

CONVENTIONAL VS. ISLAMIC FINANCE: THE IMPACT OF RAMADAN UPON SHARIA-COMPLIANT MARKETS

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Abstract. *The Islamic financial industry is growing at a rate 50% faster than that of conventional banking and is expected to be worth USD 2.1 trillion by the end of 2014. This rapid growth and institutionalization of an alternative financial market highlights a growing need to further investigate Sharia-compliant markets and how they compare with their conventional market counterparts. This paper investigates this broad relationship by focusing on the effects of Ramadan upon the performance of Sharia-compliant financial instruments. Specifically, we utilize an event-study methodology to compare the performance of Sharia-compliant stocks to their conventional counterparts across a large sample of countries and regions. We find strong evidence for a significant Ramadan effect within Muslim majority countries and regions. The effect is strongest in the days leading up to Ramadan, and also around the beginning of Ramadan's third Ashra on the 20th day. This timing reflects the mental, emotional and practical preparations that individuals go through during the course of the month-long observance. These results are not consistent with traditional economic expectations and therefore reflect the unique socially-embedded nature of this emerging and religiously inspired financial system.*

Key words: *Islamic finance, Sharia, Ramadan, event study, calendar anomalies*

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1. Introduction

"I don't just want London to be a great capital of Islamic finance in the Western world, I want London to stand alongside Dubai and Kuala Lumpur as one of the great capitals of Islamic finance anywhere in the world."

-David Cameron, British Prime Minister, October 2013

The Islamic financial industry is growing at a rate 50% faster than that of traditional banking and is expected to be worth USD 2.1 trillion in total investment capital by the end of 2014 (Ghosh, 2013). The quote above from the 2013 World Islamic Forum held in London called global attention to the rise of Islamic finance as a transnational phenomenon whose reach has begun to extend beyond the Muslim majority emerging market context. Cameron's announcement that the United Kingdom may issue *sukuk* bonds that are compliant with Sharia (Islamic law), is the first time the use of such financing has been considered by a Western country. At the same time, there are those who doubt the feasibility, long-term potential, and sincerity of Islamic finance to prosper on a global scale (e.g., Barnes, 2013).

This rapid growth and spread of an alternative financial model calls attention to a need to investigate the behavior of Sharia-compliant markets and how they may differ from their conventional counterparts. Just after the Prime Minister made the announcement above, we had the opportunity to interview two leaders in Islamic finance from Malaysia. One of the participants is an expert from a prominent university and the other is the CEO of a major bank. As they spoke about Islam as a holistic life system that includes rules for business and finance, the question of operations during the Islamic holy month of Ramadan was raised. The university professor said he suspected that the market would slow down each year during the month. He indicated that "key decisions would not be made," because "senior decision makers may not be bothered during Ramadan." In contrast, the bank president stated, "We manage money for investors... No investor is going to accept the excuse that we were tired because we are fasting". This difference in opinion caught our attention.

While Islamic business systems may be becoming more mainstream, management scholarship thus far has paid limited attention to the possible implications for financial organizations participating in markets whose rules and foundations may be unfamiliar to them (Micklethwait & Wooldridge, 2009; Tracey, 2012). Differences in religion and resulting socio-cultural practices may be a source of conflict as investors from different backgrounds participate in international investment activities (Crittenden & Crittenden, 2010; El-Ansary, 2005; McCleary & Barro, 2006). To this end, and with the aforementioned debate in mind, this paper examines the performance of both Sharia-compliant and conventional capital markets during the Islamic holy month of Ramadan. The study includes data from both the emerging markets where Islam is prominent as well as from non-Muslim countries with Islamic stock listings. While our analyses support prior findings that there is indeed a "Ramadan Effect" (e.g., Bialkowski, Etebari,

& Wisniewski, 2012), we highlight that this effect varies according to the context in which the trading occurs and whether or not the stock is compliant with religious law.

2. Literature Review

The Islamic finance industry has seen tremendous growth over the last few decades within emerging economies. Newly created financial instruments such as Islamic bonds and Islamic mortgage (*murabaha*) are increasingly common offerings in even the most traditional financial services organizations. In 2008, PriceWaterHouseCoopers estimated that this industry was worth USD 720 billion with a growth rate of 15-20% annually. However, despite growing interest in Islamic finance, there are very few empirical studies that have investigated the performance of Islamic equity investing.

An understanding of the differences between Islamic and conventional financial practices is necessary in order to evaluate the possible implications of the interface of between these two models for financial markets. El Gamal (2000) summarizes these differences as the prohibition of usury (interest), the inability to invest in certain prohibited industries, the centrality of the 'real economy' in investment decisions, and the importance of risk (or gain) sharing in investment relationships under Islam. These differences will be explored in more detail below as they are reflected in the regulation of these financial markets and the importance of Ramadan. However, it should be clear that a financial market that is not based on interest and risk might offer challenges to those unfamiliar with these rules.

In this paper we investigate how investors and markets may respond to the month-long set of observances and rituals that constitute the holy month of Ramadan. There have been studies in finance on calendar anomalies such as the January effect (Haugen & Lakonishok, 1987), the Weekend effect (French, 1980) and the Turn of the Month effect (Cadsby & Ratner, 1992). The existing literature also includes investigations of certain ethnic and religious festivals such as Chinese New Year, the Jewish High Holy Days of Rosh Hashanah and Yom Kippur, and St. Patrick's Day (Cadsby & Ratner, 1992; Chan, Khanthavit, & Thomas, 1996; Frieder & Subrahmanyam, 2004). Following in this tradition, this paper examines Sharia-compliant stock performance during the holy month of Ramadan, the ninth month of the Islamic calendar. This calendar, also known as the *Hijri* calendar, contains 12 months that are based on the motion of the moon and only has 354 days per year compared to 365 days in Gregorian calendar. According to Islamic principles, during the 30 days of Ramadan, Muslims must abstain from eating, drinking, and sensual pleasures from sunrise until sunset. Apart from controlling these desires, Muslims are also encouraged to read the Islamic holy book, *The Quran*, to perform extra prayers, to strengthen the bonds among family and friends, and to refrain from doing evil.

Conceptually, the potential impact of Ramadan upon financial markets may be attributed to its effect on investors' reasoning and emotional state during this observant period. Previous studies conducted within Muslim majority countries have

demonstrated that general stock returns are significantly higher during the Ramadan period (Bialkowski et al., 2012; Al-Khazali, 2014). These authors argue that Ramadan promotes heightened social awareness and a closer relationship to Allah (God) and with other Muslims, thus encouraging optimistic beliefs. Intense religious observance during Ramadan leads to an increase in perceived social support and happiness among the observant. This combination of psychological factors may affect investor sentiment and decision-making thereby leading to price run-ups. Furthermore, other studies also show a significant decline in volatility (Seyyed, Abraham, & Al-Hajji, 2005; Husain, 1998). As one example, researchers have found that loan defaults and other negative economic actions are less likely to occur during the holy month (Baele, Farooq & Ongena, 2012).

However, all of these studies have employed simple methodologies with limited samples and focused only on the performance of the general stock market during the entire month of Ramadan without examining the three distinct 10-day phases (*Ashras*) of the religious observance. Furthermore, no previous study has differentiated between the conventional market and the growing Sharia-compliant Islamic financial market. This paper extends this body of research by employing a sophisticated event-study methodology with a much larger sample to compare Sharia-compliant stocks to their conventional market counterparts in daily time increments before, during and after Ramadan. Using an event-study analysis allows us to investigate daily market movements during the three Ashras of Ramadan, which include Ashra #1–The Days of Mercy (*Rahmat*); Ashra #2–The Days of Forgiveness (*Maghfirat*); and Ashra #3–The Days of Salvation (*Nijaat*). Each of these Ashras is categorized by a unique set of remembrances, requirements, challenges, emotions and opportunities. Previous studies have treated Ramadan as a single calendar event, which fails to recognize the embedded rhythms of the month-long religious observance.

Islamic finance follows Islamic (Sharia) law where money cannot create or produce more money. It strictly acts as a medium of exchange or storing value, but not for the goal of making excessive profit. As a result, investors cannot earn interest (*riba'*) on money they lend nor be required to pay it on money they owe (El Gamal, 2000). This is significantly different from conventional finance where interest is an fundamental operating principal. Islamic principles also mandate that any financial activities are free from ambiguity (*gharar*) and speculation or gambling (*maysir*). Thus, Islamic finance prohibits any transactions that have a high degree of uncertainty regarding the content or outcome. Therefore, the trading of futures, warrants, options and short-selling is prohibited as it involves speculative activities with significant uncertainty (Ayub, 2009). In comparison, conventional finance has incorporated ambiguity as a form of risk and investors are rewarded based on amount of risk they are willing to take. Thus, the more ambiguous the transaction, the higher the return investors must expect. Another difference is that Islamic finance prohibits any investments in non-productive or potentially harmful activities such investment in pork, alcohol, fire arms, adult

entertainment or gambling industry (El Gamal, 2000). Finally, Islamic finance operates based upon risk (profit or loss) sharing. Since interest is prohibited, suppliers of funds become investors, rather than creditors and debtors are replaced by entrepreneurs. The investor and the entrepreneur will then share business risk in return for shares of profits and losses (Iqbal & Mirakhor, 2011). Conversely, creditors in conventional finance do not necessarily share business risk with debtors. Creditors receive a fixed return regardless of the debtor's business performance.

Sharia-compliant financial instruments

Sharia-compliant securities are an emergent and increasingly important category within Islamic Finance that gives Muslims the opportunity to invest in products that conform to religious requirements. Sharia-compliant bonds (*sukuk*), Islamic insurance (*takaful*), and Islamic contracts (*ijarah*) are all religiously sanctioned financial instruments that have been historically available to the world's Muslims, however, Sharia-compliant stocks and indicies are a relatively new form of ethical investment opportunity. These securities are selected using a negative screening process to exclude specific industries or companies. Furthermore, Sharia-compliant stocks also have to undergo additional religious testing to ensure that the stocks follow Sharia rules and principles. For example, Sharia-compliant firms must not be engaged in conventional banking or any other interest-related activities that utilize conventional lending or brokerages. Additionally, they must not be in businesses relating to non-productive and potentially harmful activities as mention above (El Gamal, 2000).

The screening process, done by members of the Sharia board of Islamic scholars, involves two stages: the industry test and the financial tests. The industry test is intended to remove corporations that are involved in prohibited (*haram*) industries while the second screening is based on financial ratios intended to remove corporations based on debt and interest income levels (Dow Jones, 2013). Companies that generate interest income or incur interest expense below certain benchmarks are classified as compliant, but the interest-earned income, *riba'*, needs to be quantified and purified by distributing it to suitable charities. The Sharia board may also establish a charitable fund for cleaning purposes (Delorenzo, 2000).

All of these factors help facilitate growing Muslim demand to invest in accordance with their religious observances. This is all the more important considering Muslims represent nearly a quarter of the world's population. This community includes many first time investors potentially interested in Sharia-compliant stocks as well as others who have invested in the funds and will likely invest more. This fast-expanding base of investors consists of three main groups: first, the existing markets which include the Gulf Cooperation Council (GCC) Countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates) and Malaysia; second, countries with large Muslim populations such as Indonesia, Pakistan, and India; and finally, developed market countries with small and wealthy Muslim populations such as US and Europe

(PWC, 2008). Beyond population and demographic measures, the tremendous growth of Sharia-compliant indices around the world shows that there is an increasing demand for such funds.

3. Data and Methods

Data Collection

We collected daily closing price and volume data for the selected indices through the Bloomberg database. These indices are characterized into two broad categories, The “Regional Indices” and the “Country Indices” where the “Regional Indices” represent a specific region while the latter represent specific countries. We then divided the “Country Indices” into two categories: “The Muslim Majority Countries” and “The Non-Muslim Majority Countries”. We defined Muslim majority countries as countries with a Muslim population of at least 60% of the country’s total population. To be included, a country also had to have at least one Sharia- Compliant index and a conventional index with at least five years of data. Additionally, both the Sharia-compliant index and conventional index had to be denominated in a local currency for comparison. Countries that did not meet these criteria were dropped. As for regional indices, we only used the Pan Arab region, as it was the only region with a composite index and an overall Muslim majority in all participating countries. Figure 1 illustrates how the data set was structured.

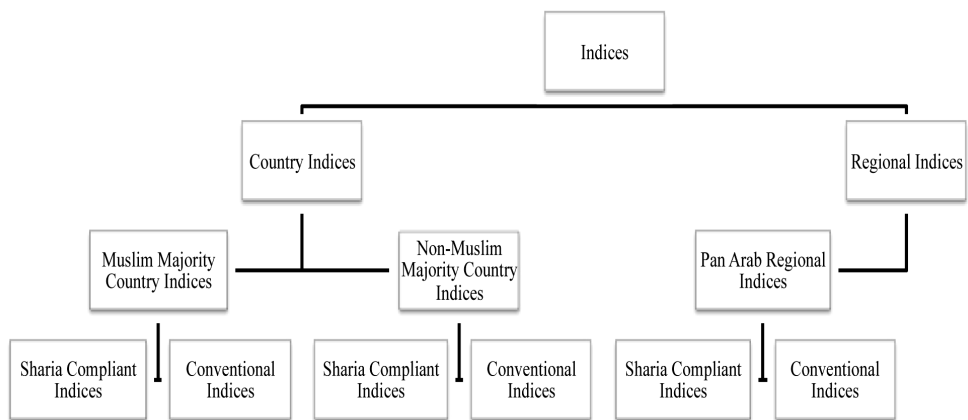


FIGURE 1: Map of Index Hierarchy Used In Data Collection

Each country and region has only one conventional index but may have multiple Sharia-compliant stock indices. We used the Morgan Stanley Capital International (MSCI) Country Index and MSCI Regional Index as the benchmark for our conventional index. These MSCI indices are widely used both in practice and within the financial literature (Hau, Massa & Peress, 2010; Darrat, Li, Liu & Su, 2011). Table 1 shows the indices included in the dataset.

TABLE 1: List of Muslim Majority, Non-Muslim, and Regional Indices

Muslim-Majority Country Stock Indices

Index Name	Bloomberg Ticker	Country	Index Type	Currency	Start Date	End Date
FTSE Bursa Malaysia EMAS Shariah Index	FBMS	Malaysia	Shariah	MYR	7/1/99	1/6/14
FTSE Bursa Malaysia Hijrah Shariah Index	FMBHS	Malaysia	Shariah	MYR	7/1/99	1/6/14
Dow Jones Islamic Market Malaysia Titans 25 Index	DJMY25	Malaysia	Shariah	MYR	1/1/04	1/6/14
S&P Kuwait Domestic Shariah Index	SPSHDKWL	Kuwait	Shariah	KWD	12/1/08	1/6/14
Dow Jones Islamic Market Kuwait Index	DJIMKW	Kuwait	Shariah	KWD	1/2/05	1/6/14
S&P UAE Domestic Shariah Index	SPSHDAEL	UAE	Shariah	AED	12/1/08	1/6/14
Dow Jones Dubai Financial Market Index	DJDFM	UAE	Shariah	AED	12/31/03	1/6/14
S&P Qatar Domestic Shariah Index	SPSHDQAL	Qatar	Shariah	QAR	12/1/08	1/6/14
S&P Bahrain Domestic Shariah Index	SPSHDBHL	Bahrain	Shariah	BHD	12/1/08	1/6/14
S&P Oman Domestic Shariah Index	SPSHDOML	Oman	Shariah	OMR	12/1/08	1/6/14
S&P Saudi Arabia Domestic Shariah Index	SPSHDSAL	Saudi Arabia	Shariah	SAR	12/1/08	1/6/14
Dow Jones Islamic Market Turkey Index	DJIMTR	Turkey	Shariah	TRY	1/1/03	1/6/14
MSCI Malaysia Index	MXMY	Malaysia	Conventional	MYR	1/3/95	1/6/14
MSCI Kuwait Index	MXKW	Kuwait	Conventional	KWD	6/1/05	1/6/14
MSCI United Arab Emirates (UAE) Index	MXAE	UAE	Conventional	AED	6/1/05	1/6/14
MSCI Qatar Index	MXQA	Qatar	Conventional	QAR	6/1/05	1/6/14
MSCI Bahrain Index	MXBH	Bahrain	Conventional	BHD	6/1/05	1/6/14
MSCI Oman Index	MXOM	Oman	Conventional	OMR	6/1/05	1/6/14
MSCI Saudi Arabia Domestic Index	MXSAD	Saudi Arabia	Conventional	SAR	6/1/05	1/6/14
MSCI Turkey Index	MXTR	Turkey	Conventional	TRY	1/2/95	1/6/14

Non-Muslim Majority Country Stock Indices

Index Name	Bloomberg Ticker	Country	Index Type	Currency	Start Date	End Date
FTSE SET Shariah Index	FSTSH	Thailand	Shariah	THB	4/23/09	1/6/14
FTSE TWSE Taiwan Shariah Index	TWSH	Taiwan	Shariah	TWD	11/12/08	1/6/14
FTSE Shariah Japan 100 Index	SJPN	Japan	Shariah	JPY	7/30/07	1/6/14
Dow Jones Islamic Market US Index	IMUS	United States	Shariah	USD	1/1/96	1/6/14
MSCI Thailand Index	MXTH	Thailand	Conventional	THB	1/2/95	1/6/14
MSCI Taiwan Index	TAMSI	Taiwan	Conventional	TWD	1/2/95	1/6/14
MSCI Japan Index	MXJP	Japan	Conventional	JPY	1/2/95	1/6/14
MSCI USA Index	MXUS	United States	Conventional	USD	1/2/95	1/6/14

Pan Arab Region Stock Indices

Index Name	Bloomberg Ticker	Country	Index Type	Currency	Start Date	End Date
S&P Pan Arab Composite Shariah Index	SPSHPA	Pan Arab/GCC	Shariah	USD	3/2/09	1/6/14
S&P Pan Arab Investable Shariah Index	SPASPU	Pan Arab/GCC	Shariah	USD	12/1/08	1/6/14
S&P GCC Investable Shariah Index	SPSHGI	GCC	Shariah	USD	10/9/08	1/6/14
Dow Jones Islamic Market GCC ex-Saudi Index	DJIGCCX	GCC	Shariah	USD	5/28/08	1/6/14
Dow Jones Islamic Market GCC Index	DJIGCC	GCC	Shariah	USD	12/31/03	1/6/14
Dow Jones Islamic Market MENA Index	DJIMENA	MENA	Shariah	USD	12/31/08	1/6/14
MSCI GCC Countries Index	MXGCC	GCC	Conventional	USD	6/1/05	1/6/14

Pan Arab Region Indices Include: Bahrain, Egypt, Jordan, Kuwait, Lebanon, Morocco, Oman, Qatar, Saudi Arabia, Tunisia, and UAE

In order to investigate a possible Ramadan effect, we first converted our data from the Gregorian calendar to the Islamic calendar. We used the official Ramadan start and end times published by the Malaysian Department of Islamic Development for all of our indices given its prominent role in the regulation of Islamic Finance worldwide (JAKIM, 2013).

Event Study Methodology

To achieve our objective of studying the idiosyncratic rhythms of Ramadan, we needed a methodology that allowed us to observe daily market movements. An event study methodology focuses on the abnormal return of stock prices on days around an event (i.e. 2013 Ramadan in Saudi Arabia) and then averages abnormal returns by day across multiple events. Therefore, this methodology allows us to analyze the effect of the first day of Ramadan for each year, country, and index.

For event i of all I total events, the abnormal return for time t can be expressed as AR_{it} and is some component of the indices' actual return, R_{it} , or the daily percent change in an indices' price. Averaging all abnormal returns across events for each individual t around an event gives the average abnormal return for an event for time t . Thus, $t = 0$ for the day Ramadan begins, $t = 1$ for the first day of Ramadan, and $t = -1$ for the day before Ramadan begins. Event studies are conducted over an event window, or time preceding and proceeding an event where index prices capture the event during the event window. If the event window spans from $T1$ days preceding the event to $T2$ days following the event, then the event window spans $T = T2 - T1 + 1$ days total. The event window is intended to capture any abnormal deviations from an event. To estimate abnormal returns, a normal return must be estimated. This involves using an estimation window immediately preceding the event window that does not capture a stock price variation due to an event. The estimation window runs from $T0$ to $T1 - j$ days before an event, where j is at least one to ensure the event window and estimation window do not overlap. The estimation window is then $T_{est} = T1 - j - T0 + 1$ days long. For our analysis we utilized four different estimation windows ranging from one to four months prior to Ramadan to reduce the potential for error due to growth differences, country differences, or some other unobserved yearly difference. The use of different estimation windows only strengthens the robustness of our results¹.

Estimating abnormal returns involves estimating a normal stock return which is the expected return if either the event did not occur or the stock did not react to an event. An abnormal return is then the difference of a stock's actual return minus the expected normal return; this may be either positive (the stock performed better than predicted), or negative. We use two common methods to calculate expected normal returns. The first is the mean returns method where the expected return is average return of a stock during the estimation window preceding the event, or

$$R_{it}^N = R_i^N = \frac{1}{T_{est}} \sum_{t=T0}^{T1-j} R_{it} \quad (1)$$

where R_{it}^N is the normal return for the stock used in event i and is time invariant. This method compares each stock index to itself pre- and post- Ramadan. These results are listed as *Sharia-Compliant Stock Indices* and *Conventional Stock Indices* in Tables 2, 3 and 4.

¹ See Mackinlay (1997) for a thorough description of using and performing event studies in economics.

The second method for calculating the expected normal return is a multivariate regression market model outlined in Fama, Fisher, Jensen, and Roll (1969). A regression is run for all separate events to find how a Sharia-compliant index returns are a function of the market returns, or conventional (non-Sharia index) returns in our case. The expected normal return is then

$$R_{it}^N = \hat{\alpha}_i + \hat{\beta}_i R_t^M \quad (2)$$

where R_t^M is the conventional market return, and $\hat{\alpha}_i$ and $\hat{\beta}_i$ are the estimated OLS coefficients by regressing the stock return of Sharia-Compliant index in Ramadan-year i on the conventional market return during the estimation window. The coefficients explain how the Sharia-compliant index moves with the conventional index during normal times. This relationship is then extrapolated to predict normal returns during Ramadan. This method compares not only an index pre- and post-Ramadan, but also compares a Sharia-compliant index to a conventional index. These results are listed as *Sharia-Compliant & Conventional Stock Indices Comparison* in Tables 2, 3 and 4.

Abnormal returns are then estimated to be the difference of the actual return for stock i at time t minus the expected normal return for the stock at that time. More formally,

$$AR_{it} = R_{it} - R_{it}^N \quad (3)$$

$$VAR(AR_i) = \frac{1}{(T_{est} - 2)} \sum_{t=0}^{T1-j} AR_{it}^2$$

After each abnormal return is calculated, the average abnormal return, AAR_t , is calculated as the mean of AR_{it} across all I events, or

$$AAR_t = \frac{1}{I} \sum_{i=1}^I AR_{it} \quad (4)$$

$$VAR(AAR) = \frac{1}{I^2} \sum_{i=1}^I VAR(AR_i)$$

where AAR_t is tested to be significant using test statistics derived by the square root of $VAR(AAR)$. The average abnormal return gives insight if there is any single day during Ramadan where all indices experience significant abnormal returns.

The parametric estimation of abnormal returns from Equation (4) assumes a normal distribution of abnormal returns, which has been shown to be very strict when using daily stock prices. As an alternative, two nonparametric tests are commonly used to

verify the results from the parametric tests. The rank test and the sign test for abnormal returns are assumption-free about the distribution of stock returns and are used as a robustness check for Equation (4).

The rank test was first proposed by Corrado (1989) and tests the whether the average rank of all abnormal returns at time t is significantly different than the null hypothesis of the middle given there are no abnormal returns. It involves creating a ranking order of abnormal returns across time for all N events. If the event window is $T = T2 - T1 + 1$ days long, we create a ranking system for each event ranging from 1 to T with 1 being the lowest abnormal return in the event window for that event and T being the largest abnormal return for that event. We define K_{it} as that rank for event i at time t . The test statistic at time t for the rank test, θ_t^{Rank} is normally distributed and is expressed as

$$\theta_t^{\text{Rank}} = \frac{1}{I} \sum_{i=1}^I (K_{it} - \frac{T+1}{2}) / s(K) \quad (5)$$

$$s(K) = \sqrt{\frac{1}{T} \sum_{t=T1}^{T2} (\frac{1}{I} \sum_{i=1}^I (K_{it} - \frac{T+1}{2}))^2}$$

The sign test is based on the sign of the abnormal return and assumes under the null hypothesis of no abnormal returns that a negative abnormal return is no more likely than a positive abnormal return for any given event. This test examines if the proportion of negative abnormal returns to positive abnormal returns is significantly different than one-to-one; the expected proportion under the null hypothesis of no abnormal returns. The test statistic at time t for the sign test, θ_t^{Sign} is normally distributed asymptotically and can be written as in Equation (6) below. The results from the sign test are listed in the column *Pos/Neg* in Tables 2, 3 and 4 and are given by the count of negative/positive abnormal returns with stars for significance assigned using the test statistic from the sign test given by

$$\theta_t^{\text{Sign}} = \left[\frac{\sum_{i=1}^I S_{it}}{I} - 0.5 \right] \frac{\sqrt{I}}{0.5} \quad (6)$$

$$S_{it} = \begin{cases} 1 & \text{if } AR_{it} < 0 \\ \text{zero} & \text{otherwise} \end{cases}$$

Lastly, Doukas and Travlos (1988) outline a type-I error test to determine if the number of significant positive or negative abnormal returns is larger than the expected number of significant returns expected by a type-I error. In this case, we test if the

number of significant positive (negative) abnormal returns differs than the expected number if there are no abnormal returns present since a type-I error is falsely rejecting the null hypothesis of no abnormal returns when the null hypothesis is indeed correct. The type-I error test statistic is given in Equation (7) below and can be found in the column *Pos**/Neg*** in Tables 2, 3, and 4. This column in these tables gives the count of negative and positive significant abnormal returns (at a 95% confidence level) and each count is assigned stars for significance using the type-I error test statistic calculated as

$$Z_i = \frac{s - qr}{\sqrt{q(1-q)r}} \quad (7)$$

where q is the probability of a type I error (0.05), s is the number of statistically significant positive/ negative abnormal returns at the 95% level, and r is the total number of abnormal returns.

Therefore, the event study methodology allows us several unique tools we can use to analyze the embedded rhythms of Ramadan. First of all, we can analyze the average abnormal returns by day relative to the start of Ramadan. This means that we are able to look at all index returns across all national and regional contexts (Muslim majority countries, Pan Arab Region, and non-Muslim majority countries) by day to determine the precise movements of the markets in response to the different phases of activity (pre-Ramadan, Phase-1, Phase-2, Phase-3, and post-Ramadan). This is an important advancement in our ability to understand the impact of Ramadan, which is not a single-day event, but which encompasses more than an entire month. Second, we can also estimate the direction of the market using the rank test and the sign test. These analytical tools allow us to investigate the positive or negative daily movement of the market in response to these different phases. Furthermore, the robustness of tests we conduct are meant to eliminate any possibility of bias one test or another may contain. Average abnormal returns, the rank test, and the sign test are conducted over the entire sample of Ramadan-years to prevent any possibility of a single Ramadan having an unobserved event. While something unobserved and unaccounted for in the data may occur during a single Ramadan that may cause abnormal returns to be observed, this is very unlikely to happen during all of the years and would be considered white noise that cancels out to zero when averaging over all Ramadan-years and over several countries.

It should also be noted that while cumulative abnormal returns are also typically used in event study methodology, our theoretical foundations suggest that certain days or periods of Ramadan yield different market outcomes. Cumulative abnormal returns, which track the cumulative effect of an event over several days, cannot distinguish individual daily effects as do abnormal returns. As such, we do not include the cumulative abnormal returns in this paper, but they can be provided upon request.

4. Results and Discussion

It has been established that Ramadan is a significant religious and cultural observance that affects the returns and volatility of markets in comparison to other months of the year. Our results suggest a more complex phenomenon that is composed of distinct periods of significant activity throughout the month-long religious observance. These distinct phases may correspond with different phases during the month of Ramadan. We will first present the results from the Muslim majority countries, before moving to the results from the Pan Arab region and the non-Muslim majority countries. Within each section, we will discuss the significant findings and trends and then present an interpretation of the findings. We conclude with a discussion of contributions and future directions.

Muslim Majority Countries

The result that becomes immediately apparent from the data is that there is indeed a Ramadan effect for all types of investments (conventional and Sharia-compliant) as previously demonstrated. However, by using the event study methodology we find the effect occurs at distinct phases within the month of Ramadan for different types of financial instruments (i.e. Sharia-compliant vs. conventional). In contrast to other studies that only examine the effects of the entire month, we find strong evidence *during* Ramadan for negative average abnormal returns (AARs) around the beginning of Ramadan and positive AARs during the latter phases of Ramadan. Due to the nature of the non-normal distribution of daily returns as described above, an insignificant AAR t-stat is very likely, but the Rank t-stat, the sign test, and the type-I error test are also all important indicators for emerging trends. Taken together, these tests provide strong evidence about the performance of the indices in comparison to the expectations of predicted models generated by using four estimation windows of one, two, three and four months prior to Ramadan (See Table 2). The examination period consists of one week preceding Ramadan to one week immediately after Ramadan in order to examine the full scope of a potential Ramadan effect. This six week examination period covers the week ahead of Ramadan when individuals prepare for the month-long observance, the time during Ramadan, and the week immediately following Ramadan which includes celebrations for successfully completing the month of fasting i.e., Eid al-Fitr. While results from all four estimation windows are provided to demonstrate robustness, we will only utilize the first month-long estimation window (denoted -38 to -8) in our analysis going forward. Complete daily results for this time period are provided for reference in Appendix A.

Among Muslim majority countries, the Sharia-Compliant stock indices data showed strong evidence for a downturn in the days leading up to Ramadan with the fifth day before the start of Ramadan (day = -5) showing a strongly negative rank t-stat ($p < .05$), sign test ($p < .01$), and type-I error test ($p < .01$). The conventional stock indices also show strong evidence for a pre-Ramadan downturn with the third day before the start

of Ramadan (day = -3). The particular theoretical significance of these days cannot be determined with the current data, but it is worth noting that the Sharia-Compliant stock indices tend to lead the conventional indices throughout the entire data set. One potential explanation is that the Sharia-Compliant stocks are preferred by more religiously observant investors who make earlier preparations for Ramadan.

In Muslim majority countries, the rebound in these stock indices occurred around the transition between the second phase (The Days of Forgiveness) and third phase (The Days of Salvation) of the month. The Sharia-compliant and conventional stock indices show a distinctly positive trend during this transition period with the Sharia-compliant indices responding three days earlier than the conventional indices (the 18th day of Ramadan vs. the 21st day). The first phase (*Ashra*) of Ramadan is characterized

TABLE 2: Muslim Majority Countries: Sharia-Compliant, Conventional & Comparison Results

Muslim Majority Countries: Sharia-Compliant Stock Indices						
Estimation Window	Day	AAR	AAR t-stat	Rank t-stat	Pos/Neg	Pos**/Neg**
-38 to -8	-5	-0.4	(-0.41)	-2.41**	36/62***	0/10***
	18	0.28	(0.284)	3.02***	64/34***	5/3
-68 to -8	-5	-0.36	(-0.363)	-2.41**	38/60**	0/9**
	18	0.31	(0.31)	3.02***	66/32***	6/2
-98 to -8	-5	-0.37	(-0.372)	-2.41**	38/60**	1/8**
	18	0.3	(0.297)	3.02***	63/35***	6/2
-128 to -8	-5	-0.41	(-0.396)	-2.35**	36/58**	1/7
	18	0.29	(0.282)	3***	64/30***	5/2

Muslim Majority Countries: Conventional Stock Indices						
Estimation Window	Day	AAR	AAR t-stat	Rank t-stat	Pos/Neg	Pos**/Neg**
-38 to -8	-3	-0.31	(-0.292)	-2.23**	18/37**	2/6***
	21	0.22	(0.205)	2.06**	33/18**	8***/1
-68 to -8	-3	-0.25	(-0.227)	-2.23**	18/37**	2/3
	21	0.3	(0.272)	2.06**	33/18**	6***/1
-98 to -8	-3	-0.2	(-0.188)	-2.22**	17/36***	2/4
	21	0.3	(0.278)	2.12**	28/22	5**/1
-128 to -8	-3	-0.21	(-0.196)	-2.21**	15/36***	3/3
	21	0.31	(0.295)	2.2**	30/18*	6***/1

Muslim Majority Countries: Sharia-Compliant & Conventional Stock Indices Comparison						
Estimation Window	Day	AAR	AAR t-stat	Rank t-stat	Pos/Neg	Pos**/Neg**
-38 to -8	-1	-0.07	(-0.146)	-2.34**	38/56*	1/7
	3	-0.06	(-0.127)	-2.51**	35/60**	2/7
-68 to -8	-1	-0.07	(-0.136)	-2.26**	37/57**	1/4
	3	-0.08	(-0.17)	-2.54**	41/54	2/4
-98 to -8	-1	-0.07	(-0.144)	-2.31**	36/58**	0/6
	3	-0.09	(-0.173)	-2.43**	42/53	2/5
-128 to -8	-1	-0.09	(-0.173)	-2.48**	34/58**	0/6
	3	-0.09	(-0.162)	-2.53**	41/52	2/5

* p < .10

** p < .05

*** p < .01

by a focus on the mercy of Allah. During the second Ashra, Muslims are encouraged to seek the forgiveness of their sins. Finally, during the third and final Ashra of Ramadan, Muslims seek the refuge and salvation that comes from Allah. The holiest of nights known as *Laylat al-Qadr*, or the Night of Power, which Muslims believe occurs on an odd number night during this third and final Ashra. This night commemorates the first revelation of the Quran to Muhammad and is regarded as ‘more important than 1,000 months’. Therefore, many Muslims strive to be especially observant during the final Ashra so that their supplications and venerations will be increased. This transition between these distinct periods may explain the rhythms we see in the stock market data, but it is important to reiterate that this study cannot offer conclusive evidence for this hypothesis. Further research into the specific nature of investor behavior during these phases is needed.

The final section of Table 2 presents the results from a comparison of the conventional and Sharia-compliant stock indices. The movement of the two indices are recorded during the estimation window and a model is generated to predict the Sharia-compliant returns based on the ongoing statistical relationship between the Sharia-compliant and conventional indices. We used this conservative test as another robustness check for the presence of the Ramadan effect within the Sharia-compliant securities. Basically, if the Ramadan effect is present in the conventional stock indices’ data, it would be even more difficult to detect it in the comparison test. However, even with this conservative test, we continue to see negative results for the days immediately surrounding the start of Ramadan as indicated by the significant results for day = -1 and 3 both at the $p < .05$ level for the rank t-stat and the sign test. This indicates that the Ramadan effect affects the Sharia-compliant stock indices even more than the conventional market indices.

Pan Arab Region

The results from the Pan Arab region mirror and confirm those from the Muslim majority countries for the Sharia-compliant markets (See Table 3). Specifically, we find the Sharia-Compliant stock indices’ data shows strong evidence for a downturn in the days around the start of Ramadan with the days = -2 and +2 displaying strong and significant negative trends. These early negative trends in the market may suggest that individuals are preparing for the long observance by selling stocks to generate liquidity for the days ahead. The market clearly reverses the downward trend by the 22nd and 24th days after the beginning of Ramadan. This reversal may be attributable to the better social mood and expectation that comes with *Laylat al-Qadr* and the third Ashra of Salvation. We believe these trends would also hold for the conventional market indices, but we were unable to confirm this expectation due to missing data in the regional conventional stock indices.

It is worth noting that these interpretations are also dependent upon the ratio of retail to institutional investors in the market, which is currently unknown. In our preliminary interviews, the bank president indicated that institutional investors “are not

even aware there is a Ramadan month” because there are automated trading algorithms that trigger certain trades at pre-defined prices. This would certainly dilute the effect of Ramadan if there were a high proportion of institutional investors in the market. However, our results demonstrate a strong and persistent Ramadan Effect, which may indicate that there is a large enough proportion of retail investors that are influenced by the rhythms of Ramadan.

TABLE 3: Pan Arab Region: Sharia-Compliant and Comparison Results

Pan Arab Region: Sharia-Compliant Stock Indices						
Estimation Window	Day	AAR	AAR t-stat	Rank t-stat	Pos/Neg	Pos**/Neg**
-38 to -8	-2	-0.33	(-0.507)	-2.48**	11/23**	0/5***
	2	-0.11	(-0.163)	-1.99**	9/25***	1/0
	22	0.44	(0.671)	2.66***	28/6***	6***/0
	24	0.32	(0.486)	2.47**	29/5***	4**/0
-68 to -8	-2	-0.3	(-0.43)	-2.48**	10/24**	0/3
	2	-0.08	(-0.11)	-1.99**	9/25***	0/0
	22	0.47	(0.667)	2.66***	32/2***	7***/0
	24	0.35	(0.495)	2.47**	31/3***	4**/0
-98 to -8	-2	-0.32	(-0.457)	-2.41**	10/22**	0/2
	2	-0.1	(-0.146)	-2.15**	14/18	0/0
	22	0.46	(0.668)	2.53**	28/4***	6***/0
	24	0.36	(0.525)	2.47**	26/6***	2/0
-128 to -8	-2	-0.33	(-0.502)	-2.3**	11/19	0/3*
	2	-0.1	(-0.154)	-2.07**	13/17	0/0
	22	0.46	(0.698)	2.61***	27/3***	6***/0
	24	0.35	(0.532)	2.55**	25/5***	4***/0

Pan Arab Region: Conventional Stock Indices

Estimation Window	Day	AAR	AAR t-stat	Rank t-stat	Pos/Neg	Pos**/Neg**
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No results generated as a result of missing 2011 data.

Pan Arab Region: Sharia-Compliant & Conventional Stock Indices Comparison

Estimation Window	Day	AAR	AAR t-stat	Rank t-stat	Pos/Neg	Pos**/Neg**
-38 to -8	-2	-0.12	(-0.349)	-2.31**	7/20**	2/4***
	0	-0.17	(-0.489)	-2.66***	8/14	1/5***
	16	-0.18	(-0.511)	-2.06**	9/18*	0/3**
	24	0.24	(0.679)	2.16**	20/6***	6***/2
-68 to -8	-2	-0.14	(-0.373)	-2.42**	9/18*	2/6***
	0	-0.18	(-0.47)	-2.61***	5/17**	1/4***
	16	-0.18	(-0.472)	-1.99**	8/19**	0/3**
	24	0.23	(0.58)	2.25**	18/8**	6***/1
-98 to -8	-2	-0.15	(-0.398)	-2.51**	8/18**	3**/5***
	0	-0.05	(-0.12)	-2.29**	5/16**	1/2
	24	0.22	(0.556)	2.21**	17/8*	6***/1
-128 to -8	-2	-0.17	(-0.467)	-2.68***	8/17*	2/5***
	0	-0.13	(-0.35)	-2.72***	4/16***	0/2
	24	0.23	(0.62)	2.13**	17/7**	7***/1

* p < .10
 ** p < .05
 *** p < .01

The final section of Table 3 shows the results of the comparison between the Sharia-compliant and conventional markets. This conservative test also substantiates earlier results that indicate that Sharia-compliant stock indices are even more sensitive to the Ramadan Effect than conventional stock indices. This is evidenced by the significant and negative results on the days = -2, 0 and +16. This negative trend reverses itself after the transition into the Ashra of Salvation and by the 24th day we see strong indications of a market that exceeds the expectations of the predicted model as indicated by a significant ranked t-stat ($p < .05$) and the combination of the sign test and the type-I error test ($p < .01$).

Non-Muslim Majority Countries

The results from the non-Muslim majority countries do not follow the dominant trends that were outlined in the previous two Muslim majority and Pan Arab region contexts. To begin, the Sharia compliant stock indices did not show any effect that was associated with the start of Ramadan or the transition to the third Ashra. The only day that generated significant results was the 32nd day after Ramadan began, which is two days after Ramadan ends. It is therefore difficult to attribute this significant result to a Ramadan Effect for non-Muslim majority countries. One possible explanation could be the generally positive results are related to celebration of Eid al-Fitr, however, this interpretation would be much more plausible in Muslim majority countries. Alternatively, the result may reflect the increasingly globalized nature of Islamic finance. For example, if investors from emerging market Muslim majority countries want to invest in Sharia-compliant securities in developed nations, then there may be a significant share of ownership of locally listed Sharia-compliant stocks in non-Muslim countries. However, as previously noted, it should be clear that this study is clearly not able to answer these questions, but simply pose them as possible interpretations that should be investigated in the future with the appropriate set of data and methodologies.

The interpretation of the final two results from the conventional stock indices and the Sharia and conventional indices is problematic. According to our theoretical perspective and assumptions, we should have very little expectation of finding a distinct and consistent Ramadan effect in this national and religious context. The results from the conventional stock indices analysis confirm this expectation. There were two days that are reported to be significant, (12th and 24th) but they are generally out of phase with the Ramadan Effect that has been proposed in the literature and further supported in this paper. Furthermore, the comparison between the conventional and sharia-compliant indices yields mostly weak and inconsistent results that indicate the lack of support for a Ramadan Effect in this religious and national context. However, the one result from this section that is reliable and noteworthy is the strong response on the 34th day after Ramadan. This result indicates that Sharia-compliant stock indices that are listed in non-Muslim countries have a moderately significant (Rank t-stat is $p < .05$) and positive response (sign test and type-I error test is significant at $p < .05$ and

TABLE 4: Non-Muslim Majority Countries: Sharia-Compliant, Conventional & Comparison

Non-Muslim Majority Countries: Sharia-Compliant Stock Indices

Estimation Window	Day	AAR	AAR t-stat	Rank t-stat	Pos/Neg	Pos**/Neg**
-38 to -8	32	0.5	(0.426)	2.11**	21/9**	5***/1
-68 to -8	32	0.53	(0.45)	2.11**	21/9**	5***/1
-98 to -8	32	0.45	(0.383)	2.02**	19/9*	5***/1
-128 to -8	32	0.43	(0.376)	2.02**	18/10	5***/1

Non-Muslim Majority Countries: Conventional Stock Indices

Estimation Window	Day	AAR	AAR t-stat	Rank t-stat	Pos/Neg	Pos**/Neg**
-38 to -8	12	0.35	(0.244)	1.98**	23/11**	2/0
	24	-0.59	(-0.41)	-2.06**	12/22*	0/6***
-68 to -8	12	0.38	(0.258)	1.98**	24/10**	1/0
	24	-0.56	(-0.381)	-2.06**	13/21	0/4**
-98 to -8	12	0.36	(0.242)	1.98**	22/12*	1/1
	24	-0.58	(-0.391)	-2.06**	13/21	0/5***
-128 to -8	12	0.34	(0.239)	1.98**	22/12*	2/1
	24	-0.6	(-0.413)	-2.06**	10/24**	0/4**

Non-Muslim Majority Countries: Sharia-Compliant & Conventional Indices Comparison

Estimation Window	Day	AAR	AAR t-stat	Rank t-stat	Pos/Neg	Pos**/Neg**
-38 to -8	-5	0.08	(0.296)	2.47**	19/13	2/0
	34	0.13	(0.475)	2.5**	23/9**	4***/1
-68 to -8	-5	0.09	(0.332)	2.58**	22/10**	1/0
	3	-0.08	(-0.281)	-2.19**	9/23**	1/2
	34	0.13	(0.464)	2.33**	22/10**	5***/1
-98 to -8	-5	0.08	(0.302)	2.09**	20/11	2/0
	1	-0.14	(-0.52)	-2**	12/19	2/4***
	34	0.14	(0.511)	2.54**	22/9**	4***/1
-128 to -8	-5	0.09	(0.313)	1.99**	20/11	2/0
	1	-0.14	(-0.516)	-2.12**	11/20	1/3*
	34	0.14	(0.513)	2.43**	22/9**	4***/1

* p < .10
 ** p < .05
 *** p < .01

p < .01 respectively) four days after Ramadan ends. Since this is a comparison test, this would indicate that Sharia-compliant stocks outperformed their expectations vis-à-vis conventional stocks in the days after Ramadan.

Contributions and Future Directions

This paper makes several contributions to the literature. First, it complements prior work on Ramadan in that it takes a fine-grained approach including information collected daily rather than for whole month. Furthermore, it is also the first to differentiate between stocks that are compliant with Sharia law and non-compliant stocks that may be traded in Islamic countries. Finally, we have sought to quantitatively analyze and understand the Ramadan Effect as a phenomenon that is embedded within a very specific cultural, national and religious context.

There are several limitations that relate directly to areas for future research. First, it would be useful to conduct primary research among traders and other participants in these financial markets to gain insight into how they make decisions about trading around Ramadan. While we have theorized that piety may be an explanatory variable, the data collected do not allow us to make a definitive claim. Second, as Islamic Finance becomes more prevalent outside the traditional Muslim world, will the effect remain or will the efficiency of the market introduce a state of equilibrium? Finally, the event study methodology could be applied to other holiday periods to look for similar rhythms in investor behavior.

In conclusion, Islam provides Muslims with rules for how they must conduct business as well as other affairs in their daily lives. As these commercial practices spread beyond the traditional borders of the Muslim world, there is a more urgent need for research to bridge the gap in understanding between contexts. This project has expanded our knowledge of the market effects emanating from a major religious holiday. As Islamic finance continues its global expansion, more research will need to focus on its interface and possible influence on other models for organizing and governing financial markets.

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APPENDIX A: Muslim Majority Countries Sharia-Compliant Stock Indices Daily Results

Muslim Majority Countries Sharia-Compliant Stock Indices Daily Results

Estimation Window: -38 to -8 days including 98 Ramadan Events and 12 Countries

Day	AAR	AAR t-stat	Rank t-stat	Pos/Neg	Pos**/Neg**
-7	0.09	(0.089)	1.35	53/45	6/3
-6	0.17	(0.172)	1.36	59/39**	3/0
-5	-0.4	(-0.41)	-2.41**	36/62***	0/10***
-4	-0.03	(-0.027)	0.65	56/42	2/4
-3	-0.13	(-0.137)	-1.07	42/56	3/5
-2	-0.06	(-0.064)	-1.19	46/52	3/3
-1	-0.05	(-0.052)	-1.37	38/60**	4/2
0	-0.06	(-0.058)	0.16	53/45	6/8**
1	0.01	(0.013)	-0.45	42/56	3/3
2	0.08	(0.085)	0.45	47/51	3/7
3	0.03	(0.028)	-0.49	44/54	5/4
4	-0.06	(-0.061)	0.04	49/48	3/8**
5	-0.23	(-0.235)	0.03	53/45	1/13***
6	-0.17	(-0.174)	-1.1	42/56	1/9***
7	-0.13	(-0.138)	0.08	51/46	5/7
8	-0.02	(-0.018)	-0.45	46/52	3/7
9	-0.05	(-0.053)	0.06	51/47	1/3
10	-0.1	(-0.103)	-0.66	44/53	8**/9***
11	-0.06	(-0.058)	-0.31	52/46	1/2
12	0.14	(0.147)	1.17	56/42	4/0
13	0.05	(0.051)	0.4	51/46	4/2
14	0.31	(0.321)	0.51	48/50	6/4
15	-0.2	(-0.202)	-1.29	39/59**	3/9***
16	-0.05	(-0.048)	0.17	54/43	3/3
17	0.14	(0.145)	1.61	62/36***	6/7
18	0.28	(0.284)	3.02***	64/34***	5/3
19	0.02	(0.025)	0.19	52/44	2/7
20	0.16	(0.165)	1.08	45/48	5/0
21	0.09	(0.095)	0.45	47/48	6/1
22	0.03	(0.034)	0.13	52/46	3/5
23	0.17	(0.177)	0.67	49/48	10***/2
24	-0.08	(-0.083)	-0.04	52/46	6/9***
25	-0.15	(-0.151)	-1.25	39/59**	6/10***
26	-0.09	(-0.095)	-0.99	49/48	6/8**
27	0.08	(0.081)	-0.03	47/51	10***/6
28	0.18	(0.184)	1.12	50/48	13***/4
29	-0.26	(-0.268)	-1.29	42/56	2/13***
30	0.11	(0.117)	0.64	51/47	8**/12***
31	0.24	(0.247)	1.09	57/41	8**/7
32	-0.18	(-0.185)	-0.82	45/53	2/10***
33	-0.17	(-0.17)	-0.25	49/49	7/8**
34	-0.31	(-0.319)	-1.33	41/57	4/10***
35	-0.09	(-0.089)	-0.21	47/51	11***/8**
36	-0.13	(-0.136)	-1.14	42/56	6/7
37	-0.08	(-0.08)	-0.28	51/47	8**/12***

* p < .10; ** p < .05; *** p < .01