Business & Economic Review: Vol. 9, No. 3 2017 pp. 104-122
DOI: dx.doi.org/10.22547/BER/9.3.4

Islamic Calendar Anomalies: Evidence from Pakistan

Fatima Syed[1], Naimat U. Khan[2]

Abstract

This study investigates Islamic calendar anomalies in Pakistan Stock Exchange (PSX), using KSE-100 Index data over the period 1991-2014. The findings show significant volatility of stock returns during Islamic months of Safar, Rabbi-ul-Awwal and Zil-hajj. However, there is no evidence of abnormal returns in any Islamic month. These findings do not provide a compelling evidence of Islamic calendar anomalies in Pakistani market.

Keywords: *Anomalies, conditional volatility, efficient market hypothesis, Hijri calendar.*

1. Introduction

Anomalies are risk-returns combinations that are against the explanation of the efficient market hypothesis (EMH). Calendar anomalies exist because of the behavioral changes of the investors. Behavioral change or mood change can have influences on investment decisions of investors (Edmans, Garcia, & Norli, 2007; Al-Khazali, 2014). Positive and negative mood causes different reaction to the news and therefore investor's sentiment profoundly affects the trading of any stock market (Al-Hajieh, Redhead, & Rodgers, 2011). The US stock market provides evidence of the existence of anomalous behavior: that is trading is affected by behavior, moods, weather, holidays and religious events (Lee & Rui, 2002). These findings contradicts the efficient market hypothesis. In fact, Jensen (1978) argue

[1] *Institute of Management Studies, University of Peshawar. Email: fatimasyed15@yahoo.com*
[2] *Assistant Professor, Institute of Management Studies, University of Peshawar. Email: naimatims@yahoo.com*

ARTICLE HISTORY:			
5 February, 2017	Submission Received	15 February, 2017	First Review
20 February, 2017	Revised Version Received	1 March, 2017	Second Review
17 March, 2017	Revised Version Received	25 March, 2017	Accepted

that in the early years of the EMH, empirical tests did support the EMH but later it was challenged by the emergence of many market anomalies.

Literature shows that calendar anomalies are rigorously investigated in the both developed countries and emerging markets. Seasonality is a kind of anomaly which has been observed in the stock markets for decades now. Some of the anomalies examples are January effect (Lakonishok & Smidt, 1988); Half month effect (Ariel, 1987); Weekend effect (Rezvanian, Turk, & Mehdian, 2011); and month-of-the-year effect (Agrawal & Tandon, 1994).

People follow calendar according to their religions and cultural rituals. For example, Muslims follow Hijri calendar which is lunar based. Every new month starts with the sighting of the new moon. Hijri calendar is 10/11 days shorter than Gregorian calendar (Al-Hajieh et al., 2011; Halari, Tantisantiwong, Power, & Helliar, 2015); thus, Islamic months do not remain constant as they circulate throughout the year. The 12 Islamic (Hijri) months are: Muharram, Safar, Rabiul Awwal, Rabiul Thani, Jamatul Awwal, Jamatul Thani, Rajab, Shaban, Ramadan, Shawwal, Zil-Qad and Zil Hajj. From investment point of view different Islamic months play their role to describe the emotions of Muslims (Al-Hajieh et al., 2011). Every Islamic month has its own importance and different events occur during each month. A limited literature exists regarding anomalies in Hijri calendar in Pakistani market such as Husain (1998); Seyyed, Abraham, and Al-Hajji, (2005); Mustafa (2008); Shah, Rehman, and Ahmed (2014); and Halari et al. (2015).

The current research focuses on analyzing anomalous behavior on the KSE for a large sample of 24 years based on Hijri calendar. One of the contributions of this study is the analysis of full Hijri calendar of 12 months instead of looking for just Ramadan or Muharam effect as documented in the literature in Pakistani context (Husain, 1998; Seyyed et al., 2005; Mustafa, 2008). Though, Halari et al. (2015) analyses 12 Islamic months' Islamic calendar on the KSE using firm-level data of 106 companies; however, this study analyses the data of KSE-100 index which is more representative[3] of the whole market instead of focusing on specific industries. In addition to capture volatility for each Islamic month, more sophisticated

[3] *According to the official website of PSX (www.psx.com.pk), the KSE-100 index shows over 80% of total market capitalization of the PSX. For example, in year 2005, the KSE-100 index shows about 88% of total market capitalization (Khan, 2011).*

technique of GARCH (Generalized Autoregressive Conditional Heteroscedasticity) model is used for Pakistani data in comparison with simple OLS regression documented in past literature (Mustafa, 2008; Iqbal, Kouser, & Azeem, 2013). The results of the study can be used by investors to devise the 'timing' of their investment strategies based on the anomalous behavior of a particular month, if any. The remainder of the study is as follows. Section 2 provides background information of the KSE followed by literature review in section 3. Methodology is given in section 4 while analysis of the results is presented in section 5. The final section concludes the study.

1.1. Background of The Karachi Stock Exchange (KSE)

The equity market plays an important role in the economic development of a country. It helps in utilizing the financial resources of national and international investors in various sectors of a market. An equity market is considered as a measuring instrument which shows the general investment in the country (Hussain & Qasim, 1997). Pakistan is an appropriate sample for studying volatility in Islamic calendar as it is a Muslim dominated country with 97 percent of the population having faith in Islam (Halari et al., 2015). As the different holidays and investor's sentiments are more associated with Hijri calendar in comparison to Gregorian calendar. There were three main stock exchanges in Pakistan i.e., Karachi Stock Exchange (KSE), Lahore Stock Exchange (LSE) and Islamabad Stock Exchange (ISE).[4] The Karachi Stock Exchange (KSE, now Pakistan Stock Exchange, PSX; hereinafter PSX and KSE will be used interchangeably) is the most liquid and active exchange in Pakistan. There are approximately 560 national and international companies listed on the stock exchange with a market capitalization of $71 billion in 2014 (Halari et al., 2015). According to the official website of PSX, there are 558 listed firms with market capitalization of Rs.9,628,514.37 million at the end of 2016.

After the independence, Pakistan's first equity market – Karachi Stock Exchange – was established in September 1947 which was then integrated as a company limited in March 1949. The KSE was then comprised of 90 members and 5 listed companies with the paid-up capital of Rs.37 million. In 1950s KSE made

[4] *In January 2016, three of the stock exchanges were demutualized into a single stock exchange known as Pakistan Stock Exchange (PSX). The KSE-100 index is still used as prominent index/indicator for measuring the performance of PSX.*

progress and the listed companies rose to 81 with a paid-up capital of above one billion and market capitalization was approximately Rs.1.9 billion in 1960. During 1970s the stock market lost its momentum due to political instability, nationalization of economy and separation of Pakistan which resulted in the creation of Bangladesh (Khan, 2011). Nevertheless, the dependence on private companies restored the country's economy and brought international investors during 1990s. Until 1994, the KSE observed bullish trend, economy was growing and stocks were high but 1995 proved to be a disastrous year for Pakistani economy where the KSE crashed about 28% on local index (Hussain & Qasim, 1997). After the 9/11 event, the US granted financial support to the Government of Pakistan being an ally in the war on terror. Due to the funding in 2002 the stock market saw a tremendous increase and it lasted till 2004. At the start of 2005, the stock market was performing well. Whereas in March 2005, the KSE-100 Index reached to 10,303 index points which was the highest value points ever seen in the history of Pakistani market. From January 2005 to March 2005, a rise in the index points was observed and the volatility reached such a point that led to the sharpest fall and is termed as "KSE Crash of 2005" (Khan, 2011). Market capitalization dropped by $11 billion. The Index re-gained the value points on April 18th, 2005. The uncertain political environment and the global financial crisis of 2008-09 hit Pakistani markets hard and for precautions KSE implemented a floor to stop the trading in August 2008 (Akhtar & Khan, 2016). In the year 2008, a cap was also implemented in order to secure the investors against the higher variations in the share prices. The rising trend was later observed at the end of 2009 (Khan, Burton, & Power, 2011). The KSE has seen volatility over the past decades mainly due to economic and political instability (Khan et al., 2011).

The Figure 1 shows the data of KSE-100 index from 1991 to 2014 in terms of Hijri calendar equal to 1411 to 1435. The figure shows that smaller shocks are followed by smaller ones and higher are followed by higher ones. These fluctuations show volatility clustering in KSE-100 Index. The highest fluctuations are seen for the years 1418, 1419 and 1420. The figure clearly shows that variance of returns is not constant for the selected sample. The straight line for the period 1411 represents the absence of the data included for the sample (Nov 2nd, 1991). As for the period of 1429 (according to Gregorian calendar it was the year 2008) it shows the sharpest market crash in the KSE history. The straight line represents

the floor that was implemented by KSE from March to August 28th, 2008 to stop the further decline. During the crash, the KSE lost about $36.9 billion.

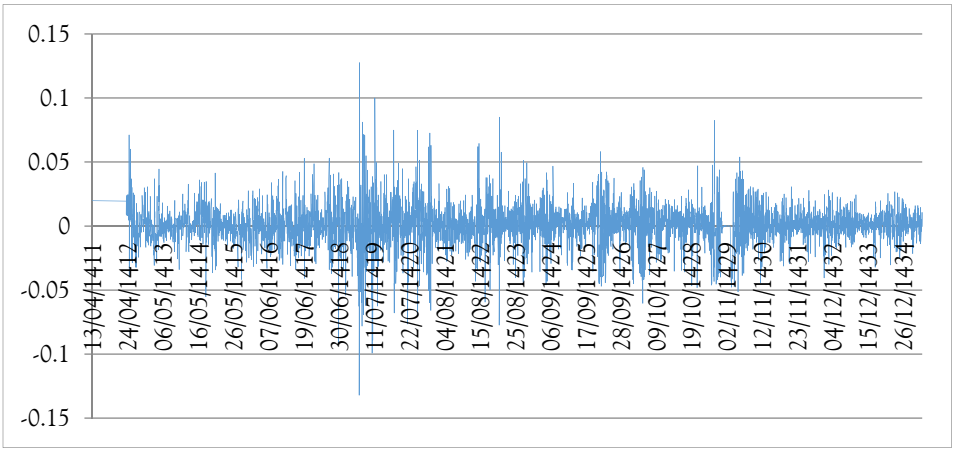

Figure 1: Returns Pattern of KSE from 1411 to 1435

Note: Figure shows the reaction of the information and the volatility for Islamic years and daily returns of the KSE. The date and years are plotted on the x-axis while mean returns are plotted against y-axis.

2. Literature Review

Fama (1965) presented the concept of Efficient Market Hypothesis (EMH) which suggests that the available information is reflected in the stock prices due to which the past prices lose their predictive nature for future prices. The theory suggests that random walk is applicable as long as information about past prices of the stocks cannot be used to gain abnormal profits. Anomalies are among one of the financial market features which is against EMH. The existence of anomalies increases the prediction ability of the investors and due to such reasons, they can easily outperform the market after adjusting for transaction cost. Investors become confident about the information they get about stock prices; hence nullifies the random walk assumption about stock prices.

Many researchers have studied anomalies arising in the stock market. Calendar or seasonal patterns are the ones which arise in time series data and occur once a year because of the calendar cycle. If there is an existence of any seasonal or calendar effect in the stock prices, then it leads to abnormal profits and investors capitalize on such opportunities. Such effects are against EMH theory. A market is said to be efficient when the information provided does not

have any effect on predictability of the stock prices and there is no opportunity for investors to outperform the market on the basis of risk-return adjustment (Marquering, 2002; Gu & Finnerty, 2002). Behavioral change or mood change has also an effect on the trading patterns. Positive mood brings a positive effect on trading and negative mood has negative implications (Edmans et al., 2007; Al-Hajieh et al., 2011; Al-Khazali, 2014).

The literature provides the evidence of the existence of the anomalies in both developed countries and emerging stock markets. Some of the prominent seasonal effects are: January effect (Gultekin & Gultekin, 1983; Ariel, 1987; Jaffe & Westerfield, 1988; Lakonishok & Smidt, 1988; Ligon, 1997; Fountas & Segredakis, 1999; Lee & Rui, 2002; Hepsen, 2012); May Effect (Gultekin & Gultekin, 1983; Iqbal et al., 2013); Half month effect (Ariel, 1987); Weekend effect (Lakonishok & Smidt, 1988; Poshakwale, 1996; Herwartz, 1999; Rezvanian et al., 2011; Kumar & Pathak, 2016); month-of-the-year effect (Agrawal & Tandon, 1994); and Weather Effect (Hirshleifer & Shumway, 2003).

There is extant literature regarding detection of seasonal anomalies in Hijri (Islamic) calendar as compared to Gregorian calendar anomalies (Husain, 1998; Seyyed et al., 2005; Mustafa, 2008; Al-Hajieh et al., 2011; Almudhaf, 2012; Shah et al., 2014; Al-Khazali, 2014; and Halari et al., 2015). The existence of seasonal patterns in the Islamic months is due to the occurrence of Islamic events at different time of the Hijri calendar. In 1930, Weber (1958) found a significant effect of religious beliefs on the economy of the country. Recently, Al-Ississ (2010) reported that religious beliefs do have an effect on trading patterns of stock exchange.

As for Hijri calendar the more pronounced anomalies are Ramadan effect and Muharram effect (Mustafa, 2008; Almudhaf, 2012; Al-Khazali, 2014). Ramadan is the 9th month of Islamic calendar, during which there is a change in normal routine of most of the Muslims. Muslims keep fasting where they do not eat and drink from dawn till dusk. Some Muslims perform *Umrah*[5] and most Muslims try to avoid sins or any other *haram*[6] activities i.e., gambling, speculation and interest-based trading etc. (Al-Ississ, 2010). The trading hours are reduced and some

[5] *Muslims visit Makkah (Saudi Arabia) to perform rituals.*
[6] *The term haram refers to all the activities that are forbidden by the religion of Islam (Al-Ississ, 2010).*

businesses operate after the *Iftaar*.[7] Due to such changes in the trading hours an effect is observed in the patterns of the stock market.

During Ramadan, excess money usage is observed for *Iftaar* preparation, buying of clothes and other presents for the *Eid*[8], and an increase in the usage of other utilities. In the last *Ashoura* (10-days) of Ramadan, some people use to pray in solitude i.e. *Aatikaf*. Restaurants are closed and working hours are kept short (Białkowski, Etebari, & Wisniewski, 2012). All these different activities lead to change in the behavior of investors in the month of Ramadan (Al-Ississ, 2010; Halari et al., 2015). Ramadan effect is when trading is affected by the behavior of the investors as they are socially and spiritually oriented towards religion, which lead to more optimism in their decisions (Al-Khazali, 2014).

Al-Ississ (2010) found a significant decrease in the volume of the trading shares by 0.33% on average for the month of Ramadan while analyzing 17 Muslim countries for 20 years (1988 to 2008). The results also showed an increase in daily returns in Ramadan and significant decrease in the month of Muharram (*Ashoura*).[9] Rezvanian et al. (2011) also studied Ramadan effect for the GCC market. The results showed that there were no significant differences in the returns of other months of the Hijri calendar but there was significant decline in the volatility of returns for the month of Ramadan (Seyyed et al., 2005). Similarly, Białkowski et al. (2012) examined 14 Muslim countries for the time span from 1989 to 2007. The results showed that stock returns were significantly higher for Ramadan as compared to other Islamic months and also less volatile. These results were not according to the figures of Seyyed et al. (2005) and Husain (1998). However, Białkowski et al. (2012) found Ramadan effect for Istanbul Stock Exchange for the time period from 1998 to 2011. Seyyed et al. (2005) conducted their study in six sectors of Saudi Arabian market for a sample from

---

[7] In Ramadan, Muslims tend to fast which is one of the five basic pillars of Islam. Breaking of fast at sunset is termed as Iftaar (Al-Ississ, 2010; Al-Khazali, 2014).

[8] Eid-Ul-Fitr is an Islamic ritual that is celebrated at the end of Ramadan as a token of reward for fasting during the whole month (Halari et al., 2015)

[9] This increase (decrease) for the month of Ramadan (Muharram) is because of the positive (negative) effect on the moods of the investors. Ramadan brings joy and peace, where as in the month of Muharram the event of Imam Hussain (R.A) death is a mourning period for the Muslims on the 10th of this month – Ashura (Al-Khazali, 2014). In addition, the Ashoura is remembered by both Sunni and Shia Muslims for different reasons. Sunnis remember this day on the liberation of Moses and Israiltes from Pharoah and his army and fast on this day by following the Sunnah of Muhammad (P.B.U.H) (Al-Ississ, 2010). However, Shia sect of Muslims remembers this day as a great sacrifice of Imam Husain (Grandson of Prophet, PBUH).

February 1985 to April 2000 using GARCH model to determine the volatility of weekly data. The results showed that weekly returns were not significantly different during Ramadan in comparison to other months. Although volatility was found significantly lower for four out of six sectors. The findings were in accordance with Husain (1998) who found a significant decrease in volatility in the month of Ramadan but was not able to find any effect on mean returns. Similarly, Al-Hajieh et al., (2011) analyzed Ramadan effect in Middle Eastern countries from 1996-2007. The results found a significant positive effect in the month of Ramadan for most of the Muslim countries. The author attributed this phenomenon to the positive investor mood and sentiment. The researcher documented that investment in the whole month of Ramadan may potentially be profitable if it covered transaction costs. In line with this finding, Almudhaf (2012) analyzed seasonal anomalies in 12 Muslim countries and documented significant effect of Islamic month. The author found positive significant returns for the month of Ramadan in Pakistan, Kuwait, Jordan and Turkey. More recently, Al-Khazali (2014) analyzed Ramadan effect in 15 Muslim countries using stochastic dominance (SD)[10] method from 1996-2012. The author found that, on average, there was presence of Ramadan effect in sample period. The author documented that risk averse investors will increase utility by switching from non-Ramadan to Ramadan, however, Ramadan does not outperform non-Ramadan from a wealth perspective.

In Pakistani stock market, calendar anomalies have been studied for quite some time such as Day-of-week-effect, Month-of-the-year-effect, End-of-the-month-effect, Half month effect and Islamic month effect (Iqbal et al., 2013). Husain (1998) was among the first studies to analyze the existence of anomalies in Islamic calendar in Pakistan. The author selected only Ramadan effect for the study over the period from 1989 to 1993 for 36 individual stocks from eight sectors. With the help of GARCH model, the author found that volatility was lower during Ramadan however it was not significant. In addition, the stock returns volatility had also fallen in this month. The author documented that the reasons can be because of low trading on the stock market and reduction of working hours. Similarly, Mustafa (2008) also conducted his study on the KSE for six out of 12 Islamic months using KSE-100 index data from the time period 1998-2004 – a longer time period as compared to Husain (1998) by taking KSE-100 Index points.

[10] *The method is based on assumption of non-normality of the data.*

The results showed that Ramadan effect does not exist but the returns increased significantly during this month. By taking risk factor as a dummy variable in one of the models,[11] he found significant Ramadan and Muharram effects in all the models; however, the Muharram effect was insignificant in one model only. The author also found that during the month of Ramadan, the KSE is quite risky which is against the findings of Husain (1998) and Seyyed et al. (2005). Most recently, Halari et al. (2015) analyzed firm-level data of 106 companies listed on the KSE for monthly data over the period 1995-2011. The authors used TGARCH model to capture volatility across 12 months of Islamic calendar. The results showed the highest average returns for the month of Ramadan, however, volatility was documented as second lowest for the same month. In addition, there was little evidence of seasonal anomaly on the basis of average returns along with significant volatility across Islamic months.

The current paper analyses the effect of Islamic calendar on stock returns of the KSE. This paper is a contribution to extant literature in Pakistan regarding Hijri calendar where only Ramadan effect was studied for five years for 36 equities data (Husain, 1998) or only six out 12 months for six-year index data (Mustafa, 2008). The current paper focuses on all 12 Islamic months for the existence of Hijri calendar anomalies by examining mean returns and volatility levels of index data for a larger sample of 24 years (1991-2014). Moreover, in comparison to monthly 106 firm-level data of Halari et al. (2015) for 16 years data (1995-2011), this study focuses on KSE-100 index which is more representative of the market – capture more than 80 percent of total market capitalization of the KSE. In addition, this study takes daily data instead of monthly data used by Halari et al. (2015).

3. Methodology

To test the calendar anomalies on share returns and volatility for the Islamic months, GARCH model is used to find the presence of volatility on the KSE-100 index (Seyyed et al., 2005; Nyamongo & Misati, 2010; Halari et al., 2015). Daily data of KSE-100 Index is used from November 2nd 1991 to June 19th 2014 i.e., 24

[11] *Mustafa (2008) used methodology of Ariel (1987), Lakonishok and Smidt (1988) and Jaffe and Westerfield (1989). Dummy variables were used for all the six Islamic months, risk factor was incorporated in the model as daily returns can be higher or lower and so the risk factor as well.*

years. Descriptive Statistics is used to show the overall pattern on the index returns (Husain, 1998; Seyyed et al., 2005; Halari et al., 2015). Generalized Autoregressive Conditional Heteroskedasticity (GARCH) is the extension of the ARCH model.[12] Bollerslev (1986) modified ARCH model because it requires a large number of parameters to access the volatility and has limited use. GARCH also focuses on historical returns to forecast volatility in a market. Similar to ARCH model, GARCH model gives more weight to the most recent returns and less weight is given to the older returns. This model belongs to the category of conditional volatility. The main purpose for the modification of ARCH was because of larger historical data and its effect on historical return was not explained efficiently.

Besides measuring volatility with the help of GARCH model, the mean equation values of GARCH model is used as a proxy of mean returns in a particular Hijri month (Halari, 2015; Akhtar and Khan, 2016). Monthly dummy variable is used to present each Hijri month. In order to control the issue of multicollinearity in the data, 11 dummies are used where intercept represents the 12^{th} month of Zil-Haj. Hence, the value of intercept (Zil-Haj) is the reference month to see the change in other months for both means returns and volatility.

To test the presence of heteroscedasticity in the residuals of KSE-100 Index, the Lagrange Multiplier (LM) test is used and to find any ARCH effect. In addition, stationarity is measured before applying GARCH model (Akhtar & Khan, 2016).

---

[12] *Autoregressive Conditional Heteroscedasticity (ARCH) model was developed by Engle (1982) which was later modified into GARCH by Bollerslev (1986). Stock markets are associated with the element of uncertainty and due to such uncertain circumstances; investors prefer to forecast the performance of the market (Alam, Siddikee, & Masukujjaman, 2013; Akhtar & Khan, 2016). The need for ARCH model development was because other models (such as Exponentially Weighted Moving Average, EWMA) are unable to calculate heteroscedasticity in time series data. Iqbal and Dheeriya (1991) suggested that any abnormal returns in the market are because of the market risk and their distribution has a constant variance but Giaccoto and Ali (1982) contradicted such assumptions and argued that abnormal returns can be because of heteroscedasticity which is due to non-constant variance. Akgiray (1989) put forward the evidence of US market that if heteroscedasticity is ignored then the tests produce statistically insignificant and inconsistent results. For such purposes, the ARCH and the GARCH models are developed to find the presence of heteroscedasticity in the market (Corhay & Rad, 1996). ARCH model does not consider variance constant.*

4. Analysis and Results

4.1. Descriptive statistics

Table 1 shows the summarized form of descriptive statistics for a sample of 24 years for 12 months of Islamic calendar.

Table 1: Descriptive Statistics

Months	Mean	Std. Dev	MAX	MIN	Skewness	Kurtosis
Muharram	0.000373	0.013506	0.039	-0.050	-0.617942	4.695097
Safar	-0.000677	0.020359	0.12	-0.132	-0.347335	11.00624
Rabbi-ul-Awwal	0.001203	0.018279	0.085	-0.078	0.079750	7.297699
Rabbi-us-Sani	0.000351	0.014623	0.070	-0.062	-0.102773	6.112316
Jamad-ul-Awwal	0.001156	0.015069	0.071	-0.060	0.135776	5.901848
Jammad-us-Sani	0.000497	0.016303	0.082	-0.099	-0.957396	11.08320
Rajjab	0.0000830	0.015851	0.100	-0.076	0.254609	7.916576
Sha'ban	0.0000192	0.014573	0.064	-0.062	-0.276742	5.163351
Ramadan	0.002351	0.013051	0.040	-0.053	-0.290853	4.293520
Shawwal	0.000683	0.014936	0.074	-0.070	-0.099488	6.504214
Zil-Qad	0.000956	0.013494	0.051	-0.046	0.033587	4.904113
Zil-Hajj	0.000413	0.013935	0.039	-0.024	-0.448285	5.143588

Note: The above table shows the descriptive statistics of 24 years' data sample for the Hijri calendar. Mean is equally weighted average of the daily data of KSE-100 index. Standard deviation (Std. Dev), minimum (Min) and maximum (Max) is provided.

Table 1 shows that the daily returns for the month of Ramadan are the highest 0.23% (0.002351). This finding is similar to Al-Ississ (2010); Akrami, Garkaz, and Mehrazin (2012); Białkowski et al. (2012) and Halari et al. (2015) and confirms a tentative presence of Ramadan effect. The reason behind the increase in daily returns in the month of Ramadan is the positive mood of investors which uplifts the trading in stock exchange (Al-Ississ, 2010; Al-Khazali, 2014); for investors this month turned to be good for the investment. In addition, the Table shows that the second highest mean return is found for Rabbi-ul-Awwal i.e., 0.12% and the third highest mean return is for the month of Jamad-ul-Awwal (0.1156%). The lowest positive mean return is documented for the month of Sha'ban. The reason behind decrease in daily returns for Sha'ban can be that Muslims buy food items, clothes and other commodities for the coming month of Ramadan due to which investors do not invest much in the stock market (Al-

Ississ, 2010). Moreover, the highest standard deviation is for the month of Safar[13] having a value of 2.03% (0.020359) and the only month which shows negative mean returns. Skewness shows the overall pattern of returns which gives some indication about whether to invest in a particular month or not. When the skewness shows more asymmetric tail towards the positive values, the investor prefers to invest more and vice versa. The results show positively skewed returns for four months (Rabbi-ul-Awwal, Jammad-ul-Awwal, Rajjab and Zil-Qad) and have negatively skewed returns for the remaining eight months – Muharram, Safar, Rabbi-us-Sani, Jammad-us-Sani, Sha'ban, Ramadan, Shawwal and Zil-Hajj. This shows that the returns are not normally distributed across Islamic calendar and investment should take place in the four positively skewed months. The statistics of kurtosis suggests that all the values are higher and greater than critical value of normality (i.e., 3) due to which the distribution has fat tails and high peaks at mean points (Halari et al., 2015). Such variation in the data suggests that the data is leptokurtic and has an extreme peak. More observations in the tail justify the use of the GARCH model as an appropriate model for capturing volatility (Halari et al., 2015).

4.2. Test of stationarity

We run some preliminary tests to validate the assumptions of GARCH model such as stationarity and heteroscedasticity. Augmented Dickey–Fuller (ADF) test is used for measuring stationarity of twelve months over the period of 1991-2014. The results[14] show that index returns of all twelve months are stationary at 1% level of significance. The presence of stationarity validates the use of GARCH model for analysis.

4.3. Test of heteroscedasticity

We use LM test (Engle, 1982) to find ARCH effects for KSE-100 Index. The null hypothesis is that returns of Islamic months have no ARCH effect. The rejection of null hypothesis refers the presence of heteroscedasticity on the KSE at 1% level of significance. The existence of non-constant variance

[13] *There is superstition about the month of Safar that it brings hardships and difficulties; however, the researchers did not find any such evidence from Islamic teachings.*
[14] *The results are available on demand.*

(heteroscedasticity) would lead to application of GARCH model. The results[15] show that p-values of LM test statistics are significant for all months (except Rajjab) at 1% level which refers that heteroscedasticity exists in index returns of these months. Hence, we can use GARCH model for our analysis. The seventh month of Rajjab does not show ARCH Effect as reflected by insignificant P-value; therefore, it is not suitable to apply GARCH model for measuring volatility.

4.4. The results of GARCH model

Based on the result of heteroscedasticity, we cannot run GARCH model for the Rajjab due to non-existence of heteroscedasticity for this month. The findings of the 11 months are given in Table 2. The Table presents the statistics of mean equation and volatility for 11 months (except Rajjab) along with their respective p-value at 5% significance level. The coefficients of both ARCH and GARCH terms are significant with values of 0.316653 and 0.725309 at 5% level of significance.

Table 2: The Results of GARCH model

Month	Mean Equation	P-values	Volatility	P-values
Muharram	-0.029486	0.757	-0.0764873	0.698
Safar	-0.1149133	0.183	0.8441917	0.000
Rabbi-ul-Awwal	0.0068382	0.939	0.754835	0.000
Rabbi-us-Sani	-0.0784597	0.399	0.1213151	0.533
Jammad-ul-Awwal	-0.0302678	0.738	0.0910424	0.64
Jammad-us-Sani	-0.0251022	0.767	0.2921815	0.133
Sha'ban	-0.0852355	0.364	0.1655072	0.395
Ramadan	0.078579	0.413	-0.087022	0.658
Shawwal	-0.0353848	0.704	0.1455724	0.468
Zil-Qad	0.0522324	0.562	-0.1330408	0.493
Zil-hajj	0.1342765	0.047	2.298626	0.000
ARCH	0.316653	0.000		
GARCH	0.725309	0.000		

Note: The above table summarizes the 24 years data of KSE-100 index to check the volatility level and returns of mean equation during the Islamic months. The significance level is provided by respective p-value at 5% level of significance.

[15] *The results are available on demand.*

Table 2 shows that the volatility is statistically significant at 5% level of significance for only three months i.e., Safar, Rabbi-ul-Awwal and Zil-hajj. The most volatile month for the above analysis is Safar, which is consistent with the finding of the highest standard deviation for the same month of Table 1. The coefficient of Safar month is 0.8441917 in comparison to reference month (Zil-Hajj, used as intercept). It means that Safar is 0.844 percent more volatile than 2.29 percent volatility for the month of Zil-Hajj.[16] The effect of Safar continues in the following months a well where the second volatile month is Rabbi-ul-Awwal. Rabbi-ul-Awwal is considered as month of happiness as well as of grief because Prophet (P.B.U.H) was born and has passed away in the same month. The reason behind the increase in the level of volatility can be because of the event of *Eid Milad-Nabi*.[17] This is one sentiment. As a reference category and intercept, the month of Zil-hajj has significant volatility with value of 2.298%. The reason can be that Muslim investors take out money to perform *Hajj* (Pilgrimage) and make booking in advance and buy cattle for *Eid-ul-Azah*[18] few days before celebrating the *Eid*.

The statistics of mean equation of Table 2 do not show significant value for any Islamic month. Seven months show negative coefficients and four months have positive coefficients including Ramadan; however, none of them has significant p-value at 5% level. It refers that investors do not get extra profit while exploiting anomalies on the basis of Islamic months.

We did not find significant mean equation and volatility for the month of Ramadan.[19] Though, the volatility has decreased having a negative value of -0.087022, however, it is not significant. These findings are not accordance with Husain (1998) of Pakistani market, Seyyed et al. (2005) of Saudi Arabian stock market and Rezvanian et al. (2011) for GCC countries. These results show that Ramadan effect do not exist on the KSE which is according to the findings of Mustafa (2008).

---

[16] The results of other months should be interpreted in similar way while using the volatility of Zil-Hajj as reference category (i.e., intercept in this case have a value of 2.29 percent).

[17] Eid Milad- Nabi is the third Eid celebrated by the Muslims all over the world as the birth day of beloved Prophet Muhammad (P.B.U.H) (Al-Ississ, 2010).

[18] Eid-ul-Azah is commemorated in the memory of Hazart Ibrahim (A.S) and Hazrat Ismail (A.S) (Al-Ississ, 2010). As a ritual, Muslims slaughter animals on this day.

[19] These statistics do not support the results of descriptive statistics where the highest daily returns are documented for the month of Ramadan (see Table 1).

5. Conclusion

This paper studies the existence of calendar anomalies in the Pakistan Stock Exchange. For this purpose, GARCH model is applied on the KSE-100 Index to capture volatility and mean returns across 12 Islamic months over a period 1991-2014.

The results of descriptive statistics show that mean returns for Islamic months vary across full calendar. During some months, higher returns are observed. However, mean equation of GARCH model show insignificant values of returns for all months including Ramadan. Hence, the current study does not find evidence of Ramadan effect which are consistent with Mustafa (2008). The results of GARCH model show that Safar is the most volatile month followed by Rabbi-ul-Awwal and Zil-Hajj.

The results show non-existence of anomalies in Islamic calendar which implies that investors cannot earn abnormal returns while investing on the basis of Islamic months. The significant values of volatility for three months need further elaboration to tease out the reasons behind this anomalous behavior in these Islamic months. The reasons can be best judged with the help of using primary data collection related to the perception of investors about the particular behavior of these months. Future research can be done to gauge these volatilities across PSX sectors to get further insights.

References

Agrawal, A., & Tandon, K. (1994). Anomalies or illusions? Evidence from stock markets in eighteen countries. *Journal of international Money and Finance*, *13*(1), 83-106.

Al-Ississ, M. (2010). *The impact of religious experience on financial markets*. Working Paper, Harvard Kennedy School of Government.

Al-Hajieh, H., Redhead, K., & Rodgers, T. (2011). Investor sentiment and calendar anomaly effects: A case study of the impact of Ramadan on Islamic Middle Eastern markets. *Research in International Business and Finance*, *25*(3), 345-356.

Al-Khazali, O. (2014). Revisiting fast profit investor sentiment and stock returns during Ramadan. *International Review of Financial Analysis*, *33*, 158-170.

Almudhaf, F. (2012). The Islamic calendar effects: Evidence from twelve stock markets. *International Research Journal of Finance and Economics*, *87*, 185–191.

Akgiray, V. (1989). Conditional heteroscedasticity in time series of stock returns: Evidence and forecasts. *Journal of business*, 55-80.

Akrami, H., Garkaz, M., and Mehrazin, A. (2012). The effect of Ramadan month on stocks abnormal return of the companies accepted in Tehran Stock Exchange. *Journal of Economics and Finance Review*, *2*(5), 45-51.

Akhtar, S., & Khan, N. U. (2016). Modeling volatility on the Karachi Stock Exchange, Pakistan. *Journal of Asia Business Studies*, *10*(3), 253-275.

Alam, M. Z., Siddikee, M. N., & Masukujjaman, M. (2013). Forecasting volatility of stock indices with ARCH model. *International Journal of Financial Research*, *4*(2), 126-143.

Ariel, R. A. (1987). A monthly effect in stock returns. *Journal of Financial Economics*, *18*(1), 161-174.

Białkowski, J., Etebari, A., & Wisniewski, T. P. (2012). Fast profits: Investor sentiment and stock returns during Ramadan. *Journal of Banking & Finance*, *36*(3), 835-845.

Bollerslev, T. (1986). Generalized autoregressive conditional heteroskedasti city. *Journal of Econometrics*, *31*(3), 307-327.

Corhay, A., & Rad, A. T. (1996). Conditional heteroskedasticity adjusted market model and an event study. *The Quarterly Review of Economics and Finance*, *36*(4), 529-538.

Edmans, A., Garcia, D., & Norli, Ø. (2007). Sports sentiment and stock returns. *The Journal of Finance*, *62*(4), 1967-1998.

Engle, R. F. (1982). Autoregressive conditional heteroscedasticity with estimates of the variance of United Kingdom inflation. *Econometrica: Journal of the Econometric Society*, *50*(4), 987-1007.

Fama, E. F. (1965). The behavior of stock-market prices. *The Journal of Business*, *38*(1), 34-105.

Fountas, S., & Segredakis, K. N. (1999). *Emerging stock markets return seasonalities: The January selling effect and the tax-loss selling hypothesis*. Department of Economics, University College Galway.

Gu, A. Y., & Finnerty, J. (2002). The evolution of market efficiency: 103 years' daily data of the Dow. *Review of Quantitative Finance and Accounting, 18*(3), 219-237.

Gultekin, M. N., & Gultekin, N. B. (1983). Stock market seasonality: International evidence. *Journal of Financial Economics*, *12*(4), 469-481.

Hepsen, A. (2012). Calendar anomalies and Turkish real estate investment trusts. *International Journal of Economics and Finance*, *4*(3), 230-236.

Herwartz, H. (1999). Weekday dependence of German stock market returns. *Applied Stochastic Model in Business and Industry, 16*, 47-71.

Hirshleifer, D., & Shumway, T. (2003). Good day sunshine: Stock returns and the weather. *The Journal of Finance*, *58*(3), 1009-1032.

Halari, A., Tantisantiwong, N., Power, D. M., & Helliar, C. (2015). Islamic calendar anomalies: Evidence from Pakistani firm-level data. *The Quarterly Review of Economics and Finance*, *58*, 64-73.

Husain, F. (1998). A seasonality in the Pakistani equity market: The Ramadhan effect. *The Pakistan Development Review*, *37*(1), 77-81.

Hussain, F., & Qasim, M. A. (1997). The Pakistani equity market in 50 years: a review. *The Pakistan Development Review*, 863-872.

Iqbal, Z., & Dheeriya, P. L. (1991). A comparison of the market model and random coefficient model using mergers as an event. *Journal of Economics and Business*, *43*(1), 87-93.

Iqbal, M. S., Kouser, R., & Azeem, M. (2013). Conventional and Islamic anomalies in Karachi Stock Exchange. *Science International*, *25*(4), 999-1007.

Jaffe, J., & Westerfield, R. (1989). Is there a monthly effect in stock market returns? Evidence from foreign countries. *Journal of Banking & Finance*, *13*(2), 237-244.

Jensen, M. C. (1978). Some anomalous evidence regarding market efficiency. *Journal of Financial Economics*, *6*(2-3), 95-101.

Khan, N. U., (2011). *Dividend policy and the stock market reaction to dividend announcement in Pakistan*. Doctoral dissertation, University of Dundee.

Khan, N. U., Burton, B. M., & Power, D. M. (2011). Managerial views about dividend policy in Pakistan. *Managerial Finance*, *37*(10), 953-970.

Kumar, S., & Pathak, R. (2016). Do the calendar anomalies still exist? Evidence from Indian currency market. *Managerial Finance*, *42*(2), 136-150.

Lakonishok, J., & Smidt, S. (1988). Are seasonal anomalies real? A ninety-year perspective. *Review of Financial Studies*, *1*(4), 403-425.

Lee, B. S., & Rui, O. M. (2002). The dynamic relationship between stock returns and trading volume: Domestic and cross-country evidence. *Journal of Banking & Finance*, *26*(1), 51-78.

Ligon, J. A. (1997). A simultaneous test of competing theories regarding the January effect. *Journal of Financial Research*, *20*(1), 13-32.

Marquering, W. (2002). Seasonal predictability of stock market returns. *Review of Business and Economics*, *47*(4), 557-576.

Mustafa, K. (2008). *The Islamic calendar effect on Karachi stock market*. Paper presented at the 8th International Business Research Conference, Dubai, UAE.

Nyamongo, M. E., & Misati, R. (2010). Modelling the time-varying volatility of equities returns in Kenya. *African Journal of Economic and management studies*, *1*(2), 183-196.

Poshakwale, S. (1996). Evidence on weak form efficiency and day of the week effect in the Indian stock market. *Finance India*, *10*(3), 605-616.

Rezvanian, R., Turk, R., & Mehdian, S. M. (2011). *Investors' reaction to sharp price changes in GCC Markets*. Midwest Finance Association 2012 Annual Meetings Paper.

Seyyed, F. J., Abraham, A., & Al-Hajji, M. (2005). Seasonality in stock returns and volatility: The Ramadan effect. *Research in International Business and Finance*, *19*(3), 374-383.

Shah, S. M., Rehman, A., & Ahmed, S. N. (2014). The Ramadan effect on stock market. *European academic research*, *1*(11), 4712-4720.

Weber, M. (1958). The Protestant Ethic and the Spirit of Capitalism: The relationships between religion and the economic and social life in modern culture. *Anthony Giddens, trans. Talcott Parsons (New York: Charles Scribner's Sons, 1976)*.