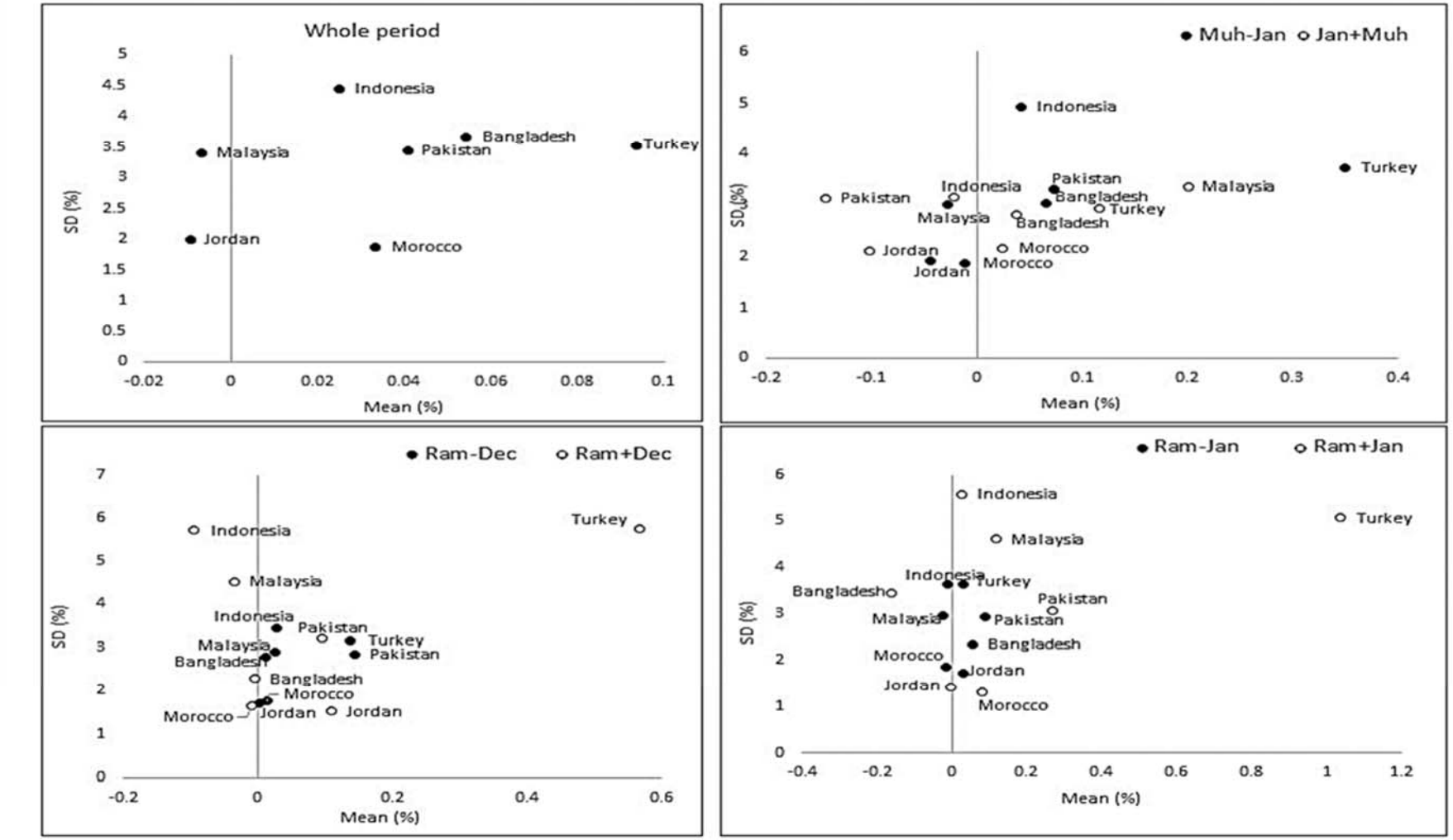
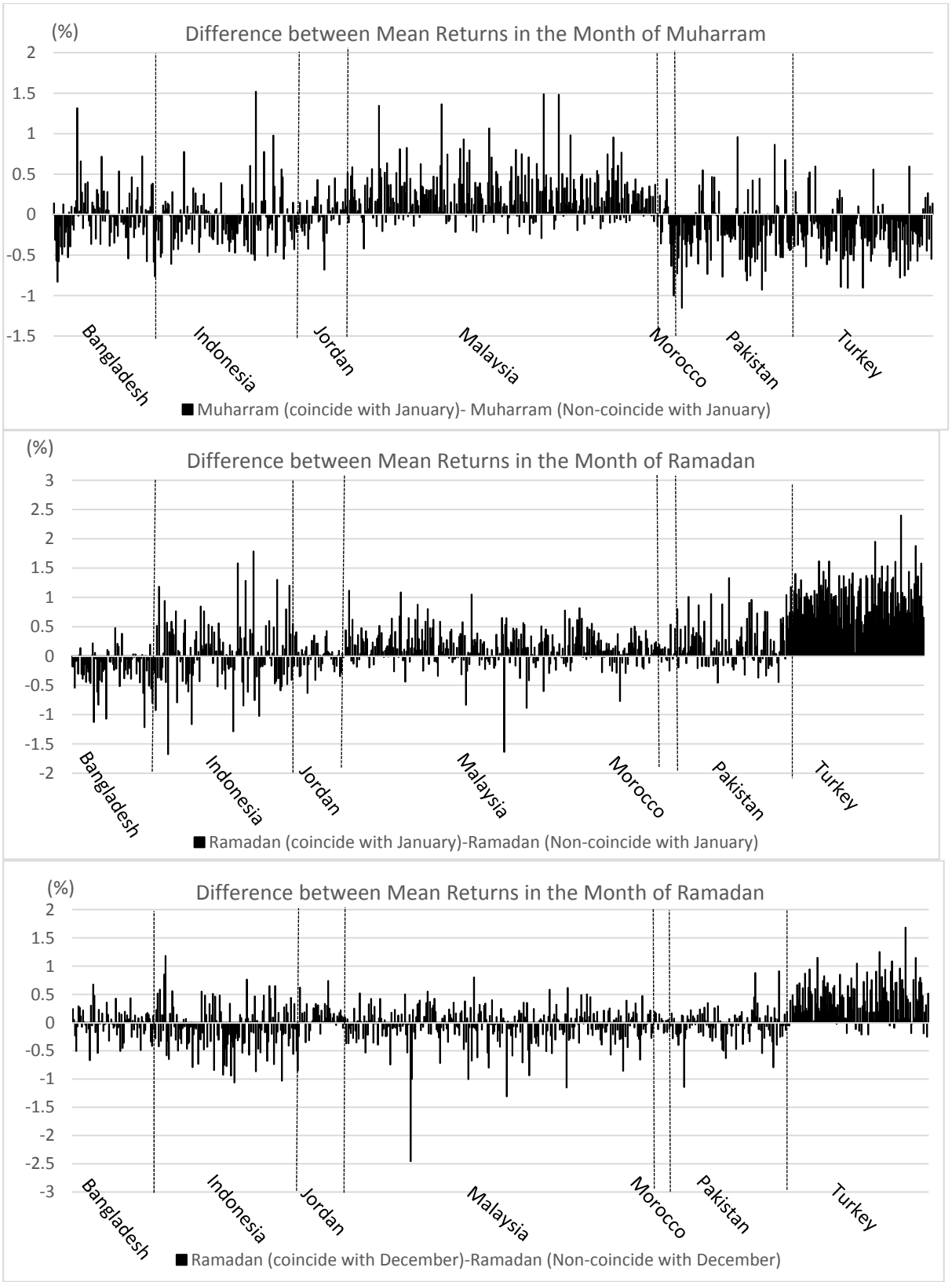
Figure 1: Mean Return and Risk in each market



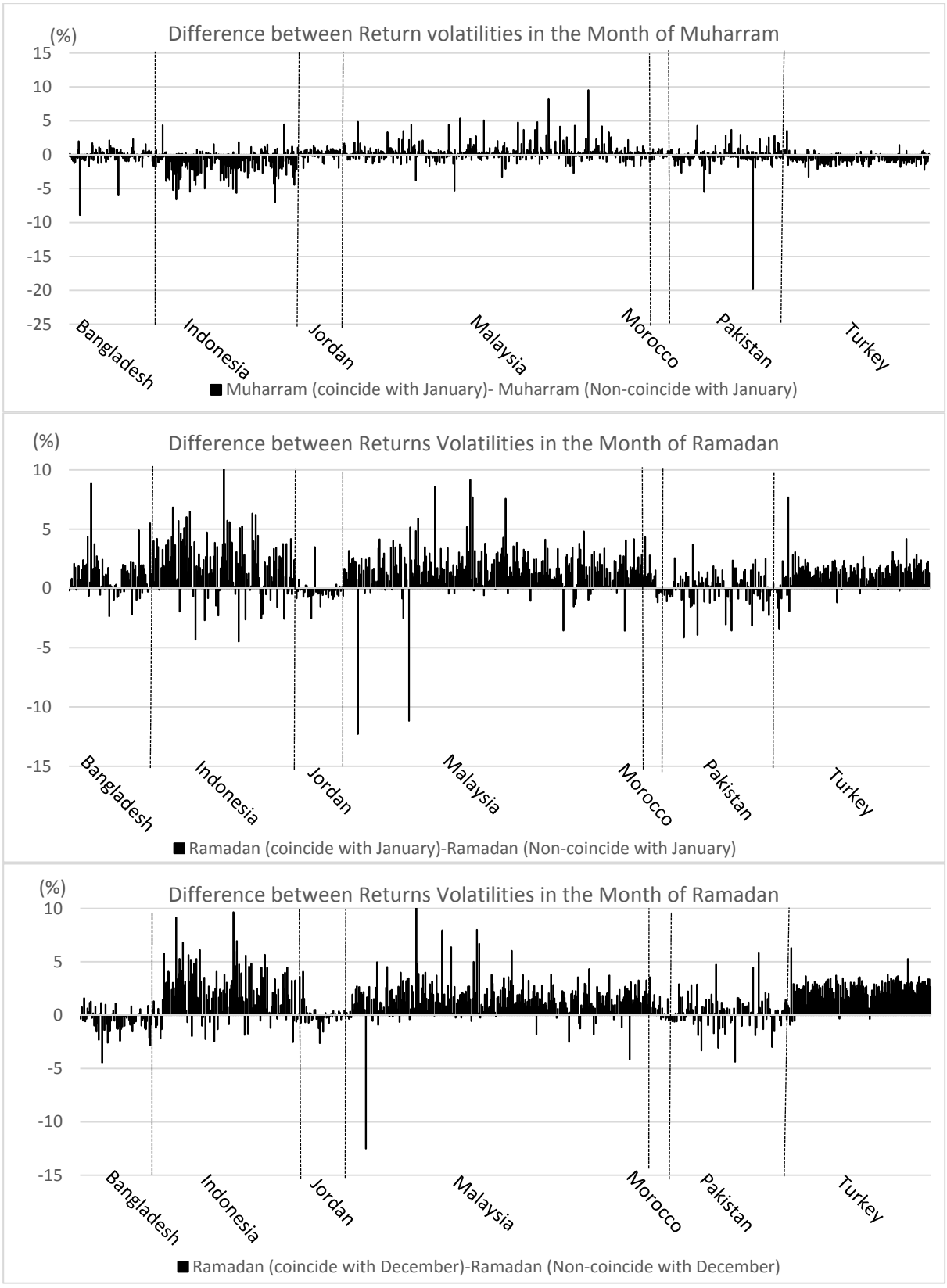
Note: The scatter plot between mean and standard deviation values of share returns in seven Islamic markets during non-coincidence periods (-) and coincidence periods (+).

Figure 2: Differences between mean returns in coincidence and non-coincidence periods



Note: This Figure shows, for each of the 756 individual firms' shares across the 7 countries on the x-axis, the differences between the mean values and volatilities of share returns. For example, the first graph shows the returns for each share for the month of Ramadan when it coincides with December and then deducting the returns of each share in Ramadan when it does not coincide with December.

Figure 3: Differences between return volatilities in coincidence and non-coincidence periods



Note: This Figure shows, for each of the 756 individual firms' shares across the 7 countries on the x-axis, the differences between the return volatilities of share returns. For example, the first graph shows the volatility of share returns for the month of Ramadan when it coincides with December and then deducting the volatility of returns of each share in Ramadan when it does not coincide with December.

Table 1: Sample and Distribution

Countries	Bangladesh	Indonesia	Jordan	Malaysia	Morocco	Pakistan	Turkey
Panel A: Sample							
No. of small firms	17	22	5	42	3	16	23
No. of large firms	16	20	10	49	2	17	21
Total firms (incl. small and large)	**73**	**127**	**41**	**274**	**14**	**104**	**123**
Panel B: Distribution of share returns							
(+) Skewness	54.79%	27.56%	9.76%	72.99%	0.00%	23.08%	34.15%
(-) Skewness	12.33%	27.56%	63.41%	10.95%	14.29%	25.00%	4.88%
Leptokurtic	100%	100%	97.56%	100%	100%	100%	100%
Non-normal Distribution	100%	100%	100%	100%	100%	100%	100%

Note: This table reports the sample by country and by size (small firms v large firms) over the 21.5 Gregorian (22 Islamic) years. Firms are classified as small (large) if they are ranked in the first (last) quintile of sample firms by size in more than 13 Gregorian years. Panel B reports the percentages of firms which have a positively skewed distribution of share returns ((+) Skewness), the percentages of firms which have a negatively skewed distribution of share returns ((-) Skewness), the percentage of firms with a fat-tailed distribution of share returns (Leptokurtic), and the percentage of firms with a non-normal distribution of share returns (Non-normal Distribution).

Table 2: Number of daily Observations by Month and Coinciding months

Months/Interactions	Total observations		Muh			Ram		
	Days	%	Period	Observations	%	Periods	Observations	%
Jan	487	8.68	23/01/2007 - 05/01/2011	56	1.00	23/01/1996 - 10/01/2000	63	1.12
Dec	466	8.31				22/12/1998 - 05/12/2002	58	1.03
AFC	630	11.23	09/05/1997 - 17/05/1999	63	1.12	01/01/1998 - 19/01/1999	42	0.75
Jan	43		N/A	0	0.00	01/01/1998 - 19/01/1999	34	0.61
Dec	46					22/12/1998 - 31/12/1998	8	0.14
GFC	626	11.16	11/01/2008 - 31/12/2009	51	0.91	14/19/2007 - 21/09/2009	63	1.12
Jan	45		11/01/2008 - 27/01/2009	34	0.61	N/A	0	0.00
Dec	67					N/A	0	0.00
EDC	1218	21.72	08/12/2010 - 21/11/2014	104	1.85	12/08/2010 - 28/07/2014	107	1.91
Jan	89		03/01/2011 - 05/01/2011	3	0.05	N/A	0	0.00
Dec	111					N/A	0	0.00
Sep-11	3863	68.87	18/03/2002 - 12/11/2015	314	5.60	19/11/2001 - 30/06/2016	337	6.01
Jan	332		23/01/2007 - 05/01/2011	56	1.00	N/A	0	0.00
Dec	333					03/12/2001 - 05/12/2002	15	0.27
Afghan	66	1.18	N/A	0	0.00	19/11/2001 - 17/12/2001	21	0.37
Jan	5		N/A	0	0.00	N/A	0	0.00
Dec	21					03/12/2001 - 17/12/2001	11	0.20
Iraq	31	0.55	20/03/2003 - 03/04/2003	11	0.20	N/A	0	0.00
Jan	0		N/A	0	0.00	N/A	0	0.00
Dec	0					N/A	0	0.00
Arab Spring	792	14.12	20/12/2010 - 04/12/2013	76	1.35	03/08/2011 - 08/08/2013	65	0.00
Jan	66		03/01/2011 - 05/01/2011	3	0.05	N/A	0	0.00
Dec	75					N/A	0	0.00
Total number of days during Jan. 1996- Jun. 2016	5609		Total number of days in Muharram	463		Total number of days in Ramadan	487	

Note: This table shows the number of observations for the Islamic and Gregorian months being investigated in this study. As well as individual months, this table also shows the number of observations between the three pairs of interactions investigated in this study (Ram x Dec, Muh x Jan and Ram x Jan) as well as the interaction between the financial crises. AFC, GFC and EDC denote the Asian Financial Crisis, the Global Financial Crisis and the Euro Debt Crisis, respectively. Sep11, Afghan, Iraq and Arab Spring refer to the Twin Towers attack of 9/11, Afghan war, the Iraq war and the Arab Spring period. The % relates to how much of the sample period is affected by these events. For example, 6.01% of the sample period has Ramadan coinciding with Sep 11.

Table 3: Percentage of firms where performance in coinciding periods is better than non-coinciding periods

Countries	Bangladesh	Indonesia	Jordan	Malaysia	Morocco	Pakistan	Turkey
Panel A: ($Mean^C / Mean^{NC}$) > 1							
Ram and Dec							
All sample	47.94	35.43	**71.42**	44.52	42.85	40.38	**88.61**
Small (1st quintile)	41.17	22.72	**100.00**	**61.90**	33.33	43.75	**82.60**
Large (5th quintile)	**56.25**	40.00	**60.00**	**51.02**	**50.00**	41.17	**95.23**
Muh and Jan							
All	43.83	40.94	38.09	**79.52**	**57.12**	24.03	18.69
Small (1st quintile)	**52.94**	45.45	40.00	**71.42**	0.00	37.50	21.73
Large (5th quintile)	18.75	35.00	20.00	**77.55**	0.00	35.29	9.52
Ram and Jan							
All	21.91	**53.54**	**54.76**	**69.34**	**78.57**	**64.42**	**100.00**
Small (1st quintile)	35.29	**81.81**	**60.00**	**73.80**	**66.67**	**81.25**	**100.00**
Large (5th quintile)	18.75	**65.00**	**50.00**	**81.63**	**100.00**	**70.58**	**100.00**
Panel B: (SD^C / SD^{NC}) < 1							
Ram and Dec							
All	**67.12**	15.74	**57.14**	8.39	35.71	36.53	2.43
Small (1st quintile)	**64.70**	27.72	**80.00**	11.90	**66.67**	**50.00**	0.00
Large (5th quintile)	**56.25**	5.00	30.00	2.04	0.00	5.88	0.00
Muh and Jan							
All	**58.90**	**87.40**	23.80	47.44	**57.14**	**53.84**	**88.61**
Small (1st quintile)	**52.94**	**81.81**	0.00	26.19	33.33	**62.50**	**86.95**
Large (5th quintile)	**56.25**	**95.00**	20.00	**61.22**	**50.00**	41.17	**95.23**
Ram and Jan							
All	23.28	18.11	**80.95**	9.12	0.00	42.30	4.06
Small (1st quintile)	**52.94**	31.81	**100.00**	14.28	0.00	**75.00**	8.69
Large (5th quintile)	12.50	5.00	**70.00**	0.00	0.00	17.64	0.00
Panel C: ($MRPUR^C / MRPUR^{NC}$) > 1							
Ram and Dec							
All	46.57	33.07	**71.42**	43.79	42.85	37.50	**82.11**
Small (1st quintile)	35.29	18.18	**100.00**	**61.90**	33.33	**50.00**	**78.26**
Large (5th quintile)	**56.25**	45.00	**50.00**	46.93	**50.00**	35.29	**80.95**
Muh and Jan							
All	46.57	38.58	30.95	**82.84**	**57.12**	23.07	21.95
Small (1st quintile)	**52.94**	36.36	40.00	**78.57**	0.00	37.50	21.73
Large (5th quintile)	18.75	40.00	20.00	**83.67**	0.00	35.29	9.52
Ram and Jan							
All	23.28	**53.54**	**54.76**	**70.07**	**78.57**	**63.46**	**100.00**
Small (1st quintile)	35.29	**81.81**	**60.00**	**71.42**	**66.67**	**81.25**	**100.00**
Large (5th quintile)	18.75	**60.00**	**50.00**	**77.55**	**100.00**	**64.70**	**100.00**

Note: The Table shows a simple percentage where the ratio of coinciding (C) to non-coinciding (NC) observations is more than (or less than for SD) 1. For example, 47.94% of Bangladeshi firms have higher returns in the month of Ramadan when Ramadan coincides with December; that is 35 out of 73 firms have a ratio of $Mean^C/Mean^{NC}$ which is greater than 1. Emboldened numbers show where the percentage of firms is more than or equal to 50% of the total sample. Hence for Jordan 71.42% (in bold) of firms have higher returns when Ramadan coincides with December (that is, 71.42% of firms had a coinciding (C) to non-coinciding (NC) ratio of greater than 1). Small refers to the portfolio of firms that are small relative to other firms (the firms are in the first quintile of the sample firms for more than 13 years) and Large refers to large firms in terms of their size (the firms are in the last quintile of the sample firms for more than 13 years).

Table 4: Estimation results for the EGARCH (1,1) model: Mean equation of daily returns

$$R_{jt} = \mu_j + a_j R_{jt-1} + a_{2j} RM_{t-1} + a_{3j} S_{t-1} + b_{1j} Muh_t + b_{2j} Ram_t + b_{3j} Jan_t + b_{4j} Dec_t + c_{1j} Ram_t \times Dec_t + c_{2j} Muh_t \times Jan_t + c_{3j} Ram_t \times Jan_t + D_j Z_t + \varepsilon_{jt}$$

	H_a	All Firms				Small Firms				Large Firms			
Variables		**Mean**	**SD**	**%$^+$**	**Sign test**	**Mean**	**SD**	**%$^+$**	**Sign test**	**Mean**	**SD**	**%$^+$**	**Sign test**
R_{jt-1}	≠0	-0.0459	0.0496	16.14	-18.62$^+$	-0.0442	0.0541	24.22	-5.83$^+$	-0.0353	0.0354	9.63	-9.38$^+$
RM_{t-1}	≠0	0.4460	0.4101	89.68	21.82$^+$	0.3633	0.4144	84.38	7.78$^+$	0.5954	0.3933	97.78	11.10$^+$
S_{t-1}	<0	0.1227	0.2223	70.24	11.13	0.2942	0.3631	85.16	7.95	-0.0205	0.0803	25.19	-5.77$^+$
μ_j	≠0	-0.0900	0.1393	25.26	-13.60$^+$	-0.1040	0.1726	28.91	-4.77$^+$	-0.0416	0.0816	31.11	-4.39$^+$
Muh	<0	0.0102	0.1354	57.28	4.00	0.0190	0.1423	58.59	1.94	0.0057	0.0546	54.07	0.95
Ram	>0	-0.0089	0.0927	45.90	-2.25	-0.0091	0.1129	50.00	-0.00	-0.0078	0.0590	45.19	-1.12
Jan	>0	0.0079	0.0922	51.19	0.65	0.0167	0.1103	53.91	0.88	-0.0003	0.0722	45.93	-0.95
Dec	>0	0.0036	0.1100	50.00	0.00	0.0158	0.1541	60.94	2.47$^+$	-0.0019	0.0591	45.19	-1.12
Ram × Dec	>0	-0.0205	0.3869	46.30	-2.04	-0.0150	0.4242	42.19	-1.77	-0.0220	0.2663	40.74	-2.15
Muh × Jan	>0	-0.0328	0.3383	43.92	-3.35	-0.0557	0.4235	48.44	-0.35	-0.0153	0.2726	41.48	-1.98
Ram × Jan	>0	0.0744	0.3331	56.22	3.42$^+$	0.0092	0.3738	40.63	-2.12	0.1077	0.3021	62.96	3.01$^+$
AFC	≠0	-0.0483	0.1774	38.49	-6.33$^+$	-0.0845	0.1962	36.72	-3.00$^+$	-0.0219	0.0890	40.74	-2.15$^+$
GFC	≠0	-0.0240	0.1315	40.87	-5.02$^+$	-0.0101	0.1570	49.22	-0.18	0.0000	0.1024	44.44	-1.29
EDC	≠0	-0.0094	0.1200	46.43	-1.96$^+$	-0.0069	0.1471	50.78	0.18	-0.0004	0.0677	51.85	0.43
Sep-11	≠0	0.0323	0.1345	59.26	5.09$^+$	0.0369	0.1457	63.28	3.00$^+$	0.0049	0.0770	51.11	0.26
AW	≠0	0.0269	0.2636	59.79	5.38$^+$	0.0178	0.2549	61.72	2.65$^+$	0.0517	0.1674	62.22	2.84$^+$
IW	≠0	0.1373	0.4390	63.36	7.35$^+$	0.1313	0.6449	59.38	2.12$^+$	0.1150	0.3032	59.26	2.15$^+$
AS	≠0	-0.0039	0.1239	49.21	-0.44	-0.0209	0.1477	49.22	-0.18	-0.0154	0.0822	43.70	-1.46
PTE	≠0	-0.0087	0.1903	44.44	-3.05$^+$	0.0016	0.3278	42.97	-1.59	-0.0226	0.1022	45.93	-0.95
Dec + Ram × Dec	>0	-0.0169	0.3903		-1.05	0.0008	0.4164		-1.41	-0.0239	0.2756		-1.12
Jan + Muh × Jan	>0	-0.0248	0.3272		-3.49	-0.0390	0.4259		-0.18	-0.0156	0.2757		-2.50
Jan + Ram × Jan	>0	0.0822	0.3210		4.69$^+$	0.0259	0.3418		-0.80	0.1074	0.3025		3.36$^+$

Note: This summary table shows the estimation results for all firms, small firms and large firms for the mean equation. Z_t is the set of control factors which include dummy variables representing the Asian Financial Crisis (AFC), the Global Financial Crisis of 2008 (GFC), the Euro debt crisis (EDC), the 9/11 attack (Sep-11), Afghanistan war (AW), Iraq war (IW), the Arab spring (AS) and political and terrorism events (PTE). In addition to dummy variables, control factors in the mean equation include the lag return (R_{jt-1}), lagged stock market return (RM_{t-1}) as well as the return differences between small and large firms (S_{t-1}). "Mean" shows the average of coefficients and "SD" shows the standard deviation from the distribution of the coefficients across the sample firms. "%Sig" refers to the percentage of coefficients which are significant at 5 percent level while "%$^+$" implies the percentage of coefficients which are positive. "Sign test" reports the sign test statistics and $^+$ indicates that our alternative hypothesis shown in column "H_a" cannot be rejected at the 0.05 significance level.

Table 5: Estimation results for the EGARCH (1,1) model: Variance equation of daily returns

$$\log(h_{jt}) = \theta_j + \alpha_j \left[\frac{|\varepsilon_{jt-1}|}{\sqrt{h_{jt-1}}} - \sqrt{\frac{2}{\pi}} \right] + \beta_j \log(h_{jt-1}) + \gamma_j \frac{\varepsilon_{jt-1}}{\sqrt{h_{jt-1}}} + \psi_{1j} Muh_t + \psi_{2j} Ram_t + \psi_{3j} Jan_t + \psi_{4j} Dec_t + \delta_{1j} Ram_t \times Dec_t + \delta_{2j} Muh_t \times Jan_t + \delta_{3j} Ram_t \times Jan_t + \Gamma_j Z_t$$

Variables	H_a	All Firms				Small Firms				Large Firms			
		Mean	SD	%-	Sign test	Mean	SD	%-	Sign test	Mean	SD	%-	Sign test
θ_j	≠0	0.1863	0.7914	37.70	6.76^{+}	0.3327	0.9491	27.34	5.13^{+}	0.0554	0.2999	53.33	-0.77
$[\varepsilon_{it-1} / \sqrt{h_{it-1}} - \sqrt{2/\pi}]$	≠0	4.2747	73.5578	0.00	27.49^{+}	1.5205	3.3560	0.00	11.31^{+}	0.7999	1.1800	0.00	11.62^{+}
$\varepsilon_{it-1} / \sqrt{h_{it-1}}$	≠0	1.8096	35.3580	23.81	14.40^{+}	0.3520	1.4921	18.75	7.07^{+}	0.1235	0.4797	37.04	3.01^{+}
$\log(h_{it-1})$	≠0	0.8470	0.1349	0.13	27.42^{+}	0.7862	0.1851	0.00	11.31^{+}	0.8896	0.0830	0.00	11.62^{+}
Muh	<0	-0.0012	0.1629	45.63	2.40	0.0187	0.2839	47.66	0.53	0.0124	0.0387	32.59	4.04
Ram	<0	-0.0794	0.1987	86.24	-19.93^{+}	-0.0742	0.2445	82.81	-7.42^{+}	-0.0731	0.1552	89.63	-9.21^{+}
Jan	>0	0.0018	0.2897	51.06	-0.58	-0.0199	0.4685	54.69	-1.06	0.0074	0.0546	36.30	3.18^{+}
Dec	<0	-0.0644	0.2281	77.38	-15.06^{+}	-0.1145	0.4129	74.22	-5.48^{+}	-0.0414	0.1339	77.04	-6.28^{+}
Ram × Dec	<0	0.0916	0.6996	32.67	9.53	0.1868	0.9590	26.56	5.30	0.0688	0.2615	33.33	3.87
Muh × Jan	>0	-0.0230	0.7006	49.21	0.44	-0.0351	1.1705	51.56	-0.36	-0.0052	0.1268	51.85	-0.43
Ram × Jan	>0	0.0410	0.7525	35.98	7.71^{+}	0.0319	0.9543	44.53	1.24	0.0495	0.1532	25.93	5.59^{+}
AFC	<0	0.0429	0.7051	27.38	12.44	0.0952	0.9024	35.94	3.18	0.0551	0.2088	14.81	8.18
GFC	<0	0.0357	0.7491	31.88	9.96	0.0750	1.2812	32.81	3.89	0.0031	0.4144	20.74	6.80
EDC	<0	0.1866	1.0627	57.41	-4.07^{+}	0.4529	1.7531	48.44	0.35	-0.0307	0.1030	74.81	-5.77^{+}
Sep-11	<0	0.2077	1.3550	57.94	-4.36^{+}	0.3305	1.6874	57.03	-1.59	0.0636	0.3752	65.19	-3.53^{+}
AW	<0	-0.1145	1.3993	42.20	4.29	-0.2620	1.7220	49.22	0.18	0.0290	0.2338	35.56	3.36
IW	<0	0.0415	1.2554	57.28	-4.00^{+}	0.1952	1.8186	47.66	0.53	-0.0191	0.1712	63.70	-3.18^{+}
AS	<0	0.0047	0.5132	44.84	2.84	0.1372	0.5763	46.88	0.71	0.0152	0.0779	41.48	1.98
PTE	<0	0.0168	0.4183	43.78	3.42	-0.0052	0.5850	46.09	0.88	-0.0120	0.1492	51.85	-0.43
Dec + Ram × Dec	<0	0.0272	0.6639		5.24	0.0723	0.9399		2.30	0.0274	0.3012		0.77
Jan + Muh × Jan	>0	-0.0212	0.6602		1.24	-0.0550	1.1877		0.35	0.0022	0.1185		0.95
Jan + Ram × Jan	>0	0.0428	0.7101		7.64^{+}	0.0120	0.9898		1.06	0.0569	0.1720		5.94^{+}

Note: This summary table shows the estimation results for all firms, small firms and large firms for the variance equation. Z_t are control factors which include dummy variables representing the Asian Financial Crisis (AFC), the Global Financial Crisis of 2008 (GFC), the Euro debt crisis (EDC), the 9/11 attack (Sep-11), Afghanistan war (AW), Iraq war (IW), the Arab spring (AS) and political and terrorism events (PTE). "Mean" shows the average of coefficients and "SD" shows the standard deviation from the distribution of the coefficients across the sample firms. "%Sig" refers to the percentage of coefficients which are significant at 5 percent level while "%-" refers to the percentage of coefficients which are negative. "Sign test" reports the sign test statistics and $^{+}$ indicates that our alternative hypothesis shown in column "H_a" cannot be rejected at the 0.05 significance level.

Table 6: Estimation results for the EGARCH (1,1) model: Country Results (Mean equation of daily returns)

$$R_{jt} = \mu_j + a_j R_{jt-1} + a_{2j} RM_{t-1} + a_{3j} S_{t-1} + b_{1j} Muh_t + b_{2j} Ram_t + b_{3j} Jan_t + b_{4j} Dec_t + c_{1j} Ram_t \times Dec_t + c_{2j} Muh_t \times Jan_t + c_{3j} Ram_t \times Jan_t + D_j Z_t + \varepsilon_{jt}$$

Variables	H_a	Bangladesh		Indonesia		Jordan		Malaysia		Morocco		Pakistan		Turkey	
		Mean	Sign test	Mean	Sign test	Mean	Sign test	Mean	Sign test	Mean	Sign test	Mean	Sign test	Mean	Sign test
R_{jt-1}	≠0	-0.0133	-4.33^{+}	-0.0375	-6.83^{+}	-0.0001	1.09	-0.0775	-16.31^{+}	-0.0240	-2.14^{+}	-0.0130	-0.78	-0.0493	-10.73^{+}
RM_{t-1}	≠0	0.2228	7.14^{+}	0.2834	7.36^{+}	0.0055	2.03^{+}	0.5483	15.10^{+}	0.0988	-2.67^{+}	0.3668	5.88^{+}	0.7719	11.09^{+}
S_{t-1}	<0	0.0026	1.29	0.0297	0.62	-0.0374	-2.97^{+}	0.1838	12.44	-0.0044	-1.60	0.0516	0.78	0.2819	8.93
μ_j	≠0	0.0106	1.05	-0.0511	-3.28^{+}	-0.0291	-2.03^{+}	-0.1091	-10.63^{+}	-0.0123	-1.07	-0.0364	-3.53^{+}	-0.2217	-10.55^{+}
Muh	<0	-0.0351	-0.82	-0.0053	-2.04^{+}	-0.0009	1.09	0.0215	4.11	0.0073	0.00	-0.0011	0.39	0.0415	5.50
Ram	>0	0.0016	0.59	-0.0261	0.27	0.0263	1.09	0.0014	-1.69	0.0068	-1.60	0.0034	2.16^{+}	-0.0444	-5.86
Jan	>0	-0.0155	-0.59	-0.0265	-3.10	0.0404	2.97^{+}	0.0142	0.00	-0.0046	-1.07	0.0326	2.55^{+}	0.0130	1.53
Dec	>0	0.0110	0.82	0.0068	1.33	0.0120	-0.47	-0.0128	-2.54	0.0079	-1.07	0.0128	0.39	0.0212	2.07^{+}
Ram × Dec	>0	0.0012	0.59	0.1333	0.98	-0.0108	-1.09	-0.1634	-6.04	-0.0803	-1.07	-0.0220	-0.98	0.1313	4.42^{+}
Muh × Jan	>0	0.0618	-0.59	0.0288	0.80	0.0185	-0.78	-0.0396	-1.33	-0.0113	-0.53	-0.1935	-4.51	-0.0210	-1.89
Ram × Jan	>0	0.0249	1.29	0.0686	0.62	-0.0428	-1.72	0.0799	2.54^{+}	0.0142	1.07	0.0264	-1.18	0.1836	4.78^{+}
AFC	≠0	-0.0627	-3.86^{+}	-0.0393	-2.57^{+}	-0.0034	-0.78	-0.0702	-5.32^{+}	0.0295	1.60	-0.0360	-0.39	-0.0343	-1.89
GFC	≠0	-0.0503	-3.39^{+}	-0.0270	-2.75^{+}	-0.0127	-2.03^{+}	-0.0240	-0.85	-0.0109	-2.14^{+}	0.0235	1.37	-0.0505	-5.14^{+}
EDC	≠0	-0.0521	-4.33^{+}	-0.0169	0.80	0.0202	1.41	-0.0171	-3.75^{+}	-0.0096	-1.60	-0.0243	-1.18	0.0435	4.06^{+}
Sep-11	≠0	-0.0623	-5.50^{+}	0.0256	-0.80	0.0050	-1.09	0.0542	7.49^{+}	0.0346	2.67^{+}	0.0026	-1.37	0.0807	7.48^{+}
AW	≠0	0.0277	3.86^{+}	-0.0589	0.44	0.0839	2.03^{+}	0.0554	4.95^{+}	0.0125	-1.07	0.0672	2.35^{+}	0.0003	-0.45
IW	≠0	0.2176	5.50^{+}	0.1890	3.28^{+}	0.1998	2.03^{+}	0.0192	2.17^{+}	0.2982	-1.07	0.2654	3.73^{+}	0.1519	3.16^{+}
AS	≠0	-0.0170	-0.35	-0.0004	-1.67	-0.0317	-0.47	0.0054	1.45	-0.0094	0.00	-0.0025	0.39	-0.0116	-1.35
PTE	≠0	0.0160	0.59	-0.0026	-2.04^{+}	0.0142	-0.16	-0.0220	-2.17^{+}	-0.0367	-1.60	0.0265	0.00	-0.0344	-2.07^{+}
Dec + Ram × Dec	>0	0.0121	0.59	0.1400	1.69^{+}	0.0013	-0.16	-0.1762	-6.77	-0.0725	-1.07	-0.0092	0.98	0.1524	4.96^{+}
Jan + Muh × Jan	>0	0.0463	-1.05	0.0023	-0.80	0.0589	-0.47	-0.0254	-0.60	-0.0159	-0.53	-0.1609	-4.31	-0.0080	-1.71
Jan + Ram × Jan	>0	0.0094	0.59	0.0421	0.09	-0.0024	-0.16	0.0942	3.50^{+}	0.0095	0.00	0.0590	0.00	0.1966	6.04^{+}

Note: This summary table shows the estimation results for individual countries for the mean equation. Z_t is the set of control factors which include dummy variables representing the Asian Financial Crisis (AFC), the Global Financial Crisis of 2008 (GFC), the Euro debt crisis (EDC), the 9/11 attack (Sep-11), Afghanistan war (AW), Iraq war (IW), the Arab spring (AS) and political and terrorism events (PTE). In addition to dummy variables, control factors in the mean equation include the lag return (R_{jt-1}), stock market return (RM_{t-1}) as well as the return differences between small and large firms (S_{t-1}). "Mean" shows the average of coefficients and "Sign test" reports the sign test statistics and $^{+}$ indicates that our alternative hypothesis shown in column "H_a" cannot be rejected at the 0.05 significance level.

Table 7: Estimation results for the EGARCH (1,1) model: Country Results (Variance equation of daily returns)

$$\log(h_{jt}) = \theta_j + \alpha_j\left[\frac{|\varepsilon_{jt-1}|}{\sqrt{h_{jt-1}}} - \sqrt{\frac{2}{\pi}}\right] + \beta_j \log(h_{jt-1}) + \gamma_j \frac{\varepsilon_{jt-1}}{\sqrt{h_{jt-1}}} + \psi_{1j} Muh_t + \psi_{2j} Ram_t + \psi_{3j} Jan_t + \psi_{4j} Dec_t + \delta_{1j} Ram_t \times Dec_t + \delta_{2j} Muh_t \times Jan_t + \delta_{3j} Ram_t \times Jan_t + \Gamma_j Z_t$$

Variance Equation	H_a	Bangladesh		Indonesia		Jordan		Malaysia		Morocco		Pakistan		Turkey	
		Mean	Sign test	Mean	Sign test	Mean	Sign test	Mean	Sign test	Mean	Sign test	Mean	Sign test	Mean	Sign test
θ_j	≠0	0.1303	1.76	0.6369	4.35^{+}	-0.2989	-3.59^{+}	0.2529	4.11^{+}	-0.1287	-1.07	-0.2263	-2.35^{+}	0.1523	9.47^{+}
$[\varepsilon_{jt-1} / \sqrt{h_{jt-1}} - \sqrt{2/\pi}]$	≠0	1.4544	8.54^{+}	20.3509	11.27^{+}	0.9446	6.40^{+}	1.4193	16.55^{+}	1.0883	3.74^{+}	0.4608	10.20^{+}	0.4080	11.09^{+}
$\varepsilon_{jt-1} / \sqrt{h_{jt-1}}$	≠0	0.3419	5.97^{+}	10.0628	3.99^{+}	0.3168	4.84^{+}	0.1273	6.40^{+}	0.2881	2.14^{+}	0.0826	5.29^{+}	0.0373	9.11^{+}
$\log(h_{jt-1})$	≠0	0.8678	8.54^{+}	0.7668	11.09^{+}	0.8431	6.40^{+}	0.8907	16.55^{+}	0.8286	3.74^{+}	0.8122	10.20^{+}	0.8533	11.09^{+}
Muh	<0	-0.0277	-3.16^{+}	-0.0171	1.15	-0.0169	0.78	0.0018	1.20	0.0051	1.07	0.0095	0.98	0.0196	3.70
Ram	<0	-0.1933	-7.61^{+}	-0.0704	-6.12^{+}	-0.1189	-4.22^{+}	-0.0494	-12.81^{+}	-0.2099	-3.21^{+}	-0.1060	-7.65^{+}	-0.0375	-7.66^{+}
Jan	>0	0.0155	-1.05	-0.0524	-0.09	-0.0575	-2.03	-0.0154	-2.42	-0.0953	-0.53	0.1317	2.75^{+}	0.0090	1.89^{+}
Dec	<0	-0.1230	-7.14^{+}	-0.2003	-7.54^{+}	0.0030	-2.65^{+}	-0.0338	-8.58^{+}	0.0538	0.00	-0.0307	-3.73^{+}	-0.0222	-6.40^{+}
Ram × Dec	<0	0.0904	0.58	0.3009	3.11	-0.0532	-0.47	0.0643	8.34	0.2893	2.14	-0.0306	1.57	0.0663	5.68
Muh × Jan	>0	0.0306	1.99^{+}	-0.1406	-2.93	0.1961	1.72^{+}	-0.0314	-0.24	0.1375	0.53	-0.0344	1.18	0.0036	0.63
Ram × Jan	>0	-0.0149	2.93^{+}	0.2837	5.23^{+}	-0.2952	-3.28	0.0593	5.92^{+}	0.0339	-0.53	-0.1478	0.39	0.0553	4.42^{+}
AFC	<0	0.1031	4.56	0.2498	5.94	0.0320	1.40	0.0800	13.89	0.2826	1.60	-0.3415	-2.16^{+}	0.0123	1.17
GFC	<0	0.1447	6.20	-0.1697	-0.26	0.4371	5.46	-0.0083	6.16	0.3858	1.60	0.1209	0.20	0.0355	7.12
EDC	<0	0.1591	5.03	0.7506	-1.51	-0.1108	-1.72^{+}	-0.0130	-2.90^{+}	-0.3594	-1.07	0.5466	2.94	-0.0783	-9.47^{+}
Sep-11	<0	0.4654	5.50	-0.2170	0.80	0.7176	6.40	-0.0667	-7.01^{+}	0.5655	3.21	1.4362	0.98	-0.1450	-11.09^{+}
AW	<0	-0.2810	0.12	0.0265	-0.62	0.0518	0.47	-0.0011	1.57	-0.1722	-1.07	-0.8098	-1.37	0.1254	10.19
IW	<0	-0.1582	-4.10^{+}	0.5544	2.93	-0.1681	-0.47	-0.1828	-8.69^{+}	-0.1573	-2.14^{+}	0.2534	1.57	0.0436	2.79
AS	<0	0.0505	4.10	0.1378	5.06	-0.1380	-1.40	-0.0150	-1.57	0.0871	2.14	-0.1075	-2.75^{+}	0.0171	3.70
PTE	<0	0.0361	1.99	-0.0374	2.21	-0.1159	-2.03^{+}	0.0473	2.66	-0.2074	-1.07	0.1033	4.12	-0.0101	-1.53
Dec + Ram × Dec	<0	-0.0325	-2.46^{+}	0.1006	-0.09	-0.0502	-1.09	0.0305	6.64	0.3431	2.14	-0.0614	0.78	0.0441	4.24
Jan + Muh × Jan	>0	0.0460	2.46^{+}	-0.1930	-1.86	0.1386	0.16	-0.0468	-0.97	0.0422	0.53	0.0973	2.94^{+}	0.0127	1.53
Jan + Ram × Jan	>0	0.0006	2.69^{+}	0.2313	4.70^{+}	-0.3527	-3.90	0.0439	4.59^{+}	-0.0614	-1.07	-0.0161	0.78	0.0644	7.12^{+}

Note: This summary table shows the estimation results for individual countries for the variance equation. Z_t is the set of control factors which include dummy variables representing the Asian Financial Crisis (AFC), the Global Financial Crisis of 2008 (GFC), the Euro debt crisis (EDC), the 9/11 attack (Sep-11), Afghanistan war (AW), Iraq war (IW), the Arab spring (AS) and political as well as terrorism events (PTE). "Mean" shows the average of coefficients and "Sign test" reports the sign test statistics and $^{+}$ indicates that our alternative hypothesis shown in column "H_a" cannot be rejected at the 0.05 significance level.