Essays on Religious Beliefs and Stock Market Outcomes

A Thesis Submitted in Fulfilment of the Requirements for the Degree of Doctor of Philosophy

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Declaration

I certify that, except where due acknowledgment has been made, the work is that of the author. The work has not been submitted previously, in whole or part, to qualify for any other academic award. The content of the thesis is the result of work that has been carried out since the official commencement date of the approved research program. Any editorial work, paid or unpaid, carried out by a third party is acknowledged. Ethics procedures and guidelines have been followed.

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Dedication

I dedicate this thesis to my parents, Mohammad Al-Awadhi and Farida Al-Awadhi. I have been blessed by their support and encouragement. I also dedicate this thesis to my grandparents, siblings, uncles, aunts, and friends.

Abstract

This thesis consists of three essays that investigate the influence of religious beliefs on investor behavior and stock market outcomes. To this end, we avail of data from the Gulf Cooperation Council (GCC) countries. Our dataset is collected from highly religious societies that have clear religious investment rules and explicit identification of both institutional investors and stocks as either "Islamic" or "non-Islamic". *The first essay* of this thesis investigates whether religious-based trading practices impede market development. Our results show that non-Islamic stocks in the markets of our study are relatively neglected, have higher returns, lower liquidity, and face higher liquidity risk compared to Islamic stocks. Our overall evidence, therefore, supports the hypothesis of market segmentation. Our results highlight a potential challenge for the stock markets of religious Islamic societies in seeking to become globally competitive. *The second essay* investigates whether religiosity affects stock market speculation. We find that an increase of Muslims' religiosity during the holy month of *Ramadan* leads to lower levels of trading frequency, market volatility, and idiosyncratic volatility, as well as higher risk-adjusted returns. Our

results indicate that religiosity is negatively related to stock market speculation. *The third essay* investigates whether religiosity influences the preference of institutional investors to hold lottery-type stocks. We find that Islamic institutional investors deviate from their religious norms by holding more lottery-type stocks than do non-Islamic institutional investors. This deviation may be explained by the evidence that Islamic institutional investors have stronger information signals to induce them to trade lottery-type stocks. Our results highlight a challenge for the regulators and Islamic *Shariah* auditors in countries that have Islamic institutions, namely, to ensure that the operations of Islamic institutions are free from prohibited excessive uncertainty (*Gharar*).

Thesis-Related Research Outcomes

Revised and Resubmitted Papers

Al-Awadhi, A., Dempsey, M. (2017), 'The Effect of Religiosity on Stock Market Speculation', *Pacific-Basin Finance Journal*.

Al-Awadhi, A., Dempsey, M. (2017), 'Social Norms and Market Outcomes: The Effects of Religious Beliefs on Stock Markets', *Journal of International Financial Markets, Institutions & Money*.

Under Review Papers

Al-Awadhi, A., Dempsey, M., Gangemi, M. (2016), 'Deviation from Religious Trading Norms', *International Review of Economics and Finance*.

Refereed Conference Papers

Al-Awadhi, A., Dempsey, M., Marisetty, V. (2016), Social Norms and Market Segmentation: The Effects of Religious Beliefs on Stock Market Returns, Liquidity, and Liquidity Risk, *in* 'KFUPM Islamic Banking and Finance Research Conference, Riyadh, Saudi Arabia, 13–15 March'.

Al-Awadhi, A., Dempsey, M., Marisetty, V. (2016), The Effects of Religious Beliefs on Stock Market Outcomes, *in* 'IFABS 2016 Barcelona Conference, Barcelona, Spain, 1–2 June'.

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Chapter 1

Introduction

Culture has many dimensions, for which religion can be an important component as well as a key aspect of life (Guiso et al. 2003). Recent behavioral finance literature suggests that religion plays a significant role in influencing risk attitudes, saving, financial decisions and other economic issues (Baker & Nofsinger 2012). Such a behavioral understanding offers an additional hypothesis with which to explain stock market anomalies. Nevertheless, the behavioral finance literature suffers from several measurement and identification issues, leading to no clear conclusive evidence (see, Lobe & Walkshäusl 2016, Guenster 2012, Karlén & Poulsen 2013).

The first objective of this research is to investigate whether religious-based trading practices impede market development. As a natural experiment, we use data from the Gulf Cooperation Council (GCC) countries, which have clearly defined religious rules on investing in stock markets. We find that non-Islamic stocks in these markets are relatively neglected, have higher returns, lower liquidity, and face higher liquidity risk compared to Islamic stocks. Our overall evidence,

therefore, supports the hypothesis of market segmentation. Our results highlight a potential challenge for the stock markets of religious Islamic societies in seeking to become globally competitive.

The second objective of this research is to investigate whether religiosity affects stock market speculation. We use the data of the GCC countries characterized by a high level of religiosity and clearly defined religious rules on investing. We find that during *Ramadan*, the stock markets of these countries encounter relatively lower levels of trading frequency, volatility, and idiosyncratic volatility. We do not find significant changes in returns during *Ramadan* compared to other months. However, a drop in volatility leads to higher risk-adjusted returns. Our results indicate that religiosity is negatively related to stock market speculation.

The third objective of this research is to investigate whether religiosity influences the preference of institutional investors to hold speculative (lottery-type) stocks. We use data from Kuwait, which is characterized by a high level of religiosity, clearly defined Islamic religious rules with regard to investing, and clear identification of institutional investors' religious identity. We find that Islamic institutional investors deviate from their religious norms by holding more lottery-type stocks than do non-Islamic institutional investors. This deviation may be explained by the evidence that Islamic institutional

investors have stronger information signals to induce them to trade such stocks. Our results highlight a challenge for the regulators and Islamic *Shariah* auditors in countries that have Islamic institutions, namely, to ensure that the operations of Islamic institutions are free from prohibited excessive uncertainty (*Gharar*).

In summary, we seek to contribute to an understanding of the interaction between religion as a key component of culture and stock market price formation. To this end, we avail of data from stock markets that encompass well-defined Islamic and non-Islamic institutional investors, as well as Islamic and non-Islamic stocks. Islamic institutional investors and stocks are clearly identified due to explicit rules for Islamic investments. Thus, our data provides a meaningful illumination of the research issues. The results of our research are expected to be important to the literature on the interaction between religion and financial behavior, as well as having a direct significance for stock market regulators, firms, and traders in Islamic countries.

This thesis consists of six chapters commencing with this introductory chapter. Chapter 2 provides an overview of the Islamic financial industry. Chapters 3, 4, and 5 are the empirical chapters presented as three separate papers. Finally, Chapter 6 concludes the thesis.

Chapter 2

Overview of Islamic Financial Industry

2.1 Introduction

Islamic finance has been practiced throughout the Muslim world since the Middle Ages. Indeed, many instruments and concepts of the Islamic financial approach have been adopted and developed by European financial systems during and following the Renaissance (Ghazanfar 2004). The modern revival of the Islamic financial approach can be traced back to the mid-1980s, when globalization played a role in shaping the modern Islamic financial industry. At this time, a demand was created for Islamic financial products that would correspond with modern Western financial products in their ability to fulfill investor goals. Such modern Islamic financial products allow Muslims the opportunity to participate in financial markets, while preserving their religious norms and values (Pepinsky 2013).

The Islamic financial approach is based on the boundaries of Is-

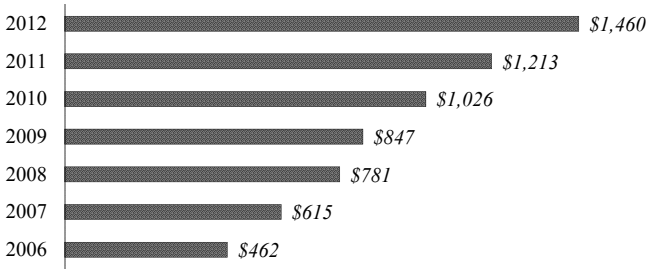

Figure 2.1: Yearly Global Assets of Islamic Financial Services Industry ($bn). Source: UKIFS, October 2013.

lamic law (*Shariah*), whereby transactions are governed by Islamic laws in combination with the rules of corporate governance, risk management, and market regulators. These laws cover various kinds of financial instruments, markets, financial intermediation, and transactions (Zaher & Kabir Hassan 2001). Moreover, they influence the nature and behavior of the institutional and individual participants in financial markets (Hearn et al. 2012). The main concepts of the Islamic financial approach are the prohibition of unfair transactions, encouragement of risk sharing transactions, and support of the concepts of the individual's rights and duties, property rights, and fair contracts.

The global Islamic financial services industry has been growing rapidly, with world asset valuations of $1,460bn in 2012 (Figure 2.1). As of 2012, Iran, Saudi Arabia, Malaysia, United Arab Emirates (UAE), Kuwait, Bahrain, and Qatar are the leading countries in the Islamic financial industry (Figure 2.2).

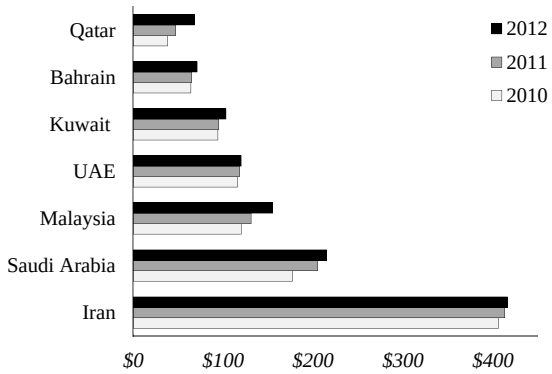

Figure 2.2: Size of Global Islamic Financial Services Industry by Country in ($bn). Source: Global Islamic Finance Report 2013.

2.2 Religion and Islamic Financial Industry

Islam reserves the option to be involved in commercial and financial trades on the basis of Islamic *Shariah* boundaries in the form of prohibitions, norms, and ethics. Such norms and ethics require that economic traders in a society avoid injustice and unfair dealing in their financial activities. Islamic finance scholars argue that the rules of *Shariah* and norms of Islamic finance can help to develop a sustainable financial system and ensure fairness for investors, the community, and institutions. The main prohibitions of Islamic finance include those of interest (*Riba*), gambling (*Maysir*), and excessive uncertainty (*Gharar*) about assets or prices in exchanges (Ayub 2009).

2.2.1 Prohibition of *Riba*

A fundamental prohibition in Islamic finance is the prohibition of interest (*Riba*). There is no ambiguity regarding the prohibition of *Riba* in that all Muslim groups consider accepting interest (*Riba*)-based dealings as sinful. The Holy *Quran* and other Islamic *Shariah* sources strongly convict transactions based on interest (*Riba*). *Riba* generally represents the return on transactions involving an exchange of money for money, or that of an unfair increase paid above the amount of the loan by the borrower. Islamic *Shariah* has prohibited *Riba* on the basis that it generates imbalances in the economy. Pepinsky (2013) notes that Islamic scholars interpret the ban on interest as an unfair trade that places the risk of the transaction on the borrower, who must repay the loan regardless of whether he/she earns a profit from the use of the loan. Islamic scholars hold that an appropriate contract form is one that allows risk to be shared by both contract parties. The goal of a vast body of modern studies on Islamic finance is to determine how to produce financial products on the basis of risk sharing.

2.2.2 Prohibition of *Maysir*

The second major prohibition in Islamic *Shariah* is *Maysir*, which is the Arabic translation for gambling or game of chance (lottery-type). All instruments such as lotteries, wherein coupons or tabs with incentives provided by an uncertain and unknown event depending on luck, or disproportionate prizes that are distributed by a drawing of lots, or where the participating persons avail themselves of a chance at prizes, are unacceptable to Islam. This is because only a small number of the participants of such schemes receive a reward at the cost of others, without undertaking liability or work (Ayub 2009). Financial derivatives, such as options and futures contracts that are settled through price differences only, are considered gambling.

2.2.3 Prohibition of *Gharar*

The third major prohibition of Islamic finance is that of excessive uncertainty (*Gharar*), which refers to the hazard or uncertainty caused by the absence of clarity about the asset or price in the agreement or exchange details. Islamic *Shariah* prohibits transactions and contracts that involve components of excessive uncertainty (*Gharar*). *Gharar* occurs if the obligation of any of the contract parties is uncertain or if the obligation is of a kind that relies on obligation. In other words,

Gharar can be present in transactions that contain excessive uncertainty, the sale of an asset over which the seller has no control, a contract in which the price has not been finalized, or future exercise date is not recognized. Thus, Islamic finance scholars prohibit engagement in activities such as excessively speculative trades in shares, short-selling, trading in unknown items, and trading in derivatives (Ayub 2009).

2.3 Stock Markets in Islamic Context

The role of stock markets is important in all economies; they are organized to serve two conceptual markets: the primary market, which provides for the initial public offering, and secondary market, which enables asset holders to trade previously created shares (Al-Masri 2007). Thus, the primary market allows investors to subscribe funds to business enterprises seeking to grow their operations. This movement of funds from surplus to deficit units seeking to raise new capital by issuing equity is one of the main roles of the stock markets in both Western and Islamic stock market theory (Zaher & Kabir Hassan 2001, Al-Masri 2007).

The secondary markets also play an important role in the Islamic finance paradigm, but they have systems that differ from their Western counterparts. Taj el din (1996) considers that Islamic stock mar-

kets are concerned more with Islamic ethics than with market efficiency. According to Taj el din (1996), in Islamic financial markets, the regulator must guarantee that the transactions are free from interest (*Riba*) and excessive uncertainty (*Gharar*). Once these *Shariah* requirements are met, regulators are left with the regulations and criteria that support and increase social benefits. Thus, the regulators are required to be extremely careful in analyzing and determining the benefits and costs of the financial system's regulations.

Many countries with a majority Muslim population have established stock markets that are Western-designed markets with laws and practices that do not rigorously follow the laws of Islam (Zaher & Kabir Hassan 2001). Iran and Sudan appear to be the only countries with fully compliant Islamic stock markets (Pryor 2007). Countries, such as Bahrain, Egypt, Indonesia, Jordan, Kuwait, Malaysia, Oman, Pakistan, Qatar, Saudi Arabia, Turkey, and UAE have now established stock markets with Western-designed laws and practices, but with both Islamic and non-Islamic stocks listed in their markets (mixed markets).

2.4 GCC Stock Markets

The Gulf Cooperation Council (GCC) region comprises six countries: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab

Emirates (UAE). GCC countries have mixed markets with both Islamic and non-Islamic stocks. Thus, they have Western-designed laws and practices combined with Islamic laws that are specific to Islamic institutions. Islamic institutions in these countries are either institutions with an Islamic operation license or institutions that mentions in their articles of association that they operate within Islamic *Shariah*.[1] In order for a firm to be considered fully *Shariah* compliant, so that its stocks are allowable for all Islamic investors to trade, it must abide by all Islamic finance codes. In the GCC, the level of religiosity is high, as shown in Table 2.1. Thus, the appearance of distinctly Islamic trading behavior in these countries is expected to be strong.[2]

Table 2.2 presents the summary statistics of GCC stock markets for the year 2012. In terms of total market capitalization, Saudi Arabia is the largest market. Saudi Arabia has the highest stock market in terms of the trading value as a percentage of GDP and turnover ratio, while Kuwait has the highest number of listed domestic firms compared to other GCC countries.

The following chapters of this thesis consists of three essays that investigate the influence of religious beliefs on investor behavior and stock market outcomes. To this end, we avail of data from the GCC

[1]See, for instance, the law of the Islamic operation license of Kuwait. https://www.cma.gov.kw/.

[2]For example, Islamic traders are expected to trade subject to Islamic *Shariah* law, and are restricted to trading stocks of firms that comply with Islamic laws.

countries. Our dataset is collected from highly religious societies that have clear religious investment rules and explicit identification of both institutional investors and stocks as either "Islamic" or "non-Islamic".

Table 2.1: Religious Indicators of GCC Countries
This table presents a religiosity index from the Gallup Survey as of 2009 for GCC. The table also presents the percentage of Muslims to the total population and the total population in million taken from the PEW Research Center, as of its 2011 report "The Future of the Global Muslim Population".

Country	*Religiosity Index (2009)*	*Muslims to Total Population (%)*	*Total Population (million)*
Bahrain	94	81.2	1.26
Kuwait	91	86.4	2.74
Oman	-	85.2	2.78
Qatar	95	77.5	1.76
Saudi Arabia	93	97.1	27.45
UAE	91	76.0	7.51

Table 2.2: Summary Statistics of GCC Stock Markets

This table compares GCC stock markets in the year 2012. Market capitalization of listed companies is in billions U.S. dollars and based on the listed domestic companies. Market capitalization of the listed companies as percentage of the GDP is also based on listed domestic companies. Trading value is calculated as the total value of shares traded during the year divided by the GDP of the year. Turnover ratio is calculated as the total value of shares traded in the year divided by the average market capitalization for the year. The number of listed companies includes only the domestic companies. The data is from the World Bank database.

Country	*Market Cap ($bn)*	*Market Cap (% of GDP)*	*Trading Value (% of GDP)*	*Turnover Ratio (%)*	*Listed Companies*
Bahrain	16	52	1.0	1.9	43
Kuwait	97	56	13.2	23.2	189
Oman	30	40	3.5	8.8	155
Qatar	126	67	8.1	12.2	42
Saudi Arabia	373	51	70.1	144.4	158
UAE	68	18	4.7	25.3	102

Chapter 3

Effects of Religious Beliefs on Stock Returns, Liquidity, and Liquidity Risks

3.1 Introduction

Social norms significantly influence an individual's general behavior (Kübler 2001), investor preferences (Kim & Venkatachalam 2011), and financial decisions (Baker & Nofsinger 2012), and, consequently, their stock market trading behavior and outcomes (Fabozzi et al. 2008, Hong & Kacperczyk 2009, Baker & Nofsinger 2012).

There is a growing trend for socially acceptable investing (Baker & Nofsinger 2012), which has impacted the investment and regulatory environment (Sparkes 2001). Investors prefer to invest in categories of stocks that conform with their norms, such as socially responsible, ethical, environmental, and faith-based investing, and to neglect stocks that conflict with their norms, such as sin, polluters, and non-

Islamic stocks (Baker & Nofsinger 2012).

Following Merton's (1987) market segmentation theory, neglected stocks in a segmented market should outperform other stocks, compensating investors for limited risk-sharing. What is not so well understood is the extent to which market segmentation as an outcome of religious beliefs enhances or impedes overall market behavior; for example, the extent to which exogenously observable beliefs interact with stock returns, trading practices, and liquidity.[1]

In this study, we use data with an Islamic religious background to investigate returns and liquidity, as well as the liquidity risk differences between stocks that are neglected by investors because they conflict with social norms and stocks that can be characterized as conforming with social norms.[2] Specifically, we contribute by examining the influence of social norms on liquidity and liquidity risk in Islamic

[1]Liquidity is recognized as a significant component in our understanding of asset pricing. Market traders understand that the time and cost of exercising trades are important features of stock market performance. Following the Global Financial Crisis (GFC) of 2007–2009, stock market regulators and participants have been made particularly aware of the significance of liquidity in financial markets. Research suggests that market returns can be linked to a stock's liquidity (Amihud 2002) and that liquidity risk is priced into the stock market (Chordia et al. 2000, Pastor & Stambaugh 2001, Acharya & Pedersen 2005).

[2]Following Amihud et al. (2012), stock market liquidity can be viewed from two broad dimensions: the current level of liquidity and liquidity risk. Liquidity implies low transaction costs and low price impacts when trading; liquidity risk is, therefore, the risk that a stock's level of liquidity will be reduced when the stockholder wishes to sell. Following Acharya & Pedersen (2005), liquidity risk has three dimensions: (i) commonality in liquidity with the market liquidity, (ii) return sensitivity to market liquidity, and (iii) liquidity sensitivity to market returns.

societies.

Although a number of studies examine the effect of social norms on stock returns, there is no standard definition as to what defines a norm-conflicting or norm-conforming stock (Lobe & Walkshäusl 2016).[3] Consequently, we have a range of norm-based screening strategies reflecting different political, religious, and ethical perspectives (Guenster 2012). Studies that focus on examining the performance of norm-conflicting stocks also use different definitions, which may explain the differences in their results (Karlén & Poulsen 2013). In our study, we use data from societies that offer relatively unambiguous religious guidance for norm-conflicting and norm-conforming stocks. Muslim societies are able to unambiguously define norm-conflicting stocks as non-Islamic stocks and norm-conforming stocks as Islamic stocks. Moreover, we may expect that a significant portion of retail investors will follow Islamic trading rules in these societies as the level of religiosity is high. The level of religiosity is considered higher than that pertaining to previous studies (France, Germany, and U.S.), where differences of emphasis between Christian denominations are the focus.[4] Furthermore, Islamic institutional investors in

[3]A good example would be the defense industry in the U.S.; it is not clear whether it is considered an ethically acceptable industry by American social norms (Hong & Kacperczyk 2009).

[4]According to a Gallup 2009 survey, the societies of the GCC countries included in our data have a strong belief that religion is important in daily life. In Bahrain, 94% of people believe that religion is important in life, 91% in Kuwait, 95%

the GCC are guided by strict, explicit rules prohibiting investment in non-Islamic stocks. In this less ambiguous setting, our study provides deeper insights as to how religious background may affect investment decisions and corresponding market outcomes.

We contribute by providing evidence that sheds light on whether social norms impede markets from becoming more competitive. For instance, the Saudi Arabian stock market has recently become open to foreigners and is seeking billions of dollars from the private sector.[5] Nevertheless, Islamic investors in Saudi Arabia are guided strictly by Islamic law and may invest only in *Shariah* compliant stocks. Hence, the market is subject to significant segmentation if a majority of investors trade only these stocks, which may have the effect of discouraging non-Islamic firms from listing in this market.

Our study finds that norm-conflicting (non-Islamic) stocks experience significantly higher returns, lower liquidity and higher liquidity risk in comparison with norm-conforming (Islamic) stocks across all of the GCC countries. Thus, the implications of our study are important for regulators in this region. We suggest that the market segmentation

in Qatar, 93% in Saudi Arabia, and 91% in UAE. In countries that have been used to examine the influence of religious background on financial decisions in prior studies, the percentage of people who believe that religion is important in life is much lower (e.g., France 30%, Germany 40%, and U.S. 65%). Source: http://www.gallup.com.

[5]For more information, read the 15 June 2015 Wall Street Journal article by Ahmed Al-Omran and Rory Jones: "Saudi Stocks Slip as Foreigners Gain Access".

problem be addressed before the stock markets in Islamic societies can become globally competitive.

The rest of this chapter is organized as follows. The next section presents the background and hypotheses development. Section 3.3 presents data and descriptive statistics. Section 3.4 presents the empirical tests. Section 3.5 concludes.

3.2 Background and Hypotheses Development

3.2.1 Background

Each society defines morality and norm-conflicting investments in different ways. What is perceived as sinful differs between societies and changes over time (Fabozzi et al. 2008). Thus, it is difficult to provide a single global definition for norm-conflicting stocks. Some studies define such stocks as "sin" stocks, which are typically stocks of companies that operate in industries considered sinful from the perspective of a particular set of social norms. For example, many studies in relation to Western societies regard stocks of companies in the alcohol, tobacco, and gaming industries as sin stocks (Hong & Kacperczyk 2009, Salaber 2009, Durand et al. 2013). Other studies include stocks

that are associated with biotechnology alteration, weapons, and adult services in the definition of sin stocks (Fabozzi et al. 2008). Further, Lobe & Walkshäusl (2016) identify stocks in industries associated with alcohol, adult services, defense, gambling, nuclear, and tobacco as sin stocks. Guenster (2012) argues that it is difficult to give a single global definition for norm-conflicting stocks that reflects the fact that people have different political, religious, and ethical views.

In the same way that it is difficult to define norm-conflicting stocks, it is difficult to define norm-conforming stocks. Norm-conforming may refer to value-based, socially responsible, socially aware, green, and ethical investing (Schueth 2003). Baker & Nofsinger (2012) define socially responsible investing (SRI) as an investment strategy that takes into consideration ethical, religious, and political values. In more recent times, investing based on social norms has been expanded to include criteria such as political issues, equality for women, labor rights, anti-nuclear activism, environmental issues, human rights, and religious criteria (Schueth 2003).

Religion is a basis for moral standards (Baker & Nofsinger 2012). Some societies use religion-based definitions for norm-conflicting and norm-conforming stocks. For instance, the Arab world defines sin investments on a religious basis, which differs from the Western world (Fabozzi et al. 2008). Most religions have criteria for what is consid-

ered acceptable. Investing based on social norms has a deep-rooted religious history that goes back to biblical times, when Judaism set investment criteria to conform with social norms from a religious perspective (Schueth 2003).

Islamic societies define sin stocks in a religious context (Fabozzi et al. 2008). Stocks of industries that conflict with Islamic *Shariah*, such as usury, sales of pork, and casinos, are considered norm-conflicting investments from the Islamic viewpoint (Durand et al. 2013). Ghoul & Karam (2007) compare screening strategies for Christian and Islamic "faith-based" investment funds with SRI. They conclude that although there are some differences in the strategies of Christian, Islamic, and SRI screening criteria, they share a similar philosophy.

3.2.2 Hypotheses Development

Previous studies have examined the performance of norm-conflicting and norm-conforming investments.[6] Fabozzi et al. (2008) examine the returns of norm-conflicting sin stocks from 21 countries for the period 1970–2007 and find that sin portfolios outperform the common benchmarks by 19% annually. Their definition of sin includes alcohol, gaming, biotechnology alteration, tobacco, weapons, and adult ser-

[6]A detailed summary of the related studies in regard to the performance of norm-conflicting and norm-conforming investments is presented in Table 3.11 in Appendix III to this chapter.

vices industries. Moreover, Hong & Kacperczyk (2009) examine the influence of social norms on stock returns for a sample of 184 U.S. sin stocks and find that these stocks outperform the relative market benchmarks.Other authors find similar results, concluding that sin stocks enjoy abnormal returns (e.g., Fauver & McDonald 2014, Luo & Balvers 2014).

Although most of the studies concentrate on examining the returns of norm-conflicting stocks in comparison to the common market benchmarks, a limited number have examined the returns of norm-conflicting stocks in comparison to the returns of norm-conforming stocks. Thus, Durand et al. (2013) examine the influence of social norms on both "saints" and "sinners". Their findings suggest that sin stocks outperform both the market benchmarks and saint stocks. They define saint stocks as stocks included in the MSCI KLD400 Social Index, which consists of the 400 highest environmental, social, and governance (ESG) rated U.S. companies. This is qualified by Lobe & Walkshäusl (2016) who employ data for 31 sin and SRI international indexes, and find that the sin portfolios do not significantly outperform the market benchmarks and SRI indexes. Liston & Soydemir (2010) compare the performance of "faith-based" and "sin" stocks in a religious context.[7] Their results indicate that sin portfolios outper-

[7]They define faith-based portfolios in a religious context. They use the Dow Jones Islamic Index and Ave-Maria Fund (based on Catholic values) to calculate

form both the market and faith-based portfolios.

The literature suggests that norm-conflicting stocks earn positive abnormal returns and that these positive abnormal returns persist as long as these stocks are neglected by a significant portion of investors (Guenster 2012). This is consistent with the theoretical framework of Merton (1987), who anticipates that, in equilibrium, investors require a higher return from neglected stocks because the unsystematic risk of these stocks is priced to reflect "limited risk sharing" (Guenster 2012). Moreover, Hong & Kacperczyk (2009) argue that sin (norm-conflicting) stocks are underpriced because they have a lower investor base in comparison to regular stocks. Their argument is based on the "neglect" assumption and the theoretical framework of market segmentation of Merton (1987). Specifically, Hong & Kacperczyk argue that sin stocks are neglected by large institutional investors and sell-side analysts. Consequently, sin stocks have less information available to investors and must compensate investors with a higher return.

The performance of norm-conforming investing has been addressed in the context of Islamic stocks from the perspectives of mutual funds (Hayat & Kraeussl 2011, Bukhari & Azam 2015) and stock indexes (Al-Khazali et al. 2014, Canepa & Ibnrubbian 2014, Ho et al. 2014, Jawadi et al. 2014, KR & Fu 2014, Ashraf 2016). However, whereas

the faith-based portfolio return.

some studies find that Islamic investments outperform non-Islamic investments, other studies either suggest the opposite or find that there is little or no difference (Merdad et al. 2015).

In mixed markets, where Islamic and non-Islamic stocks are listed on the same stock exchange, Islamic investors trade only stocks of firms that comply with Islamic *Shariah*.[8] For instance, as displayed in Appendix II to this chapter, Kuwait Finance House, one of Kuwait's major institutional investors, clearly states in its Articles of Association that it should not invest in those stocks that do not comply with Islamic *Shariah* rules. This implies that Kuwait Finance House must decline to invest in 69% of the stocks listed on the Kuwait Stock Exchange (KSE).

We have observed that norm-conflicting stock portfolios typically outperform the market (Fabozzi et al. 2008, Hong & Kacperczyk 2009, Kim & Venkatachalam 2011, Luo & Balvers 2014) as well as outperforming norm-conforming portfolios (Liston & Soydemir 2010).Thus, we expect non-Islamic (norm-conflicting) stocks to outperform Islamic (norm-conforming) stocks and compensate investors for their limited risk sharing. This leads us to our Hypothesis 1:

[8]Islamic institutional investors are expected to follow Islamic rules, as they have a *Shariah* board committee that ensures institutional transactions are acceptable within *Shariah* rules. Moreover, in countries with a Muslim majority and high level of religiosity, we may expect that a significant portion of retail investors follow Islamic trading rules, as is the case for markets in our study (see, for instance, the Gallup Religiosity Index).

Hypothesis 1: Norm-conflicting (non-Islamic) stocks outperform norm-conforming (Islamic) stocks.

Hong & Kacperczyk (2009) suggest that a norm-conflicting stock premium can be explained by a neglect effect. Their finding supports the neglect effect explanation that sin stocks are neglected by large institutional investors and analysts. They also expect that sin stocks should have lower liquidity (they actually find an insignificant liquidity difference between sin and other market stocks). Luo & Balvers (2014), using Amihud's 2002 illiquidity ratio as a liquidity proxy, find that sin (norm-conflicting) stocks have a smaller investor base and lower liquidity than regular stocks. In contrast, norm-conforming stocks are expected to have a higher investor base, as they are more widely accepted. Fernando et al. (2009), using a bid-ask spread liquidity measure, confirm that stocks of environmental firms (norm-conforming) have higher stock market liquidity.

In an Islamic context, Abdullah & Bacha (2001) examine the impact of the decision to add or delete a stock from the list of norm-conforming *Halal* stocks on the Kuala Lumpur Stock Exchange, and find that the inclusion of a stock on the *Halal* list has a positive impact on trading volume, whereas deletion has a significant nega-

tive effect in the 60-day window post-announcement.[9] In a mixed market, all traders trade Islamic stocks, but only non-Islamic traders trade non-Islamic stocks. Thus, Islamic and non-Islamic stocks have different levels of investor bases in mixed markets. We expect that in these markets, the higher investor base of Islamic stocks will increase their trading volume and liquidity, in comparison to non-Islamic stocks (e.g., Tauchen & Pitts 1983, Amihud et al. 1999). Thus, our Hypothesis 2 is as follows:

Hypothesis 2: Norm-conforming (Islamic) stocks are more liquid than are norm-conflicting (non-Islamic) stocks.

The uncertainty of future liquidity leads to liquidity risk (Amihud et al. 2005). Acharya & Pedersen (2005) introduce a liquidity-adjusted form of the capital asset pricing model (CAPM) that captures expected liquidity and three types of liquidity risk. The three liquidity risk factors (betas) used in our study are as follows: (i) commonality in liquidity with the market liquidity, $cov(c^i, c^M)$; such a relationship is anticipated because investors expect to be rewarded for holding a security that becomes illiquid when the market, in general, becomes illiquid (Acharya & Pedersen 2005); (ii) return sensitivity to market liquidity, $cov(r^i, c^M)$; Acharya & Pedersen (2005) find that $cov(r^i, c^M)$

[9] *Halal* stocks are those that comply with Islamic *Shariah* rules.

affects required returns negatively because investors are willing to accept a lower return on an asset with a high return in times of market illiquidity; and (iii) liquidity sensitivity to market returns, $cov(c^i, r^M)$; Acharya & Pedersen (2005) interpret this effect as due to the willingness of investors to accept a lower expected return on liquid security in a down-turned market. When the market declines, investors have less wealth and the ability to sell easily is particularly valuable. Hence, an investor is prepared to accept a lower return on stocks with low illiquidity costs in states of low market return.

Liquid stocks have lower commonality with market liquidity, lower return sensitivity to market liquidity, and lower liquidity sensitivity to market returns (Acharya & Pedersen 2005). In other words, stocks that are more liquid in absolute terms also tend to have lower liquidity risk, which leads us to hypothesize the following:

Hypothesis 3: Norm-conforming (Islamic) stocks have less liquidity risk than do norm-conflicting (non-Islamic) stocks.

3.3 Data and Descriptive Statistics

3.3.1 Data

Our study is based on stock markets in religious Islamic societies that have both "Islamic" and "non-Islamic" stocks, specifically the listed firms in the Gulf Cooperation Council (GCC) stock markets.[10] Figure 3.1 displays the countries leading in the Islamic financial industry: Iran, Saudi Arabia, Malaysia, United Arab of Emirates (UAE), Kuwait, Bahrain, and Qatar. Five of the countries leading in the Islamic financial industry are Gulf Cooperation Council (GCC) countries: Saudi Arabia, UAE, Kuwait, Bahrain, and Qatar.

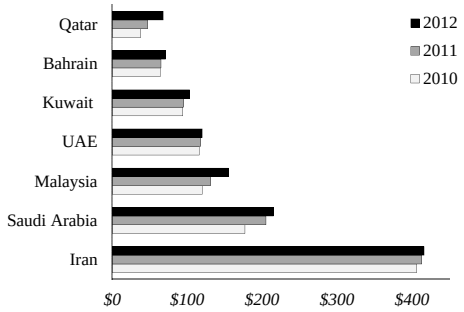

Figure 3.1: Size of Global Islamic Financial Services Industry by Country in ($bn). Source: Global Islamic Finance Report 2013.

Islamic stocks in the GCC are the stocks of firms that operate

[10]Although these countries are oil producing countries, the oil industry is a public industry. In fact, there is only a limited number oil-related firms that are publicly traded. According to Datastream, there are only 2 listed companies in Kuwait operating in oil-related industries, 2 in Saudi Arabia, 2 in Qatar, 0 in Bahrain, and 0 in Dubai.

following Islamic *Shariah* and have an Islamic *Shariah* board. Islamic firms are identified by the Articles of Association, which determines whether they operate within Islamic rules. The stocks of these firms qualify fully as Islamic-compliant for which there is no need for Islamic investor's purification.[11] Thus, the stocks of these firms are likely to be preferred by Islamic investors.[12]

The GCC stock markets provide an opportunity to compare Islamic and non-Islamic stocks. The GCC has advantages over other countries with a Muslim majority because they have a clear and stable classification of Islamic and non-Islamic stocks. The classification of Islamic stocks in the other Muslim countries continues to be modified (the stock can move from Islamic to non-Islamic classification though

[11]Purification is the process of eliminating the income resulting from interest or other prohibited revenue sources from the portfolio dividends and capital gains (e.g., Zaher & Kabir Hassan 2001, Hassan & Girard 2010).

[12]In practice, there are two general Islamic screening strategies in the mixed markets; one is strict and the other is relaxed. The strict Islamic screening strategy divides the stocks into two categories: (i) Islamic companies (norm-conforming) and (ii) conventional companies or non-Islamic companies (norm-conflicting). The relaxed Islamic screening strategy divides the stocks into three categories: (i) Islamic companies (norm-conforming); (ii) non-Islamic companies, but which operate in Islamic-acceptable industries and have a low percentage of activities that conflict with Islamic *Shariah* (norm-accepted by some Islamic traders); and (iii) non-Islamic companies with a high percentage of activities that conflict with Islamic *Shariah* (norm-conflicting). Alotaibi (2014) finds that a growing number of Islamic individual and institutional investors are adopting a strict Islamic screening strategy, and this adoption arises from religious preferences. Further, he finds that many Islamic individual and institutional investors question the *Shariah* compliance of the relaxed Islamic screening strategy. Thus, in our research, we depend on the strict Islamic screening strategy to define norm-conforming and norm-conflicting stocks.

time). Malaysia, for example, has a more relaxed and less stable classification for Islamic stocks, and Iran has a fully-compliant Islamic stock market (so that we cannot compare non-Islamic and Islamic stocks, (Pryor 2007)).

Our study, therefore, consists of the five stock markets of the GCC countries that have a high Muslim population, with both Islamic and non-Islamic stocks listed in the same market (Table 3.1).[13]

We follow the list of the *Al-Mashora and Al-Raya for Islamic Financial Consultancy* to identify the Islamic-listed stocks in these stock markets.[14] Table 3.2 shows the number of Islamic listed companies in each of the stock markets in our study.[15] Because non-Islamic stocks dominate these countries, our analysis does not contain the selection bias that could arise due to higher Islamic stocks in countries with Islamic religious practices.

The data is sourced from Thomson Datastream, with the exception of the Kuwait market for which we used Bloomberg as our source

[13]We do not include Abu Dhabi and Oman stock markets in our analyses as both markets have a small number and percentage of Islamic listed companies (9% in Abu Dhabi and 1% in Oman).

[14]As stated, investors can directly distinguish between Islamic and non-Islamic stocks in the GCC by observing the company articles of association. Based on the same classification, there are several lists available for Islamic investors in the GCC wishing to distinguish between Islamic and non-Islamic stocks (e.g., the *Al-Mashora and Al-Raya for Islamic Financial Consultancy* list and the *KFH Capital* list).

[15]We are not surprised that neither of the markets have more than 31% Islamic stocks listed in their respective stock exchanges, as the Islamic financial industry is fairly new in comparison to the conventional one.

(due to limited availability in the Thomson Datastream). Our daily data consists of stock closing prices, shares outstanding, and trading volume for the period 2004–2014. For the same period, we also obtained the firm specific variables, including firm size, firm age, and market-to-book ratio.

Table 3.3 reports the industry concentration of Islamic and non-Islamic stocks in the countries of our study, showing that the majority of the Islamic stocks are concentrated in the banking, insurance, and financial services industries. However, there is a significant presence of industrial firms in Kuwait and Saudi Arabia. Given that religiosity plays an important role in investment and savings decisions, the greater number of Islamic *Shariah* compliant firms in the financial services industry reflects the demand for religious-based financial products in the markets of the GCC countries. For this reason, we control for industry differences between Islamic and non-Islamic stocks though our tests.

3.3.2 Descriptive Statistics

We commence by comparing non-Islamic and Islamic stocks time-series returns using the Fama-French three factor model.[16] The sum-

[16]In our time-series tests from 2007–2014, there are 96 observations. Previous studies have estimated the coefficients in similar tests based on at least 60 observations (e.g., Fama & MacBeth 1973, Fama & French 1993, Chen et al. 2011)

mary statistics for the time-series variables are presented in Table 3.4. The dependent variable of our time-series tests is NMI_t, the month t return of the non-Islamic portfolio minus the return of the Islamic portfolio.[17] MRP_t is the month t market risk premium for the stocks universe. SMB_t and HML_t are Fama-French size and book-to-market return-mimicking portfolios, where SMB_t is the difference of return between small and big market capitalization portfolios in month t, and HML_t is the difference of return between high and low book-to-market portfolios in month t. We rank all stocks based on their market capitalization and use the 50th percentile as a breakpoint between small and big size portfolios. The book-to-market breakpoints are the 30th and 70th percentile to generate high, medium, and low book-to-market portfolios.[18]

The means of NMI_t indicate that, non-Islamic stocks outperform Islamic stocks in the Bahrain, Dubai, and Kuwait and underperform Islamic stocks in Qatar and Saudi Arabia.

Panel A of Table 3.5 reports the summary statistics for the return and liquidity panel regression variables. We report the excess

[17]Note that in all of our returns calculations, we exclude stocks that have been suspended during the whole month. We identify these stocks as having zero trading volume during the month and without any price change. Including these stock may lead to a bias in the results when we compare the average returns of non-Islamic and Islamic portfolios because these stocks always have a zero monthly return.

[18]Similar to Bauer et al. (2005), we used Style Research Ltd online tools to construct Fama-French factor portfolios.

return ($EXR_{i,t}$), the log of the monthly firm market capitalization ($LSIZE_{i,t}$), the monthly log of the stock market-to-book ratio ($LMB_{i,t}$), average monthly return for the previous 12 months ($RET_{i,t}$), the monthly industry rolling beta ($BETA_{i,t}$), and the log of the firm age ($LAGE_{i,t}$). We define liquidity using two proxies the monthly turnover ratio ($TOV_{i,t}$), and Karolyi et al.'s (2012) adjusted form of Amihud's (2002) illiquidity measure:[19]

$$LILLIQ_{i,t} = \frac{1}{Days_t^i} \sum_{d=1}^{Days_t^i} log\left(1 + \frac{|R_{td}^i|}{V_{td}^i}\right), \tag{3.1}$$

where R_{td}^i is the return on day d in month t, and V_{td}^i is the trading value in the local currency (in millions). The greater the stock price response to the change in volume, the greater the $LILLIQ_{i,t}$.[20]

As shown in Panel A of Table 3.5, Qatar (Kuwait) provides the highest (lowest) excess return during our sample period. Saudi Arabia has the highest trading activity with a monthly average turnover of around 131%, whereas Bahrain is the least active market.[21]

[19]The $LILLIQ$ of Karolyi et al. (2012) is calculated by adjusting Amihud's (2002) illiquidity measurement, adding a constant, and calculating the log of the daily illiquidity ratio, thereby reducing the influence of outliers.

[20]A comparison of Amihud's (2002) illiquidity ratio across countries is not possible because the ratio is affected by the differences in the magnitude of currency units (Karolyi et al. 2012). However, in our study, this issue need not be of concern since we are comparing the illiquidity ratio of norm-conflicting (non-Islamic) and norm-conforming (Islamic) portfolios within a country, and not across countries.

[21]The turnover ratio data confirms previous studies, namely, that within the GCC countries, the Saudi market has a very high turnover ratio and the Bahrain market has a very low turnover ratio (Al-Khazali et al. 2007).

Panel B of Table 3.5 reports the results of a median equality test for the return and liquidity panel regression variables. This test allows for a determination of whether Islamic stocks are inherently different from non-Islamic stocks. We find that, at the median level, non-Islamic stocks do not have significantly higher excess returns when compared to Islamic stocks. However, the absolute median values of excess returns for non-Islamic stocks are higher than those for Islamic stocks. In terms of liquidity, the median equality tests indicate that Islamic stocks have a significantly higher turnover ratio (TOV) than non-Islamic stocks in Bahrain, Kuwait, and Qatar; and that Islamic stocks have a significantly lower illiquidity ($LILLIQ$) than non-Islamic stocks in all markets with the exception of Dubai.[22]

[22]On 28 December 2011, the Kuwait Stock Exchange implemented significant changes in its stock market legal system and micro-structure. The stock market microstructure was changed from a broad-lot to an odd-lot trading system on 12 May 2012; this change in the trading system may have caused significant changes in stock returns and prices (see for instance, Hauser & Lauterbach 2003). However, in our study, this issue need not be of concern since the change in microstructure happens for both non-Islamic and Islamic stocks.

3.4 Empirical Tests

3.4.1 Returns Tests

Time-Series Return Tests

To test Hypothesis 1, we examine the monthly time-series returns of Islamic and non-Islamic stocks, estimated by the Fama-French three factor model:

$$NMI_t = \alpha + \beta_1 MRP_t + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_t, \tag{3.2}$$

where NMI_t is the monthly return of a non-Islamic portfolio minus an Islamic portfolio, specifically, an equal-weighted portfolio long in non-Islamic stocks and short in Islamic stocks; α is the intercept that represents the excess return of non-Islamic stocks; MRP_t is the monthly market risk premium; SMB_t is the return of a small minus big market capitalization portfolio in month t; HML_t is the return of a high minus low book-to-market portfolio in month t; and ε_t is the exogenous error term.

The results for the time-series tests are displayed in Table 3.6. We estimate the regression models for the period January 2007 to December 2014. The results suggest that alpha is insignificant for all

of the five markets including the factors of the Fama-French model, suggesting that there is no return difference between norm-conflicting (non-Islamic) and norm-conforming (Islamic) stocks, after controlling for the fundamental factors applied in the literature.

Panel Regression Return Test

Baltagi (2008) and Hsiao (2014) suggest that panel data regression reduces problems associated with estimation bias and multicollinearity, controls for individual heterogeneity, and specifies the time-varying relation between dependent and independent variables. Thus, to extend the test of Hypothesis 1, and examine the relative performances of Islamic and non-Islamic stocks more extensively, we apply a panel test, while controlling for firm-specific characteristics, to determine whether non-Islamic stocks outperform Islamic stocks. Thus, we estimate stock returns as:

$$EXR_{i,t} = \alpha_0 + \alpha_1 D_{i,t-1} + \boldsymbol{\beta} \boldsymbol{X}_{i,t-1} + \varepsilon_{i,t}, \tag{3.3}$$

where $EXR_{i,t}$ is the excess monthly return to the risk-free rate of stock i, regressed on the lagged previous monthly values of firm return predictors, which are $D_{i,t-1}$ as a dummy variable, equal to 1 if the stock is Islamic and 0 if non-Islamic; $X_{i,t-1}$ is a vector of firm-specific characteristics; and ε_t is the error term. $\boldsymbol{X}_{i,t-1}$ includes firm-specific

variables that have been defined earlier, $LSIZE_{i,t}$, $LMB_{i,t}$, $RET_{i,t}$, $BETA_{i,t}$, $TOV_{i,t}$, and $LAGE_{i,t}$.[23]

The coefficient α_1 indicates whether Islamic stocks have higher or lower returns than non-Islamic stocks after controlling for firm-specific characteristics. The null hypothesis is that α_1 equals zero, whereas our expectation is that it will be significantly less than zero.

Because the data are pooled (panel), heteroskedasticity and autocorrelation may influence the ordinary least squares (OLS) results. We include industry dummies and use a cluster-robust variance and covariance estimators to give more conservative standard errors (Arellano 2003). Furthermore, we include yearly dummy variables to control for the potential effect of changes in market trends that may effect stock returns such as, the Global Financial Crises (Hui 2005, Deng et al. 2013).

Table 3.7 shows the results of our panel tests. Almost all of the significant results of the panel tests are consistent with those of prior literature (with the exception of Saudi Arabia), which finds that neglected non-Islamic stocks outperform Islamic stocks. These results are consistent with the market segmentation theoretical framework of Merton (1987) and the empirical results of neglected stock returns in

[23]Following previous studies to minimize the influence of the outliers, we take the natural logarithm of the firm market capitalization, the stock market-to-book ratio, and the firm age (Galema et al. 2008, Hong & Kacperczyk 2009).

developed countries (Lemieux 2003, Ahrens 2004, Renneboog et al. 2008, Hong & Kacperczyk 2009, Luo & Balvers 2014).

One possible reason for the higher returns of norm-conforming (Islamic) stocks in Saudi Arabia is the higher retail investor trading, as cited by the Saudi Stock Market Report, 2015. In the Saudi Arabia stock market, individual trading represents around 89% of the total trading value. See, Saudi Arabia Stock Report, January 2015 (http://www.tadawul.com.sa).[24] Previous research has shown that religiosity is, in general, positively related to risk-aversion (Miller & Hoffmann 1995, Hilary & Hui 2009, Noussair et al. 2013). Thus, it is possible that the "segmentation" effect of our first hypothesis in Saudi Arabia is offset by the higher risk-aversion of Islamic retail traders who trade only Islamic stocks and require higher returns, leading to no return difference between Islamic and non-Islamic stocks.

3.4.2 Liquidity Tests

To examine whether market segmentation creates liquidity differences between norm-conflicting (non-Islamic) and norm-conforming (Islamic) stocks, we apply a separate panel regression as:

$$L_{i,t} = \alpha_0 + \alpha_1 D_{i,t-1} + \boldsymbol{\beta} \boldsymbol{X}_{i,t-1} + \varepsilon_{i,t}, \tag{3.4}$$

[24]For the same period individual trading represents around 41% in Bahrain, 71% in Dubai, 42% in Kuwait, and 61% in Qatar.

where the dependent variable $L_{i,t}$ is the liquidity proxy for stock i at time t. We use two liquidity proxies: $TOV_{i,t}$, calculated as the monthly trading volume divided by the number of shares outstanding, and Karolyi et al.'s (2012) adjusted form of Amihud's (2002) illiquidity ratio, $LILLIQ_{i,t}$.[25] $D_{i,t-1}$ is a dummy variable that is equal to 1 if the stock is Islamic and 0 otherwise. $\boldsymbol{X}_{i,t-1}$ are the variables for the firm-specific characteristics that are anticipated to affect stock liquidity: $LSIZE_{i,t}$, $LMB_{i,t}$, $RET_{i,t}$, and $BETA_{i,t}$, as defined earlier (e.g., Datar et al. 1998, Amihud et al. 2015).

Because the data are pooled (panel), heteroskedasticity and autocorrelation may influence the ordinary least squares (OLS) results. We repeat the tests including industry dummies and use a cluster-robust variance and covariance estimators to give more conservative standard errors (Arellano 2003).

As shown in Table 3.8, the results of the regressions are consistent with Hypothesis 2. All of the significant liquidity differences, after controlling for firm-specific factors, suggest that norm-conflicting (non-Islamic) stocks are less liquid than are norm-conforming (Islamic) stocks. Specifically, for the TOV, we encounter higher and significant values for Dubai, Kuwait, and Qatar Islamic stocks. For the $LILLIQ$, the results are significant for Dubai, Kuwait, and Saudi Ara-

[25]Previous studies use the same liquidity proxies and suggest that they successfully capture the essential dimensions of the liquidity (Rahim & Nor 2006).

bia, and reveal that Islamic stocks are more liquid than non-Islamic stocks, after controlling for the firm-specific factors that affect stock liquidity.

Overall, our results support Hypothesis 2 that norm-conforming (Islamic) stocks attract more investor attention than do norm-conflicting (non-Islamic) stocks.

3.4.3 Liquidity-Risks Tests

To test whether market segmentation creates a difference between Islamic and non-Islamic stock liquidity risk, we use the liquidity risk factors of Acharya & Pedersen's (2005) liquidity-adjusted CAPM. Their liquidity-adjusted CAPM captures the expected liquidity and three types of liquidity risk:

$$E(r_{i,t} - r_{f,t}) = E(c_t^i) + \lambda\beta_i^1 + \lambda\beta_i^2 - \lambda\beta_i^3 - \lambda\beta_i^4, \tag{3.5}$$

where $E(r_{i,t} - r_{f,t})$ is the expected net return and $E(c_t^i)$ is the expected relative illiquidity cost, and:

$$\beta_i^1 = \frac{cov(r_t^i, r_t^M - E_{t-1}(r_t^M))}{var(r_t^M - E_{t-1}(r_t^M) - [c_t^M - E_{t-1}(c_t^M)])}, \tag{3.6}$$

$$\beta_i^2 = \frac{cov(c_t^i - E_{t-1}(c_t^i), c_t^M - E_{t-1}(c_t^M))}{var(r_t^M - E_{t-1}(r_t^M) - [c_t^M - E_{t-1}(c_t^M)])}, \tag{3.7}$$

$$\beta_i^3 = \frac{cov(r_t^i, c_t^M - E_{t-1}(c_t^M))}{var(r_t^M - E_{t-1}(r_t^M) - [c_t^M - E_{t-1}(c_t^M)])}, \tag{3.8}$$

$$\beta_i^4 = \frac{cov(c_t^i - E_{t-1}(c_t^i), r_t^M - E_{t-1}(r_t^M))}{var(r_t^M - E_{t-1}(r_t^M) - [c_t^M - E_{t-1}(c_t^M)])}, \tag{3.9}$$

and λ is identified as:

$$\lambda = E(r_t^M - c_t^M - r^f). \tag{3.10}$$

The betas are described as follows: β^1 is the classical CAPM beta adjusted for the illiquidity cost; β^2 measures the stock illiquidity sensitivity to the market aggregate illiquidity (thus, the higher the β^2, the higher the liquidity risk and greater the expected return required by investors); β^3 measures the stock return exposure to market liquidity shocks (thus, assets with more negative β^3 have a higher required return because these stocks are riskier); β^4 measures the sensitivity of a stock's illiquidity cost to the market return (thus, the more negative β^4, the higher the risk and greater the expected return required by the investors because risk-averse investors prefer stocks with liquidity costs that do not rise when the market return falls).[26]

To calculate the Acharya & Pedersen (2005) model liquidity risk

[26]The liquidity risk betas in this model are associated with: (i) the commonality in liquidity with the market liquidity $cov(c^i, c^M)$, (ii) return sensitivity to the market liquidity $cov(r^i, c^M)$, and (iii) liquidity sensitivity to the market returns $cov(c^i, r^M)$.

betas of Islamic and non-Islamic stocks, we proceed as follows:

(i) For each month t of our sample, we estimate Karolyi et al.'s (2012) adjusted form of Amihud's (2002), $LILLIQ$.

(ii) In line with previous studies (Pastor & Stambaugh 2001, Acharya & Pedersen 2005, Lee 2011), we calculate the innovation of the illiquidity of the portfolios when computing the liquidity betas. This is because liquidity is persistent and the level of autocorrelation in the market illiquidity for the monthly data is high. To compute the market illiquidity innovation, we run the following regression:

$$(LILLIQ_t^M P_{t-1}^M) = a_0 + a_1(LILLIQ_{t-1}^M P_{t-1}^M) + u_t, \tag{3.11}$$

for the market portfolio as well as for the Islamic and non-Islamic illiquidity portfolios. We estimate the innovations in illiquidity using the first order autoregressive AR(1), as Equation (3.11), where the residual, u_t, of the regression is the illiquidity innovation. Moreover, similar to Acharya & Pedersen (2005), we introduce the market capitalizations ratio P_{t-1}^M as a scaling factor to ensure that the model of illiquidity is relatively stationary.

(iii) Using these illiquidity innovations and returns, we estimate the monthly liquidity risk rolling betas as Equations 3.7–3.9, based on a 36-month rolling window. This is consistent with previous studies that calculate the beta for asset pricing models based on a 36-month

rolling window (e.g., Florackis et al. 2011). In addition, to capture the total effect of the three liquidity risk dimensions, we follow Acharya & Pedersen (2005) and Lee (2011) by calculating the net liquidity beta as:

$$\beta_i^{Lnet} \equiv \beta_i^2 - \beta_i^3 - \beta_i^4. \tag{3.12}$$

(iv) The final step is to test the difference between Islamic and non-Islamic stock liquidity risk by running panel regressions after controlling for firm-specific factors that affect stock liquidity, including industry dummies and use a cluster-robust variance and covariance estimators to give more conservative standard errors (Arellano 2003).

The means of the monthly liquidity risk betas, calculated based on a 36-month rolling window, are reported in Table 3.9. As explained in the methodology section, we analyze three liquidity risk dimensions captured by liquidity risk betas: (i) β^2 commonality in liquidity with the market liquidity $cov(c^i, c^M)$, (ii) β^3 return sensitivity to market liquidity $cov(r^i, c^M)$, and (iii) β^4 liquidity sensitivity to market returns $cov(c^i, r^M)$. The total influence of these liquidity risk betas is captured by the net beta β^{Lnet}. A higher positive β^2 as well as a higher negative β^3 and β^4 indicate greater liquidity risk.

We present the betas of Acharya & Pedersen (2005) for norm-conforming (Islamic) and norm-conflicting (non-Islamic) stocks sepa-

rately. The results are reported in Table 3.9, and indicate that the signs of β^2, β^3, and β^4 are consistent with Acharya & Pedersen (2005). In other words, β^2 has a positive sign and β^3 and β^4 have negative signs, indicating that the factors driving the liquidity premium in the GCC countries are the same as those in the U.S. market. We conclude that Acharya & Pedersen's (2005) model is suitable for testing the liquidity difference between Islamic and non-Islamic stocks.

The results of the panel regression tests in Table 3.10 show that β^2 in all markets are significant and suggest that Islamic stocks have lower commonality in liquidity with the market liquidity. We expect that an asset's required rate of return should increase when the asset is subject to more commonality in liquidity with the market liquidity (Chordia et al. 2002, Hasbrouck & Seppi 2001, Huberman & Halka 2001). In other words, investors expect to be rewarded for holding non-Islamic stocks that have more commonality with the market liquidity (more liquidity risk) than do Islamic stocks, which supports Hypothesis 3.

The results of β^3 are mixed. For Bahrain and Dubai, the results are inconsistent with those of the previous literature. For β^3, Acharya & Pedersen (2005) find that stocks with high average illiquidity have large negative values for the beta that represents the $cov(r^i, c^M)$. In other words, stocks that are illiquid in absolute terms also tend to

have a greater return sensitivity to market liquidity $cov(r^i, c^M)$.

The prior literature in relation to β^4 suggests that illiquid stocks in absolute terms also tend to have larger negative values for β^4, as well as high liquidity sensitivity to market returns (Acharya & Pedersen 2005). Risk-averse investors prefer stocks with liquidity costs that do not rise when the market return falls; thus, they require higher returns from stocks with higher $cov(c^i, r^M)$. In contrast with prior findings in the literature, our results for β^4 show that more liquid stocks in absolute terms (Islamic stocks) have higher liquidity risk than do the less liquid stocks (non-Islamic), in relation to $cov(c^i, r^M)$. This may support the idea that Islamic stocks are traded by Islamic traders who are more religious and risk-averse than are non-Islamic traders and require higher returns during financial crises as compensation for high stock-liquidity sensitivity to market returns (Miller & Hoffmann 1995, Hilary & Hui 2009, Noussair et al. 2013).[27]

Our results for the three liquidity risk betas lead to mixed conclusions. However, when we apply the net beta to capture the total effect of the three liquidity risk dimensions, we find that the net beta β^{Lnet} is significantly lower for Islamic stocks in all markets, suggesting that norm-conforming (Islamic) stocks, in general, have relatively lower

[27]Previous findings suggest that Islamic stocks outperform the market only during crises (Ho et al. 2014). Based on our liquidity-risk betas, this could be a compensation for the higher liquidity sensitivity to declines in market returns.

liquidity risk than do norm-conflicting (non-Islamic) stocks. This supports Hypothesis 3.

3.5 Conclusion

Existing research indicates that social norms have a significant influence on investor behavior. The question we address in this study is whether investor social norms in relation to religiosity impede market development. To address this issue, we avail of data from the GCC countries. Investors in these countries have explicit Islamic *Shariah* rules that prohibit trading norm-conflicting (non-Islamic) stocks. Nevertheless, stock markets in these countries are seeking to encourage the listing of local and foreign norm-conflicting stocks as they strive to compete globally to become financial centers.

We test the conjecture that in markets that are dominated by strong social norms, those stocks that conflict with the accepted norms are relatively neglected. We find significant returns, liquidity and liquidity risk differences between norm-conflicting (non-Islamic) and norm-conforming (Islamic) stocks. Specifically, neglected non-Islamic stocks have higher returns, less liquidity and more liquidity risk in comparison to Islamic stocks.

It is important for regulators and institutions to understand the consequences of investors' behavior in response to stock returns and

liquidity. Our results highlight the possible challenges that GCC countries will face as they seek to emerge as globally competitive stock markets.

Appendix I to Chapter 3: Tables

Table 3.1: Muslim Population of GCC
This table presents the percentage of Muslims to the total population as well as the total population in millions for the GCC countries (from the PEW Research Center's 2011 report "The Future of the Global Muslim Population").

Country	*Muslims to Total Population (%)*	*Total Population (000,000')*
Bahrain	81.2	1.26
Kuwait	86.4	2.74
Qatar	77.5	1.76
Saudi Arabia	97.1	27.45
UAE	76.0	7.51

Table 3.2: GCC Stock Markets Descriptions
This table presents the number of listed Islamic firms in the stock markets of our study as of 31 December 2014 (based on the list of Al-Mashora and Al-Raya for the Islamic Financial Consultancy). This table also reports the total market capitalization as of 31 December 2014 for each stock market in U.S. dollars as well as the average market capitalization for listed firms in each stock market in U.S. dollars (taken from Bloomberg).

Stock Market	*Number of Listed Firms*	*Number of Islamic Firms*	*Percentage of Islamic Firms (%)*	*Market Cap in US$ (000,000')*	*Average Firm Market Cap in US$ (000,000')*
Bahrain	48	11	23	21,893	592
Dubai	71	20	28	80,236	2,483
Kuwait	203	62	31	101,179	562
Qatar	43	10	23	154,065	7,783
Saudi Arabia	167	39	23	482,145	2,720

Table 3.3: Industry Distribution of Islamic and Non-Islamic Stocks

This table presents the industry distribution percentages of the listed Islamic and non-Islamic stocks in the stock markets of our study as of 31 December 2014. The sector classification is from Worldscope's General Industry Classification. The percentage of Islamic stocks in each sector has been calculated as the number of Islamic stocks in that sector divided by the total number of Islamic stocks in the market. We calculated the percentage of non-Islamic stocks in each sector in the same manner.

Stock Market	*Industrial*	*Utility*	*Transportation*	*Bank & Loan*	*Insurance*	*Financial*
Bahrain						
Islamic	0.0	0.0	0.0	62.5	12.5	25.0
Non-Islamic	56.7	6.7	0.0	13.3	10.0	13.3
Dubai						
Islamic	16.67	0.00	0.00	41.67	33.33	8.33
Non-Islamic	48.65	5.41	5.41	13.51	21.62	5.41
Kuwait						
Islamic	37.5	0.0	1.8	12.5	3.6	44.6
Non-Islamic	47.4	3.2	3.2	1.9	3.2	40.9
Qatar						
Islamic	0.0	0.0	0.0	30.0	20.0	50.0
Non-Islamic	54.1	5.4	8.1	13.5	8.1	10.8
Saudi Arabia						
Islamic	48.3	0.0	0.0	13.8	34.5	3.4
Non-Islamic	70.9	4.3	3.4	6.8	11.1	3.4

Table 3.4: Summary Statistics for Time-Series Regression Variables

This table presents the summary statistics for the time-series regression variables for 2007–2014. NMI_t is the month t return of the non-Islamic portfolio minus that of the Islamic portfolio. MRP_t is the month t market risk premium for the stocks universe. SMB_t and HML_t are Fama-French size and book-to-market return-mimicking portfolios.

Stock Market	*NMI (%)*	*MRP (%)*	*SMB (%)*	*HML (%)*
Bahrain				
Mean	0.11	0.24	-0.59	0.69
St. dev.	7 .20	2.49	6.04	6.49
Dubai				
Mean	0.95	0.79	-0.76	1.22
St. dev.	3.44	10.06	4.46	6.02
Kuwait				
Mean	0.17	-0.36	-0.36	1.02
St. dev.	3.27	6.45	5.49	6.35
Qatar				
Mean	-0.22	1.04	0.20	0.24
St. dev.	4.38	6.72	5.89	5.30
Saudi Arabia				
Mean	-0.12	0.59	-0.08	0.15
St. dev.	3.94	7.79	5.30	2.24

Table 3.5: Summary Statistics for Return and Liquidity Panel Regression Variables

This table presents the summary statistics for the panel regression variables for 2007–2014. The mean is the time-series average of means, median is the time-series median of means, and st. dev. is the time-series average of standard deviations. $LSIZE_{i,t}$ is the monthly natural logarithm of the firm market capitalization in local currency in thousands, $LMB_{i,t}$ is the monthly log of the stock market-to-book ratio, $RET_{i,t}$ is stock i's average monthly return for the previous 12 months, $BETA_{i,t}$ is the rolling beta for the industry to which firm i belongs (calculated at month t based on the previous 36 months), $LAGE_{i,t}$ is the log of the firm's age calculated on a monthly basis, $TOV_{i,t}$ is stock i's turnover ratio for the month t, and $LILLIQ$ is Karolyi et al.'s (2012) illiquidity ratio. Panel A reports the mean, median, and standard deviation of the panel regression variables for the overall market data. Panel B reports the median equality test between Islamic and non-Islamic stocks for the panel regression variables. The p-values correspond to a Wilcoxon-Mann-Whitney signed rank median test.

Panel A: Mean, Median, and St. Dev.								
Stock Market	*EXR (%)*	*LSIZE (000')*	*LMB*	*RET (%)*	*BETA*	*LAGE*	*TOV (%)*	*LILLIQ*
Bahrain								
Mean	0.25	10.70	0.16	0.33	1.00	8.99	0.38	0.45
Median	0.26	10.68	0.19	0.33	0.98	9.01	0.29	0.40
St. dev.	3.01	0.11	0.14	1.36	0.05	0.15	0.34	0.19
Dubai								
Mean	0.59	14.16	0.22	1.65	0.96	8.72	10.43	0.12
Median	0.61	13.98	0.08	1.55	0.95	8.75	8.78	0.12
St. dev.	10.33	0.47	0.44	5.29	0.04	0.15	7.64	0.07
Kuwait								
Mean	-0.37	10.91	-0.10	-0.01	1.11	7.93	7.36	0.78
Median	0.20	10.77	-0.22	-0.11	1.08	7.91	6.02	0.65
St. dev.	5.81	0.34	0.31	1.96	0.09	0.30	4.36	0.42
Qatar								
Mean	1.04	14.89	0.49	0.83	1.02	8.59	6.31	0.07
Median	1.13	14.88	0.43	1.30	1.01	8.64	5.22	0.14
St. dev.	6.72	0.28	0.20	2.40	0.05	0.21	3.80	0.14
Saudi Arabia								
Mean	0.60	14.93	1.03	0.54	0.95	8.69	131.13	0.0018
Median	0.88	14.92	1.00	1.01	0.92	8.69	79.48	0.0012
St. dev.	8.03	0.25	0.22	2.33	0.06	0.16	18.33	0.00

Table 3.5 *(continued)*

Panel B: Median Equality Test								
Stock Market	*EXR (%)*	*LSIZE (000')*	*LMB*	*RET (%)*	*BETA*	*LAGE*	*TOV (%)*	*LILLIQ*
Bahrain								
Islamic	-0.13	11.12	0.06	0.56	1.09	8.61	0.32	0.27
Non-Islamic	0.22	10.59	0.22	0.24	0.97	9.12	0.26	0.48
P-value	(0.63)	(0.00)	(0.24)	(0.65)	(0.00)	(0.00)	(0.01)	(0.00)
Dubai								
Islamic	-0.81	13.30	-0.66	1.39	1.01	8.20	8.54	0.099
Non-Islamic	0.14	14.28	0.35	1.42	0.94	8.89	8.32	0.103
P-value	(0.67)	(0.00)	(0.00)	(0.13)	(0.00)	(0.00)	(0.58)	(0.48)
Kuwait								
Islamic	0.06	10.59	-0.33	-0.19	1.10	7.57	8.93	0.59
Non-Islamic	0.25	10.87	-0.16	0.00	1.08	8.04	4.91	0.64
P-value	(0.84)	(0.00)	(0.00)	(0.52)	(0.00)	(0.00)	(0.00)	(0.02)
Qatar								
Islamic	0.96	15.02	0.54	0.62	1.18	8.66	6.42	0.03
Non-Islamic	0.95	14.84	0.42	1.46	0.96	8.63	4.44	0.07
P-value	(0.91)	(0.00)	(0.00)	(0.25)	(0.00)	(0.19)	(0.00)	(0.00)
Saudi Arabia								
Islamic	0.26	14.57	0.82	1.00	0.95	8.45	51.28	0.001
Non-Islamic	1.47	15.01	1.09	1.64	0.90	8.74	80.83	0.0013
P-value	(0.74)	(0.00)	(0.00)	(0.41)	(0.00)	(0.00)	(0.00)	(0.00)

Table 3.6: Return Time-Series Regression Tests

This table reports the coefficients of the portfolio long norm-conflicting (non-Islamic) and short norm-conforming (Islamic) stocks (*NMI*) from 2007–2014. *MRP* is an equally weighted market risk premium. *SMB* is the portfolio mimicking the return difference between the stocks of small and big market capitalization companies. *HML* is the portfolio mimicking the return difference between high and low book-to-market stocks. The standard errors are in parenthesis and have been adjusted for serial correlation using Newey-West correction. ***1%, **5%, *10% level of significance.

Stock Market	α	*MRP*	*SMB*	*HML*
Bahrain				
(1)	0.005	-1.448***		
	(0.006)	(0.209)		
(2)	0.006	-1.348	0.221**	
	(0.006)	(0.210)	(0.101)	
(3)	0.006	-1.379***	0.122	-0.162
	(0.006)	(0.209)	(0.119)	(0.107)
Dubai				
(1)	0.010	-0.043		
	(0.010)	(0.097)		
(2)	0.011	-0.039	0.147	
	(0.010)	(0.097)	(0.197)	
(3)	0.012	-0.026	0.114	-0.109
	(0.010)	(0.100)	(0.204)	(0.172)
Kuwait				
(1)	0.001	-0.278***		
	(0.003)	(0.051)		
(2)	0.000	-0.281***	-0.188***	
	(0.003)	(0.047)	(0.050)	
(3)	0.002	-0.199***	-0.235***	-0.185***
	(0.003)	(0.048)	(0.048)	(0.045)
Qatar				
(1)	0.002	-0.380***		
	(0.004)	(0.055)		
(2)	0.002	-0.382***	-0.124**	
	(0.004)	(0.054)	(0.061)	
(3)	0.003	-0.390***	-0.192***	-0.155**
	(0.004)	(0.053)	(0.069)	(0.077)
Saudi Arabia				
(1)	0.000	-0.201**		
	(0.004)	(0.046)		
(2)	0.000	-0.188***	-0.112	
	(0.004)	(0.047)	(0.071)	
(3)	0.000	-0.186***	-0.094	0.066
	(0.004)	(0.047)	(0.076)	(0.103)

Table 3.7: Return Panel Regression Tests

This table reports the coefficients of the panel regressions for 2007–2014, including industry and year dummies. The dependent variable $EXR_{i,t}$ is the monthly return net of the risk-free rate for stock i in month t, and $D_{i,t}$ is the dummy variable equal to 1 if the stock is Islamic and 0 otherwise. $LSIZE_{i,t}$ is the monthly natural logarithm for the market capitalization of firm i; $LMB_{i,t}$ is the monthly log of the stock market-to-book ratio; $RET_{i,t}$ is the stock i average monthly return for the previous 12 months; and $BETA_{i,t}$ is the rolling beta for the industry to which firm i belongs, calculated at month t based on the previous 36 months. $TOV_{i,t}$ is stock i's turnover ratio for the month t, and $LAGE_{i,t}$ is the log of the firm's age. The standard errors are in parentheses. ***1%, **5%, and *10% denote levels of significance.

Stock Market	*D*	*LSIZE*	*LMB*	*RET*	*BETA*	*TOV*	*LAGE*
Bahrain							
(1)	-0.005	-0.003**					
	(0.004)	(0.001)					
(2)	-0.010**	-0.0003	-0.015***				
	(0.005)	(0.002)	(0.005)				
(3)	-0.012**	0.000	-0.018***	-0.199**			
	(0.005)	(0.003)	(0.006)	(0.089)			
(4)	-0.013**	-0.001***	-0.017**	-0.209	-0.022**		
	(0.005)	(0.003)	(0.006)	(0.089)	(0.018)		
(5)	-0.013***	0.000	-0.017***	-0.201***	-0.019**	0.857***	
	(0.005)	(0.003)	(0.005)	(0.086)	(0.017)	(0.151)	
(6)	-0.008***	-0.002	-0.014**	-0.204**	-0.018	0.865***	0.005***
	(0.009)	(0.003)	(0.007)	(0.012)	(0.098)	(0.196)	(0.004)
Dubai							
(1)	-0.019	0.003					
	(0.014)	(0.004)					
(2)	-0.021	0.007	-0.003				
	(0.016)	(0.007)	(0.005)				
(3)	-0.025	0.011	-0.003	-0.156***			
	(0.022)	(0.009)	(0.007)	(0.028)			
(4)	-0.026	0.010	-0.003	-0.157***	0.038		
	(0.023)	(0.009)	(0.007)	(0.029)	(0.079)		
(5)	-0.011	0.000	-0.001	-0.004	-0.032	0.003	
	(0.009)	(0.004)	(0.003)	(0.009)	(0.060)	(0.017)	
(6)	-0.017**	-0.001	0.000	0.009	-0.021	0.015	-0.005
	(0.009)	(0.003)	(0.003)	(0.058)	(0.018)	(0.018)	(0.004)

Table 3.7 *(continued)*

Stock Market	*D*	*LSIZE*	*LMB*	*RET*	*BETA*	*TOV*	*LAGE*
Kuwait							
(1)	0.000	0.005***					
	(0.002)	(0.001)					
(2)	0.000	0.003***	0.007***				
	(0.002)	(0.001)	(0.002)				
(3)	0.000	0.003***	0.007***	-0.088***			
	(0.002)	(0.001)	(0.002)	(0.032)			
(4)	0.000	0.003***	0.007***	-0.107***	0.037***		
	(0.002)	(0.001)	(0.002)	(0.034)	(0.008)		
(5)	-0.008**	0.005***	0.007***	-0.208***	0.040***	0.163***	
	(0.004)	(0.001)	(0.003)	(0.037)	(0.008)	(0.019)	
(6)	-0.009**	0.007***	0.009***	0.043***	-0.258***	0.166***	-0.002***
	(0.004)	(0.002)	(0.003)	(0.009)	(0.043)	(0.019)	(0.002)
Qatar							
(1)	0.002	0.002***					
	(0.003)	(0.001)					
(2)	-0.001	0.000	0.023***				
	(0.002)	(0.001)	(0.003)				
(3)	-0.002	0.000	0.028***	-0.221***			
	(0.003)	(0.001)	(0.004)	(0.084)			
(4)	-0.002	0.000	0.027***	-0.221***	0.012		
	(0.003)	(0.001)	(0.004)	(0.083)	(0.016)		
(5)	-0.008**	0.007***	0.022***	-0.283***	-0.005	0.218***	
	(0.004)	(0.002)	(0.005)	(0.089)	(0.015)	(0.036)	
(6)	-0.009**	0.006***	0.025***	-0.002***	-0.324	0.219***	0.004***
	(0.004)	(0.002)	(0.005)	(0.014)	(0.097)	(0.038)	(0.003)
Saudi Arabia							
(1)	0.003*	0.005***					
	(0.002)	(0.001)					
(2)	0.004*	0.005***	0.002*				
	(0.002)	(0.001)	(0.001)				
(3)	0.004*	0.006***	0.003**	-0.296***			
	(0.003)	(0.001)	(0.001)	(0.042)			
(4)	0.004*	0.006***	0.003**	-0.294***	0.014		
	(0.003)	(0.001)	(0.001)	(0.042)	(0.010)		
(5)	0.004*	0.006***	0.003**	-0.293***	0.015	0.000*	
	(0.003)	(0.001)	(0.001)	(0.042)	(0.010)	(0.000)	
(6)	0.005*	0.005***	0.004***	0.031***	-0.402***	0.000	0.000
	(0.003)	(0.001)	(0.001)	(0.011)	(0.047)	(0.000)	(0.002)

Table 3.8: Liquidity Regression Tests

This table reports the coefficients of the panel regressions for 2007–2014 for the liquidity proxies including industry dummies. The dependent variables are the liquidity proxies; $TOV_{i,t}$ is the stock turnover ratio calculated as the monthly trading volume divided by the number of shares outstanding; and $LILLIQ$ is the adjusted form of Amihud's (2002) illiquidity ratio. The independent variables are firm-specific factors and D is a dummy variable that is equal to 1 if the stock is Islamic and 0 otherwise. The standard errors are in parentheses. ***1%, **5%, and *10% denote levels of significance.

Stock Market	*D*	*LSIZE*	*LMB*	*RET*	*BETA*
Bahrain					
TOV	0.001	-0.001	0.000	-0.009	-0.003
	(0.001)	(0.001)	(0.001)	(0.019)	(0.002)
LILLIQ	-0.108	-0.038	0.094	0.715	0.052
	(0.119)	(0.030)	(0.062)	(0.685)	(0.081)
Dubai					
TOV	0.083***	0.011	0.008	0.003	-0.099**
	(0.017)	(0.009)	(0.007)	(0.025)	(0.043)
LILLIQ	-0.060***	-0.046***	0.030***	-0.035	-0.183***
	(0.021)	(0.008)	(0.008)	(0.040)	(0.056)
Kuwait					
TOV	0.053***	-0.009***	-0.003	0.582***	-0.011
	(0.018)	(0.005)	(0.003)	(0.110)	(0.017)
LILLIQ	-0.298***	-0.397***	0.090***	-0.963	-0.104
	(0.088)	(0.036)	(0.024)	(0.661)	(0.114)
Qatar					
TOV	0.029**	-0.032***	0.024*	0.287	0.081***
	(0.012)	(0.009)	(0.014)	(0.175)	(0.039)
LILLIQ	-0.036	-0.036	0.017	-0.272*	-0.012
	(0.041)	(0.024)	(0.031)	(0.162)	(0.028)
Saudi Arabia					
TOV	-0.002	-1.248	3.018	8.976	2.472
	(0.609)	(0.897)	(2.138)	(5.872)	(2.185)
LILLIQ	-0.001**	-0.0004***	0.0001	-0.018***	-0.001*
	(0.000)	(0.000)	(0.000)	(0.003)	(0.001)

Table 3.9: Liquidity Risk Betas

This table reports the means of the monthly liquidity risk betas for 2007–2014 for Acharya & Pedersen's (2005) liquidity risk dimensions. The liquidity risk betas are calculated based on a 36-month rolling window. β_2 represents the commonality in liquidity with the market liquidity $cov(c^i, c^M)$, β_3 represents the return sensitivity to the market liquidity $cov(r^i, c^M)$, β_4 represents the liquidity sensitivity to the market returns $cov(c^i, r^M)$, and β^{Lnet} represents the total effect of the liquidity risk betas. The standard errors of the means are in parentheses.

	β_2	β_3	β_4	β^{Lnet}
Bahrain				
Islamic	0.490	-0.025	-0.024	0.539
	(0.013)	(0.006)	(0.004)	(0.020)
Non-Islamic	1.080	-0.017	-0.020	1.117
	(0.011)	(0.003)	(0.003)	(0.008)
Dubai				
Islamic	0.570	-0.038	-0.038	0.647
	(0.039)	(0.003)	(0.002)	(0.043)
Non-Islamic	1.072	-0.028	-0.020	1.120
	(0.024)	(0.002)	(0.003)	(0.020)
Kuwait				
Islamic	0.793	-0.014	-0.027	0.835
	(0.013)	(0.007)	(0.009)	(0.015)
Non-Islamic	0.876	-0.017	-0.002	0.894
	(0.012)	(0.006)	(0.003)	(0.008)
Qatar				
Islamic	0.546	-0.003	-0.059	0.608
	(0.021)	(0.010)	(0.014)	(0.033)
Non-Islamic	0.741	-0.021	-0.023	0.785
	(0.018)	(0.008)	(0.006)	(0.015)
Saudi Arabia				
Islamic	0.012	0.001	-0.008	0.019
	(0.001)	(0.001)	(0.000)	(0.001)
Non-Islamic	0.014	-0.006	-0.005	0.025
	(0.002)	(0.001)	(0.001)	(0.001)

Table 3.10: Liquidity Risk Regression Tests

This table reports the coefficients of the panel regressions for 2007–2014 for Acharya & Pedersen's (2005) liquidity risk dimensions, including industry dummies. The dependent variables are the liquidity risk betas of the Acharya & Pedersen (2005) model. The independent variables are D, dummy variable (equal to 1 if the stock is Islamic), and the firm-specific factors. The standard errors are in parentheses. ***1%, **5%, and *10% denote levels of significance.

Stock Market	*D*	*LSIZE*	*LMB*	*RET (%)*	*BETA*
Bahrain					
β^2	-0.560***	0.031***	-0.074***	-0.385**	0.029
	(0.015)	(0.007)	(0.022)	(0.161)	(0.072)
β^3	-0.027***	0.007***	-0.034***	0.166**	-0.015
	(0.005)	(0.002)	(0.006)	(0.066)	(0.024)
β^4	-0.009	0.009***	-0.033***	0.094**	0.005
	(0.004)	(0.002)	(0.004)	(0.038)	(0.022)
β^{Lnet}	-0.523***	0.015***	-0.007	-0.646***	0.039
	(0.020)	(0.006)	(0.023)	(0.213)	(0.066)
Dubai					
β^2	-0.460***	-0.018***	0.009	0.017	0.042
	(0.015)	(0.006)	(0.006)	(0.019)	(0.042)
β^3	-0.007***	0.002***	0.001***	-0.002	0.034***
	(0.001)	(0.000)	(0.000)	(0.002)	(0.003)
β^4	-0.016***	0.001***	0.001***	-0.001	0.033***
	(0.001)	(0.000)	(0.000)	(0.002)	(0.003)
β^{Lnet}	-0.437***	-0.021***	0.006	0.020	-0.025
	(0.015)	(0.006)	(0.006)	(0.019)	(0.042)
Kuwait					
β^2	-0.072***	0.002	0.000	0.556***	0.241***
	(0.003)	(0.001)	(0.001)	(0.066)	(0.025)
β^3	0.006***	0.006***	0.005***	0.212***	0.185***
	(0.002)	(0.001)	(0.002)	(0.028)	(0.018)
β^4	-0.024***	0.006***	0.005***	0.057**	0.116***
	(0.002)	(0.001)	(0.002)	(0.022)	(0.012)
β^{Lnet}	-0.054***	-0.011***	-0.010***	0.287***	-0.061***
	(0.004)	(0.002)	(0.003)	(0.056)	(0.019)
Qatar					
β^2	-0.185***	0.015***	0.009	0.282	0.060
	(0.010)	(0.004)	(0.016)	(0.185)	(0.107)
β^3	0.005	-0.004	0.034***	-0.260***	0.113*
	(0.007)	(0.003)	(0.009)	(0.079)	(0.046)
β^4	-0.053***	-0.003	0.033***	-0.192*	0.093*
	(0.007)	(0.003)	(0.010)	(0.076)	(0.039)
β^{Lnet}	-0.101***	0.003	-0.011	0.002	-0.015
	(0.008)	(0.003)	(0.012)	(0.115)	(0.046)
Saudi Arabia					
β^2	-0.001	0.000	0.001	-0.089***	0.021***
	(0.001)	(0.000)	(0.001)	(0.014)	(0.007)
β^3	0.007***	0.000***	0.000	-0.061***	0.008**
	(0.001)	(0.000)	(0.000)	(0.009)	(0.004)
β^4	-0.003***	0.000***	0.000	-0.043***	0.004
	(0.000)	(0.000)	(0.000)	(0.006)	(0.003)
β^{Lnet}	-0.006***	0.001***	0.000***	0.014***	0.010***
	(0.000)	(0.000)	(0.000)	(0.005)	(0.003)

Appendix II to Chapter 3: Islamic Institutional Investors

Islamic institutional investors are guided by explicit rules that prohibit investing in stocks that conflict with Islamic *Shariah* rules. In addition, Islamic institutional investors are expected to have a *Shariah* board committee that ensures institutional transactions are acceptable within *Shariah* rules.

For example, Kuwait Finance House (KFH), an Islamic-listed institution on the KSE, notes in Article (5) of its Memorandum & Articles of Association:

> "Purchase shares, certificates of investment and similar financial papers, either for the account of the Company or for the account of third parties provided **that they do not conflict with the Islamic *Shariah***."

Article (7) of the KFH Memorandum & Articles of Association notes that the institution has an independent *Shariah* board to ensure that they operate within Islamic rules:

> "An independent entity called the ***Fatwa* and *Shariah* Supervisory Board** is to be founded in the Company which comprises no less than three scholars who are specialized in Islamic Jurisprudence

> and hold university degrees in the subject to be appointed by the Company's General Assembly."

As another example, the Aljazira Takaful Ta'wuni Company, one of the Islamic-listed institutions on the Saudi Arabia Stock Exchange, notes in its prospectus in Section (5):

> "The company intends to exercise cooperative insurance activity in the protection and saving sector **in compliance with the provisions of Islamic *Shariah***, in accordance with the Cooperative Insurance Companies Control Law issued by Royal Decree No. M/32 on 02/06/1424H, and there is no intention currently to change the activity."

Section (7) of the Aljazira Takaful Ta'wuni Company prospectus notes that it has a *Shariah* board to ensure that it operates within Islamic rules and to:

> "Approve the company products after affirming their **compliance with the principles of Islamic *Shariah***."

Appendix III to Chapter 3: Summary of Main Previous Studies

This appendix consists of summaries for the related studies in regard to the performance of norm-conflicting (non-Islamic, unethical, or sin) and norm-conforming (Islamic, ethical, or socially responsible) investments. Table 3.11 reports several aspects of the reviewed studies, including their aims, sample periods, data types, performance tests used, and main findings.

Table 3.11: Related Studies of the Performance of Norm-Conflicting and Norm-Conforming Stocks

Study (Authors & Date)	Aims	Sample & Period	Data Type	Performance Tests	Main Findings
Hakim & Rashidian (2002)	To examine the effect of Islamic *Shariah* on performance, diversification, and risk, and to examine the correlation and long-term relationship between Islamic and non-Islamic indexes	◇ U.S., Dow Jones Islamic Market Index (DJIM), and Wilshire-5000 Index (W5000): 1999–2002	Index-level	◇ Sharpe ratio	Using risk-adjusted returns, the Islamic index outperforms its conventional counterpart. Thus, the filtering criteria adopted to eliminate stocks that do not comply with Islamic *Shariah* does not affect the performance of the Islamic index
Hussein (2004)	To compare the performance of Islamic investments with their benchmarks	◇ FTSE Global Islamic Index and All-World Index: 1996–2003	Index-level	◇ Sharpe ratio ◇ Treynor index ◇ Jensen's alpha ◇ Capital asset pricing model (CAPM) ◇ Cumulative returns (CRs)	There is no return difference between the Islamic index and FTSE All-World index over the entire period. However, the Islamic index underperforms its counterpart index in the bearish market period
Elfakhani et al. (2005)	To compare the performance of Islamic and non-Islamic mutual funds	◇ 46 Islamic mutual funds: 1997–2002	Fund-level	◇ Sharpe ratio ◇ Treynor index ◇ Capital asset pricing model (CAPM) ◇ Fama-French three-factor model	In general, there is no risk-adjusted return difference between Islamic and non-Islamic mutual funds
Hussein & Omran (2005)	To examine the short-term and long-term performance of the Dow-Jones Islamic index	◇ Dow-Jones Islamic index: 1996–2003	Index-level	*Short-term analysis:* ◇ Sharpe ratio ◇ Treynor index ◇ Jensen's alpha *Long-term analysis:* ◇ Cumulative abnormal returns (CARs) ◇ Buy-and-hold abnormal returns ◇ Jensen abnormal return model	Islamic indexes have positive abnormal returns over the entire period, but they underperform their conventional counterpart during a bearish market

Table 3.11 *(continued)*

Study (Authors & Date)	**Aims**	**Sample & Period**	**Data Type**	**Performance Tests**	**Main Findings**
Brammer et al. (2006)	To examine the relationship between corporate social performance and stock returns	◇ U.K.: 2002–2005	Stock-level	◇ Cross-sectional regressions ◇ Fama-French three-factor model ◇ Carhart four-factor model	Corporate social performance is negatively related to stock returns
Abdullah et al. (2007)	To compare the performance of Islamic and conventional mutual funds	◇ Malaysian capital market: 1992–2001	Fund-level	◇ Sharpe ratio ◇ Adjusted Sharpe ratio ◇ Jensen's alpha ◇ Timing and selectivity ability	Conventional funds perform better than Islamic funds during bullish economic conditions, while Islamic funds perform better than conventional funds during bearish market conditions
Fabozzi et al. (2008)	To examine the performance of sin stocks	◇ Australia, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Italy, Japan, Korea, Netherlands, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, Taiwan, U.K., and U.S.: 1970–2007	Stock-level	◇ Capital asset pricing model (CAPM)	Sin portfolios outperform common benchmarks
Galema et al. (2008)	To examine the effect of socially responsible investments (SRIs) on stock returns	*U.S. stocks included in:* ◇ S&P 500 Index: 1990–2006 ◇ Domini 400 Social Index: 2001–2006 ◇ Russell 1000: 2001–2006 ◇ Russell 2000: 2003–2006	Stock-level	◇ Carhart four-factor model ◇ Fama-MacBeth regression	The demand difference between socially responsible investments (SRIs) and non-SRIs is reflected in a stock's book-to-market ratio

Table 3.11 *(continued)*

Study (Authors & Date)	**Aims**	**Sample & Period**	**Data Type**	**Performance Tests**	**Main Findings**
Hashim (2008)	To investigate the risk and returns associated with the Islamic index	◇ FTSE Global Islamic Index, FTSE All-World Index, and FTSE4Good Index: 1999–2007	Index-level	◇ Capital asset pricing model (CAPM)	The Islamic index outperforms the well diversified socially responsible index (FTSE4Good)
Hong & Kacperczyk (2009)	To examine whether social norms against sin stocks affect stock market outcomes	◇ U.S., and for robustness: Canada, France, Germany, Italy, Netherlands, Spain, Switzerland, and U.K.: 1985–2006	Stock-level	◇ Capital asset pricing model (CAPM) ◇ Fama-French three-factor model ◇ Carhart four-factor model ◇ Cross-sectional tests ◇ Panel regressions ◇ Fama-MacBeth regression	Sin stocks are neglected by norm-constrained institutions; they receive less analyst coverage and higher expected returns than do the comparable stocks
Statman & Glushkov (2009)	To examine the returns of socially responsible investments (SRIs)	◇ Stocks rated by KLD (social responsibility characteristics)	Stock-level	◇ Capital asset pricing model (CAPM) ◇ Fama-French three-factor model ◇ Carhart four-factor model	Neglecting sin stocks results in disadvantage for socially responsible portfolios relative to conventional portfolios
Hassan & Girard (2010)	To examine the performance of Islamic indexes and non-Islamic counterparts	◇ Dow Islamic Canada, Dow Islamic United Kingdom, Dow Islamic United States, Dow Islamic Asia Pacific Developed, Dow Islamic Europe Developed, Dow Islamic Emerging Markets, and Dow Islamic World Developed Markets: 1996–2005	Index-level	◇ Sharpe ratio ◇ Treynor Index ◇ Jensen's alpha ◇ Fama's selectivity analysis ◇ Carhart four-factor model	There is no return difference between Islamic and non-Islamic indexes

Table 3.11 *(continued)*

Study (Authors & Date)	**Aims**	**Sample & Period**	**Data Type**	**Performance Tests**	**Main Findings**
Liston & Soydemir (2010)	To examine the performance difference between sin and faith-based portfolios	◇ Dow Jones Islamic Index and Ave-Maria Fund (Catholic values): 2001–2007	Index-level	◇ Capital asset pricing model (CAPM) ◇ Fama-French three-factor model ◇ Carhart four-factor model	Sin portfolios outperform faith-based portfolios
Hayat & Kraeussl (2011)	To examine the risk and return of Islamic equity funds	◇ 145 Islamic equity funds divided into five geographical categories: global, Malaysia, Asia-Pacific, Europe and Middle-East, and North America: 2000–2009	Fund-level	◇ Capital asset pricing model (CAPM) ◇ Multivariate regression model of Treynor and Mazuy	Islamic equity funds underperform the conventional equity benchmarks
Kim & Venkatachalam (2011)	To examine whether higher information risk in the form of poor financial reporting quality explains sin stock outperformance.	◇ U.S.: 1988–2006	Stock-level	◇ Ecker three-factor model	The financial reporting quality of sin firms is superior, and, despite superior returns and higher financial reporting quality, sin stocks are neglected by investors
Abbes (2012)	To examine the risk and return of the Islamic market indexes compared to the conventional indexes	◇ 35 indexes from developed, emerging, and GCC markets: 2002–2012	Index-level	◇ Sharpe ratio ◇ Capital asset pricing model (CAPM)	There is no difference in risk-adjusted returns between Islamic and conventional indexes
Lobe et al. (2012)	To compare the performance of the Islamic indexes to conventional indexes	◇ 155 Islamic indexes and their conventional benchmark: 1996–2012	Index-level	◇ Sharpe ratio test ◇ Capital asset pricing model (CAPM) ◇ Carhart four-factor model	There is no performance difference between the Islamic and conventional indexes

Table 3.11 *(continued)*

Study (Authors & Date)	**Aims**	**Sample & Period**	**Data Type**	**Performance Measurements Tests**	**Main Findings**
Walkshäusl & Lobe (2012*a*)	To examine the performance of Islamic indexes in comparison to conventional benchmarks	◇ 6 developed and emerging markets MSCI Islamic indexes: 2002–2012	Index-level	◇ Sharpe ratio ◇ Treynor index ◇ Jensen's alpha ◇ Omega measure ◇ Sortino measure ◇ Kappa 3 measure ◇ Galmar measure ◇ Excess return on value at risk ◇ M2 measure (risk-adjusted returns measurement)	Islamic indexes outperform (underperform) conventional benchmarks in developed (emerging) markets
Walkshäusl & Lobe (2012*b*)	To examine whether Islamic indexes exhibit a different performance to conventional benchmarks	◇ 35 developed and emerging markets: 2002–2011	Index-level	◇ Sharpe ratio test ◇ Capital asset pricing model (CAPM) ◇ Carhart four-factor model	In general, there are no performance differences
Wan-Ni (2012)	To examine the performance and risk of belief-based indexes: ESG (Environmental, social, and corporate governance), Islamic, and Christian indexes	◇ Indexes from U.S. and European markets: 2001–2010	Index-level	◇ Sharpe ratio ◇ Treynor index ◇ Jensen's alpha ◇ M2 measure (risk-adjusted returns measurement) ◇ Capital asset pricing model (CAPM) ◇ Fama-French three-factor model	Belief-based indexes do not outperform the standard benchmarks
Durand et al. (2013)	To examine the performance of both saint (socially responsible) and sin stocks	◇ U.S.: 1990–2008	Stock-level	◇ Capital asset pricing model (CAPM) ◇ Fama-French three-factor model ◇ Carhart four-factor model	Sin stocks are underpriced and outperform socially responsible stocks

Table 3.11 *(continued)*

Study (Authors & Date)	**Aims**	**Sample & Period**	**Data Type**	**Performance Tests**	**Main Findings**
Al-Khazali et al. (2014)	To examine the performance of Islamic indexes compared to conventional indexes	◇ 9 Dow Jones Islamic indexes with 9 Dow Jones conventional counterparts for Asia Pacific, Canadian, Developed Country, Emerging Markets, European, Global, Japanese, U.K., and U.S.: 1996–2012	Index-level	◇ Stochastic Dominance (SD)	Conventional indexes stochastically dominate Islamic indexes at the second and third orders in all markets except the European market. However, the European, U.S., and global Islamic stock indexes dominate the conventional ones during the 2007–2012 period
Canepa & Ibnrubbian (2014)	To examine the effects of religious beliefs on stock prices	◇ Saudi Arabia Stock Exchange: 2002–2008	Index-level	◇ Stochastic Dominance (SD)	*Shariah* compliant stocks outperform non-*Shariah* compliant stocks
Fauver & McDonald (2014)	To examine the firm valuation and excess returns of sin stocks	◇ Stocks in G20 nations: 1995–2009	Stock-level	◇ Multivariate regression	Sin stocks have excess returns when compared with other stocks
Ho et al. (2014)	To examine the risk-adjusted performance difference between Islamic and conventional indexes	◇ U.S., U.K., Malaysia, Indonesia, Hong Kong, Switzerland, India, and France: 2000–2011	Index-level	◇ Capital asset pricing model (CAPM) ◇ Sharpe ratio ◇ Treynor index ◇ Jensen's alpha	Islamic indexes outperform conventional indexes during financial crisis, but there is no difference for the non-crisis periods
Jawadi et al. (2014)	To examine the performance of Islamic and conventional indexes	◇ Indexes for Europe, U.S., and World: 2000–2011	Index-level	◇ Sharpe ratio ◇ Roy ratio ◇ Treynor index ◇ Omega measure ◇ Jensen's alpha ◇ ARCH model ◇ Information ratio	In general, conventional indexes outperform Islamic indexes during non-crisis periods; however, Islamic indexes have outperformed since the sub-prime crisis began
KR & Fu (2014)	To examine the performance of *Shariah* compliant stocks compared to conventional stocks	◇ Australian Stock Exchange: 2001–2013	Stock-level	◇ Multiple regression analysis	There is no difference between the raw returns of Islamic and conventional stocks. However, Islamic stocks have higher risk-adjusted returns than do conventional stocks

Table 3.11 *(continued)*

Study (Authors & Date)	**Aims**	**Sample & Period**	**Data Type**	**Performance Tests**	**Main Findings**
Luo & Balvers (2014)	To investigate whether the return differences across industries can be attributed to a "boycott" factor	◇ Stocks listed on NYSE, AMEX, and NASDAQ: 1963–2012	Stock-level	◇ Capital asset pricing model (CAPM) ◇ Fama-French three-factor model ◇ Carhart four-factor model ◇ Boycott CAPM	The outperformance of sin stocks is caused by their close association with the boycott factor
Bukhari & Azam (2015)	To examine the excess risk-adjusted returns, market volatility, and systematic risk of the Islamic and socially responsible funds	◇ 224 Islamic funds and 573 socially responsible funds: 2009–2013	Fund-level	◇ Capital asset pricing model (CAPM)	Islamic and socially responsible funds have similar risk-return characteristics
Merdad et al. (2015)	To investigate the Islamic effect on stock returns	◇ Saudi Arabia: 2003–2011	Stock-level	◇ Panel regression ◇ Capital asset pricing model (CAPM) ◇ Fama-French three-factor model ◇ Fama-French three-factor model with Islamic factor	Islamic stocks have lower returns than do conventional stocks
Ashraf (2016)	To examine the performance of Islamic equity indexes versus conventional indexes	◇ 29 international Islamic equity indexes constructed by MSCI, DJ, FTSE, and S&P, and their benchmarks: 2000–2012	Index-level	◇ Capital asset pricing model (CAPM) ◇ Seemingly unrelated regression (SUR)	In general, Islamic equity indexes do not produce any abnormal returns
Lobe & Walkshäusl (2016)	To examine whether sin stocks outperform socially responsible investment stocks	◇ 31 international socially responsible investment equity indexes and sin stocks in the following geographical levels: Global, U.S., U.K., Australia, Japan, Canada, Europe, and Euro-Zone	Index and stock-level	◇ Sharpe ratio ◇ Chen three-factor model ◇ Fama-French three-factor model ◇ Carhart four-factor model	There is no difference in returns between sin stocks, socially responsible stocks, and the market benchmarks

Chapter 4

The Effect of Religiosity on Stock Market Speculation

4.1 Introduction

Religion may be regarded as a key component of social norms influencing investors' speculative behavior (e.g., Kumar 2009, Hilary & Hui 2009, Kumar et al. 2011, Kumar & Page 2014), stock market outcomes (e.g., Durand et al. 2013, Canepa & Ibnrubbian 2014), and stock market seasonality (e.g., Frieder & Subrahmanyam 2004).

Stock market trading is allowed under Islamic laws, but excessive speculation is either unacceptable or strictly restricted because it involves high uncertainty and is similar to gambling, which is strictly forbidden by the *Quran* (Ahmed 2000, Naughton & Naughton 2000, Kamali 1996, Al-Masri 2007, Zaher & Kabir Hassan 2001). Theoretical and empirical findings suggest that excessive speculation is associated with high levels of market volatility, idiosyncratic volatility, and trading frequency (Scheinkman & Xiong 2003, Dorn & Huber-

man 2007, Dorn & Sengmueller 2009, Kumar et al. 2011, Pan et al. 2015). The theoretical framework of Tokic (2014) suggests that excessive speculation leads to high levels of market volatility and causes bubbles and market inefficiencies.

Previous studies suggest that stock markets in Islamic societies exhibit relatively higher return seasonality during *Ramadan* (Al-Hajieh et al. 2011, Białkowski et al. 2012, Al-Khazali 2014). These studies argue that the religious experience of Muslim investors during the *Ramadan* month leads to a positive sentiment and, hence, higher market returns. However, there is a lack of methodological testing for this argument, and a lack of a coherent definition of sentiment in behavioral finance that can lead to incorrect conclusions (Shefrin 2010).[1]

Ramadan is the ninth month of the Islamic (*Hijri*) calendar and one of the most important religious events in the world. Around 1.6 billion Muslims observe this annual event, which requires fasting as well as religious and spiritual practices. The fast of *Ramadan* is one of the five pillars of Islam. It involves abstinence from eating, drinking and other sensual pleasures, as well as strict control of desires. *Ramadan* has a well-defined rule specifying that Muslims shall fast from dawn to sunset. In addition to fasting during the month of *Ramadan*, Muslims are encouraged to read the entire *Quran* and recite special

[1] Moreover, these studies did not consider the effect on stock market speculation and outcomes of change in the level of religiosity during *Ramadan*.

prayers (*Tarawih*), which are held in the mosques each night of the month. Muslims also ask forgiveness for past sins, pray for guidance and help in refraining from everyday evils, and try to purify themselves through self-restraint and good deeds. These religious practices lead to an increase in Muslims religiosity (Campante & Yanagizawa-Drott 2015), and provide an ideal context with which to examine the effect of religiosity on stock market speculation.

Our study examines whether speculative behavior can offer an alternative explanation for *Ramadan* seasonality. In line with Blau (2015), who suggests that religiosity is negatively related to stock market speculation and volatility, we anticipate that an increase in Muslim religiosity during *Ramadan* leads to a drop in stock market speculation, which in turn, leads to lower market volatility, idiosyncratic volatility, and trading frequency.

To the best of our knowledge, this is the first study to examine the influence of religious events on stock market speculation in an Islamic context. By understanding the link between speculative behavior and religiosity, we attempt to explain the phenomenon of stock market seasonality associated with religious events, which is not accounted for by classical finance theory (e.g., Frieder & Subrahmanyam 2004).

In the context of the Gulf Cooperation Council (GCC) countries, the main results of this study may be summarized as follows. We

find that these stock markets exhibit a significant drop in volatility, idiosyncratic volatility, and trading frequency during *Ramadan*.[2] Although we find a significant drop in stock market excessive speculation, we do not find a significant drop in liquidity. Moreover, we find no significant *Ramadan* return seasonality in the stock markets of GCC countries. However, a significant drop in stock market volatility and idiosyncratic volatility during *Ramadan* leads to higher risk-adjusted returns.

Differentiating between Islamic and non-Islamic stocks, we find that Islamic stocks face a less significant drop in volatility, idiosyncratic volatility, and trading frequency during *Ramadan* than do non-Islamic stocks, which could be attributed to the fact that while religious Muslims trade only Islamic stocks and refrain from speculative trading throughout the year, less religious Muslims trade non-Islamic stocks and refrain from speculation only during *Ramadan*, when their religiosity increases.

In addition to individual stock data, we use stock market index

[2]The GCC religious societies offer relatively unambiguous religious guidance for stock market trading. According to a Gallup 2009 survey, the societies of the GCC countries in our data have a strong belief that religion is important in daily life. In Bahrain, 94% of people believe that religion is important in life, 91% in Kuwait, 95% in Qatar, 93% in Saudi Arabia, and 91% in UAE. In other countries that have been used to examine the influence of religious background on financial decisions, the percentage of people who believe that religion is important in life is much lower (e.g., France 30%, Germany 40%, United States 65%). The religiosity index is not available for Oman. For additional details, see: http://www.gallup.com.

data to robustly confirm our findings. Specifically, we confirm that all GCC countries face lower return volatility during *Ramadan*. Again, we find no significant change in absolute returns performance, although the risk-adjusted and idiosyncratic-risk-adjusted returns during *Ramadan* show a significant increase.

This study has a number of implications. First, religiosity is negatively related to stock market excessive speculation. Furthermore, the increase in risk-adjusted returns during *Ramadan* is due to a decrease in stock volatility. During *Ramadan*, Muslim religiosity increases and excessive speculative trading is depressed because excessive stock market speculation is either forbidden or undesirable in Islam. This behavior leads to lower market volatility, higher risk-adjusted returns, and a more efficient market. Thus, this study provides an alternative explanation for *Ramadan* seasonality.

The rest of this chapter is organized as follows. The next section provides the research background and develops our hypotheses. Section 4.3 presents the data. Section 4.4 presents our research methodology. Section 4.5 provides our empirical results. Section 4.6 provides further tests and analysis. Section 4.7 presents our robustness tests with index data. Section 8 concludes the chapter.

4.2 Background and Hypothesis Development

4.2.1 Background

Following from such as Friedman & Savage (1948) and Markowitz (1952*b*), a substantial literature on speculative behavior in finance has emerged. A number of studies relate heterogeneity in speculative behavior to heterogeneity in risk-aversion, which can be influenced by religious beliefs (Kumar 2009, Kumar et al. 2011, Kumar & Page 2014). Such heterogeneity in investor behaviors may help to provide explanations for phenomena that cannot be explained in traditional financial theory within the mean-variance framework of Markowitz (1952*a*). For example, risk-aversion heterogeneity suggests an explanation for the diversification puzzle (why some investors do not diversify their portfolios) (Statman 2004).

Islamic *Shariah* advocates a number of norms and ethical codes to safeguard against unfair activities (Taj el din 1996). From the perspective of Islamic *Shariah*, many practices in traditional stock exchanges are undesirable, such as speculation leading to volatility in share prices that is not related to economic value or to the underlying performance of companies. In Islam, excessive speculation is forbidden

because it involves high uncertainty and risk (*Gharar*) and is similar to gambling, which is strictly forbidden in the *Quran* (Ahmed 2000, Naughton & Naughton 2000, Kamali 1996, Al-Masri 2007, Zaher & Kabir Hassan 2001).

These religious norms and ethical codes lead to a variation of the speculative behavior among investors with different religious backgrounds and different levels of religiosity (Kumar 2009, Kumar et al. 2011, Kumar & Page 2014). Furthermore, the religiosity level may change within the same religious group over-time. For example, in the month of *Ramadan*, religious practices lead to an increase in Muslims' religiosity (Campante & Yanagizawa-Drott 2015). This, change in the Muslim level of religiosity over-time provides us with an opportunity to examine the effect of religiosity on stock market speculation. In particular, to examine whether the increase in Muslims religiosity during *Ramadan* leads to a drop in stock market speculation proxies: volatility, idiosyncratic volatility, and trading frequency, as well as higher market efficiency, and whether the change in speculative behavior offers an explanation for *Ramadan* seasonality.

4.2.2 Hypotheses Development

The theoretical framework of Tokic (2014) suggests that excessive speculation leads to higher levels of volatility. Empirical studies also

find that speculative activities are often associated with high return volatility (Scheinkman & Xiong 2003, Dorn & Huberman 2007, Dorn & Sengmueller 2009, Kumar et al. 2011, Pan et al. 2015). For example, speculation leads to increased market volatility as investors become overconfident (Scheinkman & Xiong 2003, Mei et al. 2009, Du et al. 2011).

Stock market trading is allowed under Islamic laws, but stock market speculation is either undesirable or forbidden. During *Ramadan*, Muslims devote themselves to religious practices and become more religious (Campante & Yanagizawa-Drott 2015). We conjecture that with increased religiosity during *Ramadan*, Muslims speculate less in the stock market, leading to less volatile markets. This leads us to the following hypothesis:

Hypothesis 1.a: Stock markets in Islamic religious societies have a lower level of market volatility during Ramadan.

Idiosyncratic volatility is unsystematic risk that is related to a particular asset. Malkiel & Xu (1997) find that idiosyncratic volatility is related to stock returns. Their findings violate the assumption of the capital asset pricing model (CAPM), which states that systematic risk is the only priced risk in the market. In a later paper, Malkiel & Xu (2002) suggest that idiosyncratic volatility affects asset returns

when investors are unable to hold the market portfolio. They state that in reality investors are unlikely to hold the market portfolio due to exogenous reasons. Hence, idiosyncratic volatility is priced.

Recent empirical findings also stand against the CAPM assumptions, suggesting that idiosyncratic volatility is priced. For example, Brandt et al. (2010) suggest that overconfident investors who speculate in the stock market induce idiosyncratic volatility in returns. Thus, increasing idiosyncratic volatility might reflect investors' overconfidence (Odean 1998). If the change in the idiosyncratic volatility is caused by the change in speculative behavior (Dennis & Strickland 2004, Sousa & Serra 2008, Brandt et al. 2010, Doran et al. 2011), we anticipate a reduction in individual stock idiosyncratic volatility during *Ramadan* as an outcome of reduction in excessive speculation. This leads us to establish the following hypothesis:

Hypothesis 1.b: Stock markets in Islamic religious societies have a lower level of idiosyncratic volatility during Ramadan.

Following Dorn & Huberman (2007), speculative trading is the main driver of trading frequency (turnover ratio), with such trading frequency correlated with volatility. Assuming that trading frequency is an indicator of speculation (Dorn & Huberman 2007, Kumar et al. 2011, Pan et al. 2015) and anticipating a decrease in speculative trad-

ing during *Ramadan*, we have the following hypothesis:

Hypothesis 1.c: Stock markets in Islamic religious societies encounter a drop in trading frequency during Ramadan.

Previous studies argue that *Ramadan* as a holy month can have a positive effect on Muslim psychology (e.g., Al-Hajieh et al. 2011, Białkowski et al. 2012, Al-Khazali 2014) and that such investor sentiment can influence stock market outcomes (Edmans et al. 2007).[3] Thus, *Ramadan* as a holy month has a positive influence on the psychology of Muslim investors who participate in *Ramadan*, rendering investors more optimistic and leading to more positive stock market returns. However, this argument has not been methodologically tested and lacks clear definition (Shefrin 2010).

Husain (1998) conducts an early study on the *Ramadan* effect by testing the returns of the Pakistani equity market during *Ramadan*. He finds a significant decline in stock market returns volatility during *Ramadan* without significant change in returns. Seyyed et al. (2005) examine the effect of *Ramadan* on weekly stock returns and volatility in the Saudi stock market. They also find a significant decline in stock market returns volatility during *Ramadan* without significant change

[3]A detailed summary of the studies that have been referenced in this chapter with regard to the *Ramadan* effect is presented in Table 4.15 in Appendix II to this chapter.

in returns.

More recently, studies have analyzed the *Ramadan* return seasonality for several stock markets of Muslim-majority countries (Al-Hajieh et al. 2011, Almudhaf 2012, Białkowski et al. 2012, Al-Khazali 2014, Al-Ississ 2015). Al-Hajieh et al. (2011) examine whether *Ramadan* is reflected in positive calendar anomalies in Islamic Middle Eastern stock markets. They find significant positive returns in *Ramadan* in 6 out of 8 countries for the period 1992–2007. In his study for 1996–2007, Almudhaf (2012) finds evidence of *Ramadan* significant positive returns in only 4 out of 12 Muslim majority countries. Białkowski et al. (2012) find strong evidence of *Ramadan* significant positive returns when considering the period 1989–2007 for 11 out of 14 Muslim majority countries. More recently, Al-Khazali (2014) suggests weak evidence of a *Ramadan* effect for 14 countries with a Muslim majority over the period 1989–2012. Al-Ississ (2015) investigates the holiday effect for 10 Muslim-majority countries pooling all countries in one analysis between 1989–2012. He suggests a positive change in stock returns during *Ramadan*. Thus, these studies have provided somewhat mixed evidence on whether the stock markets of Muslim majority countries exhibit positive returns during *Ramadan*. In view of these considerations, we re-examine the following hypothesis:

Hypothesis 2: Stock markets in Islamic religious societies have positive absolute return seasonality associated with Ramadan.

Even if Hypothesis 2 is rejected, we expect that the lower return volatility of stock markets during *Ramadan* leads to positive risk-adjusted returns. Thus, we establish the following hypothesis:

Hypothesis 3: Stock markets in Islamic religious societies have positive risk-adjusted return seasonality associated with the Islamic calendar holy month of Ramadan.

4.3 Data

Our study covers stock markets from countries that have high levels of religiosity and a high percentage of Muslim population, specifically the Gulf Cooperation Council (GCC) countries (see, Table 4.1). The GCC region comprises six countries: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates. In contrast to other stock markets in countries with a Muslim majority, we have a clear and stable classification of Islamic stocks in the GCC. In the GCC we are able to clearly distinguish between Islamic and non-Islamic stocks by their article of association, which clearly distinguishes Islamic stocks as those stocks of companies that conduct their regulated activities in compliance with Islamic *Shariah* and have a *Shariah* supervisory

board.[4]

We use the individual stock-level data obtained from Thomson Datastream for the period 2006–2014. In order to include a stock in our sample we require the stock price, trading volume, number of outstanding shares, market capitalization, and book-value data. We follow the list of the *Al-Mashora and Al-Raya for Islamic Financial Consultancy* to identify the Islamic-listed stocks in these stock markets.[5] Table 4.2 shows the number of Islamic listed companies in each of the stock markets in our study. The table shows that Kuwait has the highest percentage of Islamic stocks (31%) while Oman has the lowest percentage (1%).

To facilitate our tests, we convert daily data based on the *Gre-*

[4]In practice, there are two general Islamic screening strategies; one is strict and the other is relaxed. The strict Islamic screening strategy divides the stocks into two categories: (i) Islamic companies (which have a *Shariah* board and operate within Islamic laws) and (ii) conventional companies or non-Islamic companies. The relaxed Islamic screening strategy divides the stocks into three categories: (i) Islamic companies (which have a *Shariah* board and operate within Islamic laws); (ii) non-Islamic companies, but which operate in Islamic-acceptable industries and have a low percentage of activities that conflict with Islamic *Shariah*; and (iii) non-Islamic companies with a high percentage of activities that conflict with Islamic *Shariah*. Alotaibi (2014) finds that a growing number of Islamic individual and institutional investors adopt the strict Islamic screening strategy on purely religious preferences. Further, he finds that many Islamic individual and institutional investors question the *Shariah* compliance of the relaxed Islamic screening strategy. Thus, this study follows the strict Islamic screening strategy to define Islamic stocks.

[5]As mentioned previously, investors can directly distinguish between Islamic and non-Islamic stocks in the GCC by observing the company article of association. However, there are several lists available for Islamic investors in the GCC (e.g., the *Al-Mashora and Al-Raya for Islamic Financial Consultancy* list and the *KFH Capital* list).

gorian calendar relative to the Islamic lunar calendar *Hijri*. The Islamic lunar calendar has twelve months, *Ramadan* being the ninth month: (1) Muharram, (2) Safar, (3) Rabia Awal, (4) Rabia Thani, (5) Jumaada Awal, (6) Jumaada Thani, (7) Rajab, (8) Sha'ban, (9) Ramadan, (10) Shawwal, (11) Dhul-Qi'dah, and (12) Dhul-Hijjah.

4.4 Methodology

4.4.1 Speculation-Level Tests

Volatility and idiosyncratic volatility tests

To test Hypothesis 1.a, we calculate a 17-day rolling volatility from the daily returns of individual stocks using the Islamic calendar and conduct mean and median equality tests.[6] The mean equality test examines the equality of the time-series average of means for the stock's *Ramadan* daily volatility $RVOL$ and the stock's non-*Ramadan* (normal) daily volatility $NVOL$. The median equality test examines the equality of the time-series median of means for the stock's *Ramadan* daily volatility $RVOL$ and the stock's non-*Ramadan* (normal) daily volatility $NVOL$. To calculate a proxy for the stock normal volatility, we use the non-*Ramadan* average volatility, omitting the immediate

[6]Following Ang et al. (2006), volatility can be defined as the standard deviation of at least 17 daily returns.

month before and after *Ramadan* to avoid contamination from recent abnormal volatility (e.g., Pan et al. 2015).[7]

To test Hypothesis 1.b, we define idiosyncratic volatility as the standard deviation of the residual estimated from the daily Fama & French (1993) three-factor model (Ang et al. 2006). Thus, we first calculate the daily Fama & French (1993) size (SMB_d) and the book-to-market (HML_d) return-mimicking portfolios, where SMB_d is the difference in return between the small and big market capitalization portfolios in day d and HML_d is the difference in return between the high and low book-to-market portfolios in day d. We rank all stocks according to their market capitalization and use the 50th percentile as the breakpoint between small and big portfolios. The book-to-market breakpoints are the 30th and 70th percentile to generate high, medium, and low book-to-market portfolios.

For each individual stock i, we calculate the idiosyncratic volatility in terms of a 17-day rolling idiosyncratic volatility using the Islamic calendar as follows:

$$ISV_{i,t} = \left(\frac{1}{D(t)} \sum_{d \in T(t)} \varepsilon_{i,d}^2 \right)^{1/2}, \tag{4.1}$$

[7]The contamination effect may appear before *Ramadan* because Muslim religiosity is expected to increase while preparing for *Ramadan*, and during *Shawwaal* (the month after *Ramadan*) when Muslims are encouraged to fast six days of *Shawwaal*.

where $T(t)$ is the set of trading days and $D(t)$ is the number of trading days in time (t) for the 17-day rolling idiosyncratic volatility, and $\varepsilon_{i,d}$ is the estimated residual from the Fama & French (1993) three-factor model for stock i on day d. Finally, we conduct mean and median equality tests. The mean equality test provides the equality of the time-series average of means between *Ramadan* daily idiosyncratic volatility $RISV$ and the stock non-*Ramadan* (normal) daily idiosyncratic volatility $NISV$. The median equality test gives the equality test of the time-series median of means between *Ramadan* daily idiosyncratic volatility $RISV$ and the stock non-*Ramadan* (normal) daily idiosyncratic volatility $NISV$. To calculate the proxy of the stock normal idiosyncratic volatility, we omit the immediate month before and after *Ramadan* to avoid contamination from recent abnormal volatility.

Trading frequency and liquidity tests

To test Hypothesis 1.c, we examine whether the average turnover ratio TOV during *Ramadan* is lower than the rest of the year. The value of TOV depends on individual stock-level data. Thus, we calculate the daily turnover ratio for each stock as the trading volume for the stock divided by the number of shares outstanding.[8] We then conduct

[8]We note that the turnover ratio captures trading frequency but fails to account for liquidity costs (Lesmond 2005, Summers 2000, Froot et al. 2001).

mean and median equality tests for the *Ramadan* daily turnover ratio $RTOV$ and non-*Ramadan* (normal) turnover ratio $NTOV$. Again, to avoid contamination when calculating the market non-*Ramadan* turnover ratio $NTOV$, we omit the immediate month after and before *Ramadan*.

Previous studies suggest no significant liquidity drop during *Ramadan* (Białkowski et al. 2012, Al-Ississ 2015). We extend the previous studies' liquidity analysis by applying Amihud's (2002) illiquidiy ratio as an alternative liquidity proxy that better captures the liquidity dimensions of emerging markets (Lesmond 2005). In particular, we apply the market daily adjusted form of Amihud's (2002) illiquidiy ratio, $LIL_{i,d}$, as[9]

$$LIL_{i,d} = log\left(1 + \frac{|R_d^i|}{V_d^i}\right), \tag{4.2}$$

where R_d^i is the return for stock i on day d and V_d^i is the trading volume in local currency (in millions) for stock i on day d. The greater the stock price response to change in volume, the greater the $LIL_{i,d}$.

4.4.2 Seasonality Returns Tests

Baltagi (2008) and Hsiao (2014) suggest that panel data regressions mitigate the problems associated with estimation bias and multi-

[9]The LIL is as in Karolyi et al. (2012), for which they adjust Amihud's (2002) illiquidity measurement by adding a constant and calculating the log of the daily illiquidity ratio, to reduce the influence of outliers.

collinearity, controls for individual heterogeneity, and as well as specifying the time-varying relation between dependent and independent variables. Thus, to examine whether *Ramadan* returns outperform returns in other months and whether a drop in market volatility enhances risk-adjusted returns, we conduct panel data regressions. Because the data are pooled (panel), heteroskedasticity and autocorrelation may influence the OLS results. Thus, we include country and industry dummies and use cluster-robust variance and covariance estimators to provide more conservative standard errors (Arellano 2003).

Firstly, we test Hypothesis 2 by conducting a panel regression using firm-level monthly returns data, including the dummy variables for *Ramadan*:

$$R_{i,t} = \alpha_0 + \alpha_1 D9_{i,t} + \varepsilon_{i,t}, \tag{4.3}$$

where $R_{i,t}$ is the monthly return of stock i regressed on the dummy variable for *Ramadan*; $D9_{i,t}$ is equal to 1 for the *Ramadan* month and 0 otherwise. Coefficient α_1 indicates whether the *Ramadan* returns outperform the returns of other months. For Hypothesis 2, the null hypothesis is that α_1 is zero.

Secondly, we test Hypothesis 3 to explore the effect of change in the level of risk during *Ramadan* on returns. We conduct a panel regression using firm-level monthly returns data, including the dummy variables for *Ramadan* and controlling for market returns, firm-specific

characteristics and speculation proxies (volatility or idiosyncratic volatility):

$$R_{i,t} = \alpha_0 + \alpha_1 D9_{i,t} + \alpha_2 MR_{j,t-1} + \boldsymbol{\beta X}_{i,t-1} + \alpha_3 S_{i,t} + \varepsilon_{i,t}, \qquad (4.4)$$

where $R_{i,t}$ and $D9_{i,t}$ are as Equation (4.3). MR_{t-1} is the lag of the monthly market return for stock market j. $\boldsymbol{X}_{i,t-1}$ represent the lag of firm-specific characteristic variables, including the log of the monthly firm market capitalization in U.S. dollars, $LSIZE_{i,t}$ and the log of the monthly stock market-to-book ratio, $LMTB_{i,t}$. $S_{i,t}$ represent the speculation proxies, either $VOL_{i,t}$, the monthly volatility of stock i returns for month t, or $ISV_{i,t}$, the monthly idiosyncratic volatility of stock i for month t. For Hypothesis 3, we hypothesize that a lower return volatility and/or idiosyncratic volatility during *Ramadan* leads to positive risk-adjusted returns. If this hypothesis holds, α_1, the coefficient of the *Ramadan* dummy variable $D9$ should be significantly higher than the coefficient of $D9$ in Equation (4.3) after controlling for speculation proxies (VOL or ISV).

4.5 Results

4.5.1 Speculation-Level Tests

Volatility and idiosyncratic volatility tests

From Hypotheses 1.a and 1.b, we expect a drop in stock market volatility and idiosyncratic volatility during *Ramadan*. In this section, we report the results of testing these hypotheses using mean and median equality tests.

Panel A of Table 4.3 shows the results of mean and median equality tests for the daily volatility of *Ramadan* ($RVOL$) and market normal volatility ($NVOL$) of non-*Ramadan* days (omitting the immediate month before and after *Ramadan* to avoid contamination from recent abnormal volatility). The results of the mean equality test, using the adjusted p-values of the Satterthwaite-Welch (S-W) test which corrects for unequal sample size and variances, suggest that all the markets face a statistically significant drop in volatility during *Ramadan* compared to market normal volatility (at the 1% significance level). Median equality tests suggest a statistically significant drop in volatility for all markets during *Ramadan* compared to market normal volatility for all markets at the 1% significance level except Saudi Arabia, which is at the 5% significance level.

Panel B of Table 4.3 shows the results of mean and median equality tests for the daily idiosyncratic volatility of *Ramadan* ($RISV$) and market normal idiosyncratic volatility ($NISV$) of non-*Ramadan* days (omitting the immediate month before and after *Ramadan* to avoid contamination). The Satterthwaite-Welch (S-W) mean and the median equality tests suggest a statistically significant drop in idiosyncratic volatility during *Ramadan* compared to market normal idiosyncratic volatility in all markets (at the 1% significance level).[10]

Trading frequency and liquidity tests

Consistent with Hypothesis 1.c, we anticipate a drop in stock market trading frequency during *Ramadan*. Figure 4.1 shows the time-series average of means for stocks daily trading frequency using the turnover ratio during *Ramadan* ($RTOV$) compared to the rest of the year ($NTOV$). The figure clearly shows that all the markets in our study face a lower average trading frequency during *Ramadan* compared to the rest of the year, indicating a drop in stock market specu-

[10]It is important to note that our results are not caused by the change of trading hours during *Ramadan*, as only two out of six markets included in our study reduced trading hours during *Ramadan*, namely Kuwait and Bahrain. However, in results not reported here, we tested the impact of reduced trading hours in Kuwait and Bahrain on the natural logarithm of trading volume using a generalized least-squares (GLS) estimation method (e.g., Datar et al. 1998) and including an interactive dummy variable to capture the change of trading volume of *Ramadan*. The results indicate that there is no significant change in volume during the *Ramadan* month. These results are available on request.

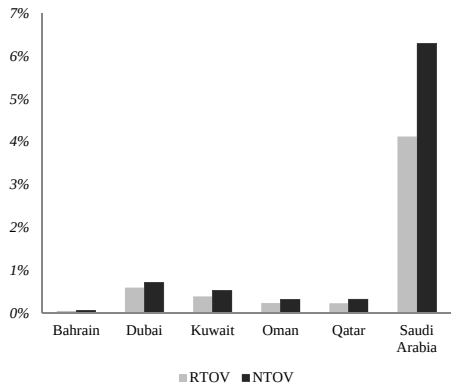

Figure 4.1: Trading Frequency of *Ramadan* Vs. Non-*Ramadan* Days

lation during *Ramadan*. The figure also shows that the strongest drop in trading frequency occurs in Saudi Arabia, which may reflect thin institutional trading where individual trading represents around 89% of total trading value in the Saudi stock market.[11]

Table 4.4 shows the results of mean and median equality tests for daily trading frequency (turnover ratio) of *Ramadan* ($RTOV$) and the normal days average turnover ratio ($NTOV$). The results of mean (S-W) and median (MWW) equality tests in the table indicate a significant drop in *Ramadan* turnover ratio ($RTOV$) for all markets, with the exception of Bahrain at the mean test and Oman at both the mean and median tests.

To ensure that our results are not biased by changes in market liquidity, we conduct liquidity equality tests. Table 4.5 shows the results of liquidity mean and median equality tests using an adjusted form of

[11]See, "Saudi Arabia Stock Report", January 2015 (http://www.tadawul.com.sa).

Amihud's (2002) illiquidity ratio. The results suggest that none of the markets in our study face a drop in market liquidity during *Ramadan* at the mean level, which is consistent with previous research findings (Białkowski et al. 2012, Al-Ississ 2015). However, at the median level only Saudi Arabia encounter a significant drop in stock market liquidity during *Ramadan*, which may reflect that the Saudi stock market lacks significant institutional trading, so that when individual trading drops during *Ramadan* there is no significant institutional trading to provide the market with liquidity.

4.5.2 Seasonality Returns Test

To examine whether *Ramadan* returns outperform returns in other months and to determine whether a drop in market volatility enhances risk-adjusted returns, we conduct a panel regression, starting with a basic regression using a *Ramadan* dummy and then controlling for market return, firm-specific characteristics, and speculation proxies (volatility or idiosyncratic volatility).

Following Hypothesis 2, we expect that before controlling for speculation proxies, we encounter a positive significant regression coefficient for *D9*, the dummy variable of *Ramadan*. Following Hypothesis 3, we expect that controlling for speculation proxies, we will have a more positive significant regression coefficient for *D9*. In other words,

we expect the *Ramadan* month to outperform other months, allowing for the drop in the level of stock volatility during *Ramadan* resulting from a drop in speculation.

Panel A of Table 4.6 shows the results of our panel regressions controlling for country and industry differences. The results suggest that *Ramadan* return seasonality does not hold in the stocks of our study without controlling for stock market volatility or idiosyncratic volatility, leading us to reject Hypothesis 2. Further, we find a strong significant positive risk-return *Ramadan* performance when controlling for stock speculation, which is associated with a significant coefficient of the speculation proxies ($VOL_{i,t}$) and ($ISV_{i,t}$). This supports Hypothesis 3, which anticipates that a drop in stock market volatility during *Ramadan* leads to positive risk-adjusted return seasonality. We derive similar conclusions when we control for changes in market trends that may affect stock market seasonality using yearly dummy variables as shown in Panel B of Table 4.6.

4.6 Further Tests: Islamic and Non-Islamic Stock Differences

To further understand the effects of the speculative behavior of Muslims on stock market outcomes, we repeat the previous tests, differ-

entiating between Islamic and non-Islamic stocks. These tests allow us to determine whether the same conclusions hold for Islamic and non-Islamic stocks, and whether non-Islamic stocks show a more significant drop relative to Islamic stocks in stock market speculation (since religious Muslims trade only Islamic stocks and refrain from speculative trading throughout the year, whereas less religious Muslims trade non-Islamic stocks and refrain from speculation only during *Ramadan* when their religiosity increases). We do not include Oman in this analyses as it has only a small number and percentage of Islamic listed companies (Table 4.2).

Panel A of Table 4.7 shows the mean and median equality test results for Islamic stocks for *Ramadan* and market normal volatility. The results of the mean (S-W) and the median (MWW) tests suggest that all markets face a statistically significant drop in volatility during *Ramadan* (with the exception of the Saudi Arabia median test). Panel B of Table 4.7 shows the mean and median equality test results for non-Islamic stocks for *Ramadan* and market normal volatility. The results of the mean (S-W) and the median (MWW) tests suggest that non-Islamic stocks face a statistically significant drop in market volatility in all markets during *Ramadan*.

Panel A of Table 4.8 shows the mean and median equality test results for idiosyncratic volatility of Islamic stocks for the *Ramadan* days

and non-*Ramadan* days. The results suggest that Islamic stocks in all markets face a statistically significant drop in idiosyncratic volatility at the mean (S-W) and median (MWW) levels during *Ramadan*. Panel B of Table 4.8 shows the mean and median equality test results for non-Islamic stocks for *Ramadan* and market normal idiosyncratic volatility. The results suggest that non-Islamic stocks in all markets face a significant drop in idiosyncratic volatility at the mean (S-W) and median (MWW) levels during *Ramadan* (at the 1% significance level).

Panel A of Table 4.9 shows the mean and median equality test results for the trading frequency of Islamic stocks for the *Ramadan* days and non-*Ramadan* days. The results suggest that Islamic stocks face a statistically significant drop in trading frequency at the mean (S-W) and median (MWW) levels during *Ramadan* in all markets at the 1% significance level (with the exception of the Bahrain mean test, which is at the 5% significance level). Panel B of Table 4.9 shows the mean and median equality test results for non-Islamic stocks for the *Ramadan* and non-*Ramadan* (normal) trading frequency. The results suggest that non-Islamic stocks face a statistically significant drop in trading frequency during *Ramadan* in all markets at the mean (S-W) and median (MWW) levels (with the exception of the Bahrain mean test).

Overall, our statistically significant results suggest a significant drop in market volatility, idiosyncratic volatility, and trading frequency during *Ramadan* for both Islamic and non-Islamic stocks, supporting Hypotheses 1.a, 1.b, and 1.c, which is explained by increase in Muslim religiosity during *Ramadan* leading to a reduction in stock market speculation. Furthermore, most of our results show the drop in speculation proxies to be stronger for non-Islamic stocks than for Islamic stocks. We conclude that non-Islamic stocks are more sensitive to changes in Muslim trading behavior than Islamic stocks. This probably reflects the fact that religious Muslims who follow Islamic trading rules and trade only Islamic stocks refrain from speculative behavior throughout the year, but less religious Muslims who trade non-Islamic stocks refrain from speculation only during *Ramadan* when their religiosity increases.

4.7 Robustness Test Using Index-Level Data

As a further robustness, we use long-term indexes data (S&P) to test Hypotheses 1, 2, and 3. We obtain the market S&P indexes daily prices data from Thomson Datastream. These indexes have different establishment dates, as shown in Table 4.10. To facilitate our tests,

we convert the daily data based on the *Gregorian* calendar relative to the Islamic lunar calendar *Hijri*.

The daily annualized returns for the *Ramadan* month and the rest of the year are shown in Table 4.11 along with the equality of mean, median, and variance test results. The mean and median equality test results in Panels A and B of Table 4.11 suggest that none of the markets exhibit significantly higher returns during the *Ramadan* month compared to the rest of the year at both the mean and median levels (except for UAE, which exhibits significantly higher returns during *Ramadan* at the median level). The variance equality test results in Panel C of Table 4.11 suggest that except for Qatar, all the markets indicate a significantly lower standard deviation of returns (volatility) during *Ramadan*.

4.7.1 Dummy Variables Test

For the classical dummy variables test, we follow Whyte & Picou (1993) and Brooks & Persand (2001) and calculate the average monthly continuous returns for each stock market index based on the Islamic lunar calendar months. We then regress each index return separately with 12 dummy variables representing the Islamic calendar months from the establishment date to the end of 1435 *Hijri* (10/25/2014,

Gregorian):

$$R_t = \beta_1 D_{1t} + \beta_2 D_{2t} + ... + \beta_{12} D_{12t} + \varepsilon_t, \tag{4.5}$$

where R_t is the average monthly continuous return; D_{1t}, D_{2t},..., D_{12t} are the dummy variables representing the 12 Islamic calendar months ($D_{1t} = 1$ if month t is the first month in the Islamic calendar *Muharram*, zero otherwise, and so on); and ε_t is an iid error term. The coefficients β_1–β_{12} represent the mean of the returns for the 12 months of the Islamic calendar. A significant index return coefficient for the ninth month of the Islamic calendar (*Ramadan*) supports the hypothesis of Islamic calendar seasonality.

Table 4.12 displays the dummy variable regression test results. The test results suggest no pronounced *Ramadan* effect in any market (at the 10% or higher significance level). The results for all the six markets considered are consistent with the findings of Almudhaf (2012) who finds no *Ramadan* effect for the markets of our study with the exception of Kuwait.

4.7.2 Risk-Adjusted Returns Test

Previous studies suggested a significant decline in return volatility during *Ramadan* (Husain 1998, Seyyed et al. 2005, Białkowski et al.

2012, Halari et al. 2015). Thus, we predict an increase in risk-adjusted returns during *Ramadan* due to a drop in volatility.

The Sharpe Ratio measures the performance of an index by dividing the average excess return to total risk, measured by the standard deviation of returns.[12] The Sharpe Ratio is calculated on a monthly basis as:

$$SR_{it} = \frac{R_{it} - RF_{it}}{\sigma_{it}}, \tag{4.6}$$

where R_{it} is the average continuous return for index i over month t, RF_{it} is the average risk-free rate for country i over month t, and σ_{it} is the standard deviation of index i returns over month t.[13]

To test for the presence of a *Ramadan* effect in risk-adjusted returns, we conduct the classical dummy variables test using the same indexes data and monthly risk-adjusted returns (Sharpe Ratio). A significant regression coefficient for *D9*, the dummy variable for the ninth *Hijri* calendar month is required to support the hypothesis of *Ramadan* risk-adjusted return seasonality.

Table 4.13 shows the dummy variable regression results with risk-adjusted returns. The dummy variable test suggests a *Ramadan* effect for four out of the six markets considered in our study: Kuwait, Oman,

[12]Previous studies have applied the Sharpe Ratio as a risk-adjusted method to measure the performance of indexes (Hassan & Girard 2010, Ho et al. 2014).

[13]As with previous studies, we use a proxy for the risk-free rate (Hassan & Girard 2010, Ho et al. 2014, Al-Khazali et al. 2014). Specifically, we use the monthly discount rates of the local central banks.

Qatar, and UAE.

Finally, we consider risk-adjusted returns using idiosyncratic volatility calculated as monthly standard deviation of the errors of the capital asset pricing model (CAPM) (e.g., Boyer et al. 2010). Thus, we measure the performance of an index by dividing the monthly average excess return by the monthly idiosyncratic risk. We then conduct the classical dummy variables test using the same indexes data and monthly idiosyncratic risk-adjusted returns.[14]

Table 4.14 shows the dummy variable regression results with idiosyncratic-risk-adjusted returns. The results suggest that except for Bahrain, all markets indicate significantly positive *Ramadan* idiosyncratic-risk-adjusted returns.

4.8 Conclusion

Extant studies in the literature suggest that religiosity is negatively related to investor speculation (e.g., Kumar 2009, Hilary & Hui 2009, Kumar et al. 2011, Kumar & Page 2014). The question we address in this chapter is whether the negative relation between investor speculation and religiosity explains the phenomenon of stock market seasonality based on religious events.

[14]For the CAPM market risk premium we use the returns of the FTSE All World Index as a proxy for the market return.

Our main results can be summarized as follows. First, from our individual stocks data analysis of the GCC stock markets, we find that these markets exhibit a lower level of speculation during the Muslim holy month of *Ramadan*. Second, these markets show no *Ramadan* return seasonality when we do not control for the change in risk due to the decline in speculation behavior. However, the significant drop in stock market volatility and idiosyncratic volatility during *Ramadan* leads to higher risk-adjusted returns. Third, our analysis suggests that non-Islamic stocks encounter a more significant drop in speculation during *Ramadan* relative to Islamic stocks. This could be because Islamic stocks are traded by religious Muslims who adopt Islamic trading rules and refrain from speculation all through the year, but non-Islamic stocks are traded by less religious Muslims who refrain from speculation only during *Ramadan*. An extension of this analysis to test overall market speculation and return seasonality using the stock market indexes data (S&P) gives consistent results.

We conclude that the *Ramadan* effect in previous studies is due to a drop in stock market speculation, and not the outcome of positive investor sentiment (as suggested by previous studies). During *Ramadan*, Muslims devote their time to religious practices and their religiosity increases. Thus, they speculate less, because excessive stock market speculation is either forbidden or undesirable in Islam. We

conclude that this behavior leads to lower market volatility, higher risk-adjusted returns, and a more efficient market during *Ramadan*.

Appendix I to Chapter 4: Tables

Table 4.1: Religious Indicators of the GCC Countries

This table presents the percentage of Muslims to total population and the total population in millions (from the 2011 PEW Research Center report "The Future of the Global Muslim Population"); and the religiosity index (form the Gallup Survey as of 2009) for the GCC countries.

Country	*Muslims to Total Population (%)*	*Total Population (million)*	*Religiosity Index (%)*
Bahrain	81.2	1.26	94
Kuwait	86.4	2.74	91
Oman	85.2	2.78	-
Qatar	77.5	1.76	95
Saudi Arabia	97.1	27.45	93
UAE	76.0	7.51	91

Table 4.2: Stock Markets Description

This table presents the number of listed firms; the number of listed Islamic firms; and the percentage of Islamic firms in the stock markets of our study as of December 31, 2014 (based on the list of Al-Mashora and Al-Raya for the Islamic Financial Consultancy). The table also reports the total market capitalization as of December 31, 2014 for each stock market in U.S. dollars (taken from Bloomberg).

Stock Market	*Number of Listed Firms*	*Islamic Firms*	*Percentage of Islamic Firms (%)*	*Market Cap in U.S.$ (000,000')*
Bahrain	48	11	23	21,893
Dubai	71	20	28	80,236
Kuwait	203	62	31	101,179
Oman	117	1	1	37,830
Qatar	43	10	23	154,065
Saudi Arabia	167	39	23	482,145

Table 4.3: Market Volatility and Idiosyncratic Volatility Equality Tests

This table presents the volatility and idiosyncratic volatility mean and median equality tests from 2006 to 2014. The mean is the time-series average of means and the median is the time-series median of means. Panel A gives the equality tests for *Ramadan* daily volatility ($RVOL$) and non-*Ramadan* (normal) daily volatility ($NVOL$) (omitting the immediate month before and after *Ramadan*). $AVOL$ represents the abnormal volatility for *Ramadan* calculated as ($RVOL$ minus $NVOL$) scaled by $RVOL$. Panel B gives the mean and median equality tests for *Ramadan* daily idiosyncratic volatility ($RISV$) and non-*Ramadan* (normal) daily idiosyncratic volatility ($NISV$) (again, omitting the immediate month before and after *Ramadan*). $AISV$ represents the abnormal idiosyncratic volatility for *Ramadan* calculated as ($RISV$ minus $NISV$) scaled by $RISV$. The p-values of the (t-test) correspond to a standard test for equality, the p-values of the (S-W) test correspond to a Satterthwaite-Welch test with correction for unequal sample size and variances, and the p-values of the median equality test correspond to a Wilcoxon/Mann-Whitney (MWW) signed rank median test.

Panel A: Volatility Equality Tests

Stock Market	**Mean Equality Test**					**Median Equality Test**			
	RVOL (%)	*NVOL (%)*	*AVOL (%)*	*P-Value (t-test)*	*P-Value (S-W)*	*RVOL (%)*	*NVOL (%)*	*AVOL (%)*	*P-Value (MWW)*
Bahrain	1.21	2.62	-53.57	(0.20)	(0.00)	0.76	0.90	-16.24	(0.00)
Dubai	1.50	1.87	-19.83	(0.00)	(0.00)	1.32	1.59	-16.71	(0.00)
Kuwait	2.38	4.20	-43.32	(0.15)	(0.00)	2.29	2.53	-9.23	(0.00)
Oman	1.97	2.34	-15.87	(0.00)	(0.00)	1.78	2.07	-13.93	(0.00)
Qatar	1.67	2.01	-17.13	(0.00)	(0.00)	1.57	1.81	-13.38	(0.00)
Saudi Arabia	2.31	2.65	-12.66	(0.00)	(0.00)	2.09	2.14	-2.26	(0.04)

Panel B: Idiosyncratic Volatility Equality Tests

Stock Market	**Mean Equality Test**					**Median Equality Test**			
	RISV (%)	*NISV (%)*	*AISV (%)*	*P-Value (t-test)*	*P-Value (S-W)*	*RISV (%)*	*NISV (%)*	*AISV (%)*	*P-Value (MWW)*
Bahrain	1.66	4.80	-65.38	(0.14)	(0.00)	0.93	1.10	-15.31	(0.00)
Dubai	1.60	2.08	-23.13	(0.00)	(0.00)	1.40	1.73	-19.09	(0.00)
Kuwait	2.56	5.82	-56.07	(0.11)	(0.00)	2.57	2.69	-4.20	(0.00)
Oman	1.81	2.28	-20.95	(0.00)	(0.00)	1.74	1.95	-10.97	(0.00)
Qatar	1.45	1.80	-19.74	(0.00)	(0.00)	1.31	1.72	-23.95	(0.00)
Saudi Arabia	1.87	2.09	-10.21	(0.00)	(0.00)	1.61	1.89	-14.65	(0.00)

Table 4.4: Market Trading Frequency Equality Tests

This table presents the trading frequency mean and median equality tests from 2006 to 2014 for the *Ramadan* turnover ratio ($RTOV$) and the other days' normal turnover ratio ($NTOV$) (omitting the immediate month before and after *Ramadan*). The mean is the time-series average of means and the median is the time-series median of means. $ATOV$ represents the abnormal turnover ratio for *Ramadan* calculated as ($RTOV$ minus $NTOV$) scaled by $RTOV$. The p-values of the (t-test) correspond to a standard test for equality, the p-values of the (S-W) test correspond to a Satterthwaite-Welch test with correction for unequal sample size and variances, and the p-values of the median equality test correspond to a Wilcoxon/Mann-Whitney (MWW) signed rank median test.

Stock Market	**Mean Equality Test**					**Median Equality Test**			
	RTOV (%)	*NTOV (%)*	*ATOV (%)*	*P-Value (t-test)*	*P-Value (S-W)*	*RTOV (%)*	*NTOV (%)*	*ATOV (%)*	*P-Value (MWW)*
Bahrain	0.04	0.05	-14.95	(0.67)	(0.65)	0.02	0.02	-31.67	(0.00)
Dubai	0.59	0.71	-16.03	(0.03)	(0.01)	0.44	0.48	-9.74	(0.03)
Kuwait	0.38	0.52	-26.01	(0.00)	(0.00)	0.34	0.45	-25.41	(0.00)
Oman	0.29	0.28	2.21	(0.83)	(0.83)	0.14	0.18	-21.44	(0.28)
Qatar	0.23	0.32	-30.69	(0.00)	(0.00)	0.19	0.26	-27.24	(0.00)
Saudi Arabia	4.12	6.30	-34.54	(0.02)	(0.00)	1.62	3.06	-47.04	(0.00)

Table 4.5: Market Illiquidity Equality Tests

This table presents the mean and median equality tests for the *Ramadan* illiquidity ratio ($RLIL$) and the other days' normal illiquidity ratio ($NLIL$) (omitting the immediate month before and after *Ramadan* to avoid contamination from recent abnormal illiquidity) from 2006 to 2014. The mean is the time-series average of means and the median is the time-series median of means. $ALIL$ represents the abnormal illiquidity for *Ramadan* calculated as ($RLIL$ minus $NLIL$) scaled by $RLIL$. The p-values of the (t-test) correspond to a standard test for equality, the p-values of the (S-W) test correspond to a Satterthwaite-Welch test with correction for unequal sample size and variances, and the p-values of the median equality test correspond to a Wilcoxon/Mann-Whitney (MWW) signed rank median test.

Stock Market	**Median Equality Test**					**Median Equality Test**			
	RLIL	*NLIL*	*ALIL*	*P-Value (t-test)*	*P-Value (S-W)*	*RLIL*	*NLIL*	*ALIL*	*P-Value (MWW)*
Bahrain	0.3707	0.4451	-0.17	(0.00)	(0.00)	0.3556	0.4017	-0.11	(0.00)
Dubai	0.0941	0.0842	0.12	(0.32)	(0.20)	0.0585	0.0553	0.06	(0.10)
Kuwait	0.3771	0.3649	0.03	(0.37)	(0.39)	0.3407	0.3287	0.04	(0.52)
Oman	0.1822	0.2384	-0.24	(0.06)	(0.02)	0.0741	0.0873	-0.15	(0.10)
Qatar	0.0464	0.0497	-0.07	(0.26)	(0.18)	0.0397	0.0401	-0.01	(0.78)
Saudi Arabia	0.0022	0.0022	0.04	(0.95)	(0.84)	0.0014	0.0010	0.46	(0.00)

Table 4.6: Return Regression Tests

This table reports the panel regressions coefficients from 2006 to 2014. The dependent variable $R_{i,t}$ is the monthly return for stock i in month t. $D9_{i,t}$ is the dummy variable equal to 1 if the month is *Ramadan* and zero otherwise, MR_t is the monthly market return, $LSIZE_{i,t}$ is the log of the monthly firm market capitalization, $LMTB_{i,t}$ is the log of the monthly stock market-to-book ratio, $VOL_{i,t}$ is the return volatility for stock i for the month t, and $ISV_{i,t}$ is the idiosyncratic volatility for stock i for the month t. Cluster-robust standard errors are in parentheses (accounting for both heteroskedasticity and autocorrelation). ***1 %; **5%; *10% denote significance levels.

Panel A: Including Country and Industry Dummies

	α_0	*D9*	*MR*	*LSIZE*	*LMTB*	*VOL*	*ISV*
(1)	0.0006	-0.0068					
	(0.0011)	(0.0055)					
(2)	-0.0005	0.0000	0.9799				
	(0.0011)	(0.0022)	(0.9609)				
(3)	0.0402	0.0015	0.9833	-0.0052			
	(0.0323)	(0.0017)	(0.9609)	(0.0042)			
(4)	0.0314	0.0018	0.9836	-0.0001	-0.0349		
	(0.0250)	(0.0019)	(0.9607)	(0.0010)	(0.0309)		
(5)	-0.0214***	0.0011***	0.0005	0.0017***	-0.0020***	0.4015***	
	(0.0031)	(0.0004)	(0.0018)	(0.0003)	(0.0003)	(0.0470)	
(6)	-0.0074**	0.0013*	-0.0318**	0.0006*	-0.0019***		0.1997***
	(0.0039)	(0.0008)	(0.0143)	(0.0003)	(0.0004)		(0.0692)

Panel B: Including Country, Industry and Yearly Dummies

	α_0	*D9*	*MR*	*LSIZE*	*LMTB*	*VOL*	*ISV*
(1)	2.7798	-0.0068					
	(2.8225)	(0.0056)					
(2)	-0.0513	0.0000	0.9968				
	(0.4804)	(0.0022)	(0.9609)				
(3)	0.1120	0.0015	0.9833	-0.0052			
	(0.4955)	(0.0017)	(0.9609)	(0.0042)			
(4)	5.132	0.0021	0.9833	0.0000	-0.0038		
	(4.845)	(0.0019)	(0.9609)	(0.0012)	(0.0343)		
(5)	-0.9352***	0.0011***	0.0012	0.0019***	-0.0016***	0.4001***	
	(0.1277)	(0.0004)	(0.0018)	(0.0003)	(0.0003)	(0.0463)	
(6)	-0.6687***	0.0013*	-0.0318**	0.0004*	-0.0018***		0.1999***
	(0.1482)	(0.0008)	(0.0142)	(0.0003)	(0.0003)		(0.0692)

Table 4.7: Islamic and Non-Islamic Stocks Volatility Equality Tests

This table presents the mean and median equality tests for *Ramadan* daily volatility ($RVOL$) and non-*Ramadan* (normal) daily volatility ($NVOL$) (omitting the immediate month before and after *Ramadan*) for both Islamic and non-Islamic stocks from 2006 to 2014. The mean is the time-series average of means and the median is the time-series median of means. $AVOL$ represents the abnormal volatility for *Ramadan* calculated as ($RVOL$ minus $NVOL$) scaled by $RVOL$. The p-values of the (t-test) correspond to a standard test for equality, the p-values of the (S-W) test correspond to a Satterthwaite-Welch test with correction for unequal sample size and variances, and the p-values of the median equality test correspond to a Wilcoxon/Mann-Whitney (MWW) signed rank median test.

Panel A: Islamic Stocks Volatility Tests

Stock Market	**Mean Equality Test**					**Median Equality Test**			
	RVOL (%)	*NVOL (%)*	*AVOL (%)*	*P-Value (t-test)*	*P-Value (S-W)*	*RVOL (%)*	*NVOL (%)*	*AVOL (%)*	*P-Value (MWW)*
Bahrain	0.96	10.88	-91.17	(0.14)	(0.00)	1.03	1.23	-16.12	(0.00)
Dubai	2.04	2.46	-16.78	(0.00)	(0.00)	1.67	2.10	-20.45	(0.00)
Kuwait	2.70	2.92	-7.30	(0.00)	(0.00)	2.67	2.74	-2.57	(0.00)
Qatar	1.81	2.13	-15.11	(0.00)	(0.00)	1.57	1.86	-15.59	(0.00)
Saudi Arabia	2.46	2.73	-9.90	(0.01)	(0.00)	2.37	2.33	1.43	(0.30)

Panel B: Non-Islamic Stocks Volatility Tests

Stock Market	**Mean Equality Test**					**Median Equality Test**			
	RVOL (%)	*NVOL (%)*	*AVOL (%)*	*P-Value (t-test)*	*P-Value (S-W)*	*RVOL (%)*	*NVOL (%)*	*AVOL (%)*	*P-Value (MWW)*
Bahrain	1.26	0.97	30.05	(0.00)	(0.08)	0.70	0.77	-9.42	(0.00)
Dubai	1.29	1.67	-22.76	(0.00)	(0.00)	1.06	1.36	-22.17	(0.00)
Kuwait	2.32	5.68	-59.14	(0.19)	(0.00)	2.20	2.50	-11.87	(0.00)
Qatar	1.63	1.98	-17.67	(0.00)	(0.00)	1.48	1.80	-17.96	(0.00)
Saudi Arabia	2.16	2.52	-14.29	(0.00)	(0.00)	1.86	2.00	-6.88	(0.00)

Table 4.8: Islamic and Non-Islamic Stocks Idiosyncratic Volatility Equality Tests

This table presents the mean and median equality tests for *Ramadan* daily idiosyncratic volatility ($RISV$) and non-*Ramadan* (normal) daily idiosyncratic volatility ($NISV$) (omitting the immediate month before and after *Ramadan*) for both Islamic and non-Islamic stocks from 2006 to 2014. The mean is the time-series average of means and the median is the time-series median of means. $AISV$ represents abnormal idiosyncratic volatility for *Ramadan* calculated as ($RISV$ minus $NISV$) scaled by $RISV$. The p-values of the (t-test) correspond to a standard test for equality, the p-values of the (S-W) test correspond to a Satterthwaite-Welch test with correction for unequal sample size and variances, and the p-values of the median equality test correspond to a Wilcoxon/Mann-Whitney (MWW) signed rank median test.

Panel A: Islamic Stocks Idiosyncratic Volatility Tests

	Mean Equality Test					**Median Equality Test**			
Stock Market	*RISV (%)*	*NISV (%)*	*AISV (%)*	*P-Value (t-test)*	*P-Value (S-W)*	*RISV (%)*	*NISV (%)*	*AISV (%)*	*P-Value (MWW)*
Bahrain	1.49	13.33	-88.79	(0.10)	(0.00)	1.21	1.44	-15.59	(0.00)
Dubai	1.84	2.29	-19.64	(0.00)	(0.00)	1.69	2.02	-15.99	(0.00)
Kuwait	2.88	4.23	-31.97	(0.09)	(0.00)	2.92	2.92	-0.03	(0.04)
Qatar	1.41	1.81	-22.18	(0.00)	(0.00)	1.30	1.64	-20.75	(0.00)
Saudi Arabia	1.97	2.09	-5.91	(0.03)	(0.01)	1.93	1.96	-1.82	(0.08)

Panel B: Non-Islamic Stocks Idiosyncratic Volatility Tests

	Mean Equality Test					**Median Equality Test**			
Stock Market	*RISV (%)*	*NISV (%)*	*AISV (%)*	*P-Value (t-test)*	*P-Value (S-W)*	*RISV (%)*	*NISV (%)*	*AISV (%)*	*P-Value (MWW)*
Bahrain	1.69	3.06	-44.80	(0.22)	(0.00)	0.89	0.99	-10.54	(0.00)
Dubai	1.50	2.00	-24.98	(0.00)	(0.00)	1.31	1.59	-17.41	(0.00)
Kuwait	2.46	7.57	-67.51	(0.13)	(0.00)	2.34	2.62	-10.46	(0.00)
Qatar	1.45	1.91	-23.86	(0.00)	(0.00)	1.37	1.73	-21.22	(0.00)
Saudi Arabia	1.77	2.00	-11.54	(0.00)	(0.00)	1.46	1.74	-16.15	(0.00)

Table 4.9: Islamic and Non-Islamic Stocks Trading Frequency Equality Tests

This table presents the mean and median equality tests for *Ramadan* trading frequency ($RTOV$) and the other days' market normal trading frequency ($NTOV$) (omitting the immediate month before and after *Ramadan*) for both Islamic and non-Islamic stocks from 2006 to 2014. The mean is the time-series average of means and the median is the time-series median of means. $ATOV$ represents the abnormal trading frequency for *Ramadan* calculated as ($RTOV$ minus $NTOV$) scaled by $RTOV$. The p-values of the (t-test) correspond to a standard test for equality, the p-values of the (S-W) test correspond to a Satterthwaite-Welch test with correction for unequal sample size and variances, and the p-values of the median equality test correspond to a Wilcoxon/Mann-Whitney (MWW) signed rank median test.

Panel A: Islamic Stocks Trading Frequency Tests

	Mean Equality Test					Median Equality Test			
Stock Market	*RTOV (%)*	*NTOV (%)*	*ATOV (%)*	*P-Value (t-test)*	*P-Value (S-W)*	*RTOV (%)*	*NTOV (%)*	*ATOV (%)*	*P-Value (MWW)*
Bahrain	0.03	0.05	-46.97	(0.40)	(0.04)	0.01	0.02	-44.86	(0.00)
Dubai	0.64	0.87	-25.76	(0.01)	(0.00)	0.41	0.49	-16.70	(0.00)
Kuwait	0.44	0.63	-29.64	(0.00)	(0.00)	0.37	0.54	-32.10	(0.00)
Qatar	0.32	0.45	-29.23	(0.00)	(0.00)	0.18	0.30	-38.29	(0.00)
Saudi Arabia	2.14	3.72	-42.60	(0.00)	(0.00)	1.77	3.07	-42.28	(0.00)

Panel B: Non-Islamic Stocks Trading Frequency Tests

	Mean Equality Test					Median Equality Test			
Stock Market	*RTOV (%)*	*NTOV (%)*	*ATOV (%)*	*P-Value (t-test)*	*P-Value (S-W)*	*RTOV (%)*	*NTOV (%)*	*ATOV (%)*	*P-Value (MWW)*
Bahrain	0.04	0.05	-14.12	(0.73)	(0.68)	0.01	0.02	-30.57	(0.00)
Dubai	0.55	0.62	-11.13	(0.10)	(0.07)	0.40	0.45	-9.75	(0.02)
Kuwait	0.27	0.44	-40.03	(0.00)	(0.00)	0.23	0.36	-34.95	(0.00)
Qatar	0.20	0.29	-31.44	(0.00)	(0.00)	0.12	0.22	-44.43	(0.00)
Saudi Arabia	1.80	3.24	-44.51	(0.00)	(0.00)	1.11	2.03	-45.51	(0.00)

Table 4.10: Establishment Dates for the S&P Indexes

This table presents the establishment dates for each S&P index following both the *Gregorian* and Islamic Lunar (*Hijri*) calendars and the number of *Ramadan* months available in our data for each index from the establishment date to October 25, 2014 *Gregorian* (12/30/1435 *Hijri*).

	Establishment Date (Gregorian)	*Establishment Date (Islamic Lunar)*	*Number of Ramadan Observations*
Bahrain	01/05/2000	26/01/1421	14
Kuwait	03/01/2005	22/11/1425	9
Oman	19/04/2000	14/01/1421	14
Qatar	31/12/2004	19/11/1425	9
Saudi Arabia	31/12/1997	02/09/1418	17
UAE	03/01/2005	22/11/1425	9

Table 4.11: Summary Statistics and Equality Tests of the Annualized Index Returns

This table presents the summary statistics and equality tests of the annualized daily index returns in percentage, based on the Islamic 12-month lunar calendar from each index establishment date to October 25, 2014 *Gregorian* (12/30/1435 *Hijri*). *Ramadan* days are the days of the ninth month of the Islamic lunar calendar. The p-values of the median equality test in Panel B correspond to a Wilcoxon/MannWhitney (MWW) signed rank median test. The p-values of the variance equality test in Panel C correspond to the F-test and Bartlett-test. A Bartlett-test compares the weighted average variance logarithm and the weighted sum of the variance logarithms (for further details, see Sokal et al. 1969).

Panel A: Mean Equality Test

	Ramadan Days (%)	*Rest of the Year (%)*	*P-Value (t-test)*
Bahrain	3.38	44.08	(0.77)
Kuwait	22.32	-2.63	(0.42)
Oman	13.92	8.68	(0.80)
Qatar	34.18	7.88	(0.48)
Saudi Arabia	21.14	9.68	(0.69)
UAE	61.10	-1.04	(0.13)

Panel B: Median Equality Test

	Ramadan Days (%)	*Rest of the Year (%)*	*P-Value (MWW)*
Bahrain	2.49	2.78	(0.92)
Kuwait	35.04	5.79	(0.17)
Oman	28.18	12.03	(0.32)
Qatar	50.00	19.75	(0.28)
Saudi Arabia	22.45	26.53	(0.53)
UAE	79.72	18.19	(0.02)

Panel C: Variance Equality Test

	Ramadan Days St. dev.	*Rest of Days St. dev.*	*P-Value (F-test)*	*P-Value (Bartlett)*
Bahrain	2.13	22.18	(0.00)	(0.00)
Kuwait	3.08	3.74	(0.00)	(0.00)
Oman	2.60	3.05	(0.00)	(0.00)
Qatar	4.81	4.58	(0.43)	(0.40)
Saudi Arabia	3.64	4.41	(0.00)	(0.00)
UAE	4.60	5.12	(0.05)	(0.07)

Table 4.12: Returns Seasonality Regression Tests Using Dummy Variables

This table presents the results of seasonality regression tests using dummy variables and average monthly continuous returns for the period from each index establishment date to October 25, 2014 *Gregorian* (12/30/1435 *Hijri*). *D9* represents the *Ramadan* dummy variable coefficient. T-statistics are in parentheses. ***1 %; **5%; *10% denote significance levels.

	D1	*D2*	*D3*	*D4*	*D5*	*D6*	*D7*	*D8*	*D9*	*D10*	*D11*	*D12*
Bahrain	25.30***	0.05	0.28	0.25	0.12	-0.15	0.05	0.21	0.04	-0.17	-0.21	0.08
	(3.44)	(0.01)	(0.04)	(0.03)	(0.02)	(-0.02)	(0.01)	(0.03)	(0.01)	(-0.02)	(-0.03)	(0.01)
Kuwait	-0.31	0.30	0.27	0.25	0.29	0.00	-0.07	0.22	0.31	-0.41	-0.37	0.07
	(-0.88)	(0.83)	(0.75)	(0.70)	(0.80)	(-0.01)	(-0.19)	(0.61)	(0.88)	(-1.16)	(-1.10)	(0.20)
Oman	0.17	0.11	0.04	0.58*	0.28	-0.26	-0.02	0.13	0.13	-0.35	0.33	-0.11
	(0.71)	(0.44)	(0.16)	(2.36)	(1.13)	(-1.05)	(-0.08)	(0.53)	(0.53)	(-1.41)	(1.34)	(-0.43)
Qatar	-0.25	0.07	-0.23	0.59	0.50	0.22	0.37	-0.33	0.35	-0.81*	0.36	0.66
	(-0.54)	(0.15)	(-0.51)	(1.28)	(1.08)	(0.49)	(0.81)	(-0.72)	(0.75)	(-1.76)	(0.81)	(1.51)
Saudi Arabia	0.34	0.51	-0.45	0.72**	0.42	-0.45	0.25	-0.19	0.15	-0.06	-0.35	0.38
	(0.98)	(1.46)	(-1.27)	(2.05)	(1.20)	(-1.27)	(0.71)	(-0.53)	(0.45)	(-0.18)	(-1.02)	(1.13)
UAE	0.08	0.46	0.32	0.71	0.40	-0.26	0.40	-0.35	0.67	-0.58	0.20	-1.00**
	(0.17)	(1.01)	(0.70)	(1.53)	(0.87)	(-0.56)	(0.88)	(-0.76)	(1.46)	(-1.27)	(0.45)	(-2.27)

Table 4.13: Risk-Adjusted Returns Seasonality Regression Tests Using Dummy Variables

This table presents the results of seasonality regression tests using dummy variables and risk-adjusted returns for the period from each index establishment date to October 25, 2014 *Gregorian* (12/30/1435 *Hijri*). *D9* represents the *Ramadan* dummy variable coefficient. T-statistics are in parentheses. ***1 %; **5%; *10% denote significance levels.

	D1	*D2*	*D3*	*D4*	*D5*	*D6*	*D7*	*D8*	*D9*	*D10*	*D11*	*D12*
Bahrain	-0.06	0.01	0.15*	0.06	0.07	-0.03	0.01	0.11	0.03	0.01	-0.07	0.07
	(-0.64)	(0.13)	(1.72)	(0.62)	(0.77)	(-0.36)	(0.07)	(1.19)	(0.32)	(0.14)	(-0.78)	(0.82)
Kuwait	0.02	0.12	0.05	0.08	0.10	-0.04	-0.03	0.08	0.21**	-0.06	-0.01	0.06
	(0.24)	(1.22)	(0.49)	(0.77)	(0.99)	(-0.44)	(-0.29)	(0.8)	(2.07)	(-0.62)	(-0.1)	(0.66)
Oman	0.11	0.07	0.06	0.22**	0.06	-0.13	0.00	0.01	0.23**	-0.03	0.16	0.01
	(1.09)	(0.76)	(0.57)	(2.22)	(0.59)	(-1.38)	(-0.05)	(0.15)	(2.38)	(-0.34)	(1.65)	(0.14)
Qatar	-0.02	0.01	0.00	0.23**	0.09	0.05	0.05	-0.14	0.24**	-0.02	0.14	0.14
	(-0.21)	(0.10)	(-0.01)	(2.20)	(0.83)	(0.44)	(0.45)	(-1.34)	(2.23)	(-0.23)	(1.33)	(1.38)
Saudi Arabia	0.20	0.21**	0.04	0.30***	0.18**	-0.06	0.10	-0.07	0.13	0.18**	-0.06	0.13
	(2.28)	(2.39)	(0.47)	(3.37)	(2.03)	(-0.72)	(1.18)	(-0.78)	(1.52)	(2.09)	(-0.67)	(1.51)
UAE	0.05	0.18*	0.14	0.26**	0.10	-0.04	0.11	-0.05	0.30***	-0.05	0.05	-0.16
	(0.49)	(1.71)	(1.32)	(2.46)	(0.98)	(-0.35)	(1.00)	(-0.48)	(2.81)	(-0.43)	(0.49)	(-1.6)

Table 4.14: Idiosyncratic-Risk-Adjusted Returns Seasonality Regression Tests Using Dummy Variables

This table presents the results of seasonality regression tests using dummy variables and idiosyncratic-risk-adjusted returns for the period from each index establishment date to October 25, 2014 *Gregorian* (12/30/1435 *Hijri*). *D9* represents the *Ramadan* dummy variable coefficient. T-statistics are in parentheses. ***1 %; **5%; *10% denote significance levels.

	D1	*D2*	*D3*	*D4*	*D5*	*D6*	*D7*	*D8*	*D9*	*D10*	*D11*	*D12*
Bahrain	-0.02	0.07	0.15*	0.09	0.08	-0.03	0.03	0.10	0.04	0.03	-0.06	0.03
	(-0.21)	(0.92)	(1.96)	(1.21)	(1.05)	(-0.43)	(0.42)	(1.34)	(0.47)	(0.43)	(-0.76)	(0.35)
Kuwait	0.06	0.10	0.00	0.09	0.12	-0.07	-0.03	0.06	0.17**	-0.05	0.01	0.05
	(0.71)	(1.15)	(-0.04)	(1.02)	(1.47)	(-0.77)	(-0.31)	(0.70)	(1.98)	(-0.57)	(0.11)	(0.59)
Oman	0.10	0.10	0.08	0.19**	0.05	-0.06	0.01	0.03	0.20**	-0.01	0.14*	0.05
	(1.23)	(1.19)	(0.95)	(2.38)	(0.57)	(-0.76)	(0.10)	(0.32)	(2.43)	(-0.18)	(1.72)	(0.58)
Qatar	-0.01	-0.01	0.07	0.27***	0.05	0.08	0.03	-0.12	0.24**	0.03	0.14	0.14
	(-0.11)	(-0.10)	(0.73)	(2.84)	(0.49)	(0.80)	(0.35)	(-1.25)	(2.54)	(0.29)	(1.59)	(1.49)
Saudi Arabia	0.19***	0.17**	0.13*	0.20***	0.13**	-0.03	0.10	-0.04	0.13*	0.15**	-0.04	0.07
	(2.67)	(2.48)	(1.90)	(2.80)	(1.93)	(-0.40)	(1.38)	(-0.64)	(1.87)	(2.21)	(-0.55)	(0.98)
UAE	0.04	0.14	0.15	0.19**	0.16*	-0.04	0.07	-0.04	0.29***	-0.02	0.02	-0.08
	(0.38)	(1.51)	(1.63)	(2.08)	(1.70)	(-0.38)	(0.77)	(-0.47)	(3.13)	(-0.20)	(0.22)	(-0.94)

Appendix II to Chapter 4: Summary of Main Previous Studies

This appendix consists of summaries for the related *Ramadan* return seasonality studies. Table 4.15 reports several aspects of the reviewed studies, including their aims, data length, data type, econometric techniques used, and main findings.

Table 4.15: Related Studies of Ramadan Effect

Study (Authors & Date)	Aims	Sample & Period	Data Type	Econometric Techniques	Main Findings
Husain (1998)	To explore *Ramadan* effect	◇ Pakistani Equity Market: 1989–1992	36 individual stocks, 8 sector indexes, and general index	◇ GARCH	Significant decline in stock market returns volatility during *Ramadan* without significant change in returns
Seyyed et al. (2005)	To examine the effect of *Ramadan* on weekly stock returns and volatility	◇ Saudi Arabia Stock Market: 1985–1999	General market index and 6 sector indexes	◇ GARCH	Significant decline in stock market returns volatility during *Ramadan* without significant change in returns
Al-Hajieh et al. (2011)	To examine whether *Ramadan* is reflected in positive calendar anomalies in Islamic Middle Eastern stock markets	◇ Bahrain: 1996–2007 ◇ Egypt: 1998–2007 ◇ Jordan and Turkey: 1992–2007 ◇ Kuwait: 2001–2007 ◇ Qatar and UAE: 2005–2007 ◇ Saudi Arabia: 1994–2007	Local market indexes	◇ Wald-Wolfowitz runs test; country level analysis	Significant positive returns in *Ramadan* in 6 of the 8 countries
Almudhaf (2012)	To investigate the Islamic calendar seasonal anomalies in the stock returns of 12 countries with Muslim majority	◇ Bahrain and Oman: 2001–2007 ◇ Egypt, Indonesia, Jordan, Malaysia, Morocco, Pakistan, and Turkey: 1996–2007 ◇ Kuwait: 1997–2007 ◇ Saudi Arabia: 1998–2007 ◇ UAE: 2004–2007	S&P indexes except for Kuwait Dow Jones 50 and UAE Dubai Financial Market index	◇ Dummy variables test; country level analysis	*Ramadan* has higher returns only in 4 of the 12 tested countries, including Jordan, Kuwait, Pakistan, and Turkey
Białkowski et al. (2012)	To investigate stock returns during *Ramadan* for 14 predominantly Muslim countries	◇ Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and UAE: 2005–2007 ◇ Egypt, Morocco, and Turkey: 1994–2007 ◇ Indonesia, Jordan, and Malaysia: 1987–2007 ◇ Pakistan: 1992–2007 ◇ Tunisia: 2004–2007	MSCI indexes	◇ CARs using t-test adjusting for risk; pooling all countries in one analysis	Strong evidence for *Ramadan* positive returns seasonality in long and sub-periods

Table 4.15 *(continued)*

Study (Authors & Date)	**Aims**	**Sample & Period**	**Data Type**	**Econometric Techniques**	**Main Findings**
Al-Khazali (2014)	To examine the effect of *Ramadan* on investor psychology and investment decisions	◇ Bahrain: 1995–2012 ◇ Egypt, Indonesia, Jordan, Kuwait, Malaysia, Morocco, Pakistan, Saudi, Tunisia, and Turkey: 1989–2012 ◇ Oman, Qatar, and Dubai: 2000–2012 ◇ Abu Dhabi: 2001–2012	Local stock market indexes	◇ Stochastic dominance (SD); country level analysis	Weak *Ramadan* returns seasonality for all countries in the long period (1989–2012); however, *Ramadan* positive returns seasonality exists in most countries in the sub-periods (1996–2000, 20012006, and 1995–2007), and diminishes during the global financial crisis period 2007–2012
Halari et al. (2015)	To explore Islamic calendar anomalies	◇ Pakistan: 1995–2011	Stock-level data for 106 companies listed on the Karachi Stock Exchange (KSE)	◇ Threshold GARCH	Return volatility in *Ramadan* is lower than in other months of the Islamic calendar
Al-Ississ (2015)	To investigate the holiday effect	◇ Egypt and Morocco: 1995–2012 ◇ Indonesia: 1988–2012 ◇ Jordan: 1993–2012 ◇ Kuwait: 1999–2012 ◇ Malaysia: 1985–2012 ◇ Pakistan: 1992–2012 ◇ Qatar: 2002–2012 ◇ Saudi Arabia: 2000–2012 ◇ Turkey: 1989–2012	Stock-level	◇ Panel regression; pooling all countries in one analysis	Positive change in stock returns during *Ramadan*

Chapter 5

Deviation from Religious Beliefs

5.1 Introduction

The propensity to take on risk as a function of potential reward can be influenced by religious beliefs, leading to investor heterogeneity, which provides explanations for phenomena that cannot be explained by classical finance theory (Doran et al. 2011). For example, heterogeneity in gambling preferences suggests an explanation for the diversification puzzle (Statman 2004) and predicts investor preference to hold stocks with high skewness and volatility (Kumar et al. 2011), as well as explaining the negative relationship between expected returns and idiosyncratic volatility (Boyer et al. 2010).

Recent developments in finance literature have considered the influence of religion on preferences to hold gambling (lottery-type) stocks (Kumar 2009, Kumar et al. 2011, Kumar & Page 2014). They define lottery-type stocks as those with high skewness and volatility Barberis & Huang (2008). Previous studies have relied on divergence in

Christian cultures to test the implication of religion on stock market gambling behavior (Kumar 2009, Kumar et al. 2011, Kumar & Page 2014). This Christian sample suffers from a low level of religiosity,[1] unclear Christian investing rules, and a lack of clear identity as to institutional religious background.[2]

Motivated by the theoretical frameworks of Barberis & Huang (2008), our study aims to contribute to the literature that considers the influence of religious background on the preference to hold lottery-type stocks (Kumar 2009, Kumar et al. 2011, Kumar & Page 2014). To this end, we take advantage of an economy/market (Kuwait) in

[1]The World Values Survey (2010–2014) shows that countries that are used to examine the influence of religious background on financial decisions have a low percentage of people who believe that religion is very important in life (e.g., Australia 14.1%, Germany 13.1%, Netherlands 10.6%, and U.S. 40.4%). This low level of religiosity leads to unclear conclusions on the influence of religious background on financial decisions. For example, studies on risk-aversion among Christian denominations are inconsistent (Noussair et al. 2013). While some authors suggest that Protestants are less risk tolerant than are Catholics (Barsky et al. 1997, Kumar 2009, Benjamin et al. 2016, Kumar et al. 2011), other researchers report the opposite result (Dohmen et al. 2011, Renneboog & Spaenjers 2012, Köbrich Leon & Pfeifer 2013).

[2]The literature on the testing of the relationship between speculation (gambling) attitudes and Christian religious environment exhibits difficulty in distinguishing investors' religious backgrounds. Previous studies at the institutional level have combined the concentration of geographical religious groups and institutional historical portfolio holdings as indicators of institution religious identity and risk-aversion. The first proxy of geographical location and residency of religious groups provides some indication of the institution religious environment that has been used as a proxy for institution religious background (e.g., Kumar 2009, Hilary & Hui 2009, Kumar et al. 2011, Kumar & Page 2014). A second proxy is the historical institutional portfolio weight of lottery-type stocks, which also provides some indication of institutional traders' willingness to hold lottery-type stocks, and distinguishes between gambling-tolerant and gambling-averse institutions (Kumar & Page 2014).

which society is strongly influenced by religious norms. The level of religiosity in our study is higher than that in previous studies. According to the World Values Survey (2010–2014), the level of religiosity in Kuwait is 86.5%, which is much higher than for samples that have been used in the previous studies in the U.S. (40.4%). Furthermore, investors in our data from an Islamic society (Kuwait) have clear norms that prohibit/discourage excessive stock market speculation (Kamali 1996, Ahmed 2000, Naughton & Naughton 2000, Zaher & Kabir Hassan 2001, Al-Masri 2007). Finally, our study avoids the problem of previous studies, which is the lack of identification of institutional traders' religious identity. In contrast to previous studies that use geographical clustering of religious groups and historical portfolio holdings as indirect indicators of institutional investors' religious background, our measure is substantially more direct. We are able to clearly distinguish between religious and non-religious institutional investors by their article of association, which clearly distinguishes Islamic institutional investors as those companies or funds that conduct their regulated activities in compliance with Islamic *Shariah*.

In this setting, we examine the influence of institutional investors' religious background on owning lottery-type stocks (Kumar 2009, Kumar et al. 2011). In addition, we test the conjecture of Kumar & Page (2014) that gambling-averse institutional investors deviate from their

religious norms when they have significant information and the potential benefit is high. Specifically, we compare the returns of lottery-type stocks of Islamic and non-Islamic institutional portfolios to examine whether violations of norms predict the performance of institutional investors' holdings.

To the best of our knowledge, this study is the first to examine the effect of religious norms (against gambling) on the preference to hold lottery-type stocks in an Islamic context. Our main results can be summarized as follows. In contrast with our expectation, we find that Islamic institutional investors hold more lottery-type stocks in their portfolios than do non-Islamic institutional investors. This deviation from Islamic norms may be due to Islamic institutional traders having stronger information signals that induce them to trade risky gambling stocks with high skewness. Our analysis suggests that lottery-type stocks held by Islamic institutional investors earn on average 0.06% per month higher than do lottery-type stocks held by non-Islamic institutional investors (t-statistic = 2.48). Finally, our analysis suggests that as the percentage of non-Islamic institutional ownership increases in Islamic stocks, they exhibit lower lottery-type stock characteristics. The implications of our study are, therefore, important for regulators and Islamic *Shariah* auditors in countries that have institutions operating in compliance with Islamic *Shariah*. We suggest that regulators

and Islamic *Shariah* auditors may need to more effectively regulate to ensure that the operations of Islamic institutions are free from excessive uncertainty (*Gharar*), in the same way that they ensure that their transactions are free from interest (*Riba*).

The remainder of this chapter is organized as follows. Section 5.2 presents the background to the study together with the hypotheses development. Section 5.3 presents the research methodology. Section 5.4 presents the data. Section 5.5 provides empirical results. Section 5.6 concludes.

5.2 Background and Hypotheses Development

5.2.1 Background

Islamic *Shariah* has set in place a number of norms and ethical codes to safeguard against unfair activities (Taj el din 1996). From the perspective of Islamic *Shariah*, many practices in traditional stock exchanges are undesirable, such as speculation and volatility in share prices, which are not connected to economic value or to the underlying performance of companies. Stock market trading is allowed under Islamic laws, but speculation in stock exchanges is either undesirable

or forbidden. In Islam, excessive speculation is forbidden because it involves high uncertainty (*Gharar*) and is similar to gambling, which is strictly forbidden in the *Quran* (Kamali 1996, Ahmed 2000, Naughton & Naughton 2000, Zaher & Kabir Hassan 2001, Al-Masri 2007).

Religious trading rules lead to variation of the acceptance of gambling among investors with different religions and different levels of religiosity, which leads to heterogeneity in speculative behavior.[3] A number of studies relate such heterogeneity in gambling acceptance to heterogeneity in preferences for holding lottery-type stocks (Kumar 2009, Kumar et al. 2011, Doran et al. 2011, Kumar & Page 2014).[4]

A religious environment can influence professional behavior, personal behavior, and institutional constraints. The interaction between religious background and financial decision-making has been addressed at both the individual and institutional level. Previous

[3]For instance, the Catholic Church has been considered more tolerant about gambling than is the Protestant Church (Kumar et al. 2011). Muslims have a clearer prohibition for risky financial behavior than do Christians (Kunhibava 2011).

[4]Alternative definitions for lottery-type stocks are encountered in finance literature. Lottery-type stocks have been defined by Kumar (2009) as those with lottery ticket characteristics. Lottery tickets have a low price with a low probability of a very large return. Thus, lottery-type stocks can be defined as stocks with low price and high idiosyncratic volatility and skewness. Other studies use similar properties to define lottery-type stocks (such as Boyer et al. 2010, Doran et al. 2011, Kumar & Page 2014). Kumar et al. (2011) use the same definition without the price characteristic to test institutional traders' gambling attitudes. They determine similar qualitative outcomes when they include the price characteristic in their definition of lottery-type stocks. Bali et al. (2011) use an alternative definition for lottery-type stocks based on an extreme returns criterion using the maximum daily return of each security during the previous month.

studies apply demographic religious proxies to conduct research at the individual and institutional levels (Kumar 2009, Hilary & Hui 2009, Kumar et al. 2011, Kumar & Page 2014). For example, Kumar et al. (2011) use a Catholic-to-Protestant ratio in U.S. counties as a proxy for gambling preference to test the relationship between the geographical variations of religious tendency and gambling attitudes in the stock market at the institutional level.[5] Their findings suggest that religious background can affect gambling attitudes (preference of holding lottery-type stocks) at the institutional level, with firms located in high Protestant areas being more averse to holding lottery-type stocks than are those located in high Catholic areas.

5.2.2 Hypotheses Development

Notwithstanding the difficulty in measuring traders' preferences for gambling and speculation directly, the role of gambling has been considered in finance literature. Kumar et al. (2011) find evidence of the effect of gambling attitudes on the financial decisions of institutional

[5]The difference in gambling acceptance between religions may cause heterogeneity in investors' gambling preferences. Kumar (2009) uses religious groups as an explanation of the preference to hold lottery-type stocks. He finds that lottery-type stocks and state lotteries attract similar religious groups. He also finds that people who live in a Catholic geographic area have a preference to hold lottery type-stocks compared with those living in Protestant geographic areas, and that people who live in geographic areas without any strong religious background have higher preference for lottery-type stocks. His results are consistent with the literature that finds that Catholics participate in lotteries more than do Protestants (e.g., Grichting 1986).

investors in relation to the geographical variation of religious tendency, captured by the ratio of Catholics to Protestants (CPRATIO) to explain the effect of gambling norms on stock market outcomes.[6] They build their conjectures based on sophisticated institutional investors, while arguing that less sophisticated investors may deviate from their norms because of behavioral biases.

However, the role of gambling has not been considered in the extant finance literature in an Islamic context. In the stock markets of Islamic societies, where Islamic and non-Islamic stocks and traders are present in the same exchange, we may clearly differentiate between gambling-tolerant and gambling-averse institutional traders. Islamic institutions in these markets are subject to Islamic norms, which arise from Islamic *Shariah* that forbids excessive speculation as it involves *Gharar* and is similar to gambling, which is strictly forbidden in the *Quran*. Thus, we categorize Islamic institutions as gambling-averse and non-Islamic institutions as gambling-tolerant.

Traders' variation in norms against gambling predict their preference for holding lottery-type stocks (Kumar et al. 2011).[7] Since excessive stock market speculation (gambling) is prohibited in Islam,

[6]In the case that religious background determines gambling preference, the Catholic Church is considered more tolerant with regard to gambling than is the Protestant Church (Kumar et al. 2011).

[7]A detailed summary of the studies that have been referenced in this chapter with regard to lotter-type stocks is presented in Table 5.9 in Appendix II to this chapter.

we expect that Islamic institutions have a lower preference for owning lottery-type stocks than do non-Islamic institutions, which leads us to propose the following:

Hypothesis 1: Islamic institutional traders are more averse to owning lottery-type (gambling) stocks than are non-Islamic institutional traders.

If investors have access to private information, norms against holding certain types of stocks are expected to influence the decision to take advantage of that information. However, if the information is powerful and the benefit is expected to be sufficient, sophisticated investors might be expected to deviate from their norms (Kumar & Page 2014, Huang et al. 2014). The findings of Kumar & Page (2014) and Huang et al. (2014) are consistent with the conjuncture that "gambling-averse" institutional investors outperform those that are "gambling-tolerant" when the former invest against their norms in lottery-type stocks. Thus, we expect that:

Hypothesis 2: "Lottery-type" stocks owned by Islamic institutional traders outperform those owned by non-Islamic institutional traders.

Islamic institutional traders are expected to speculate less than are non-Islamic institutional traders. For most Islamic countries, specu-

lation is not legally controlled. Nevertheless, we expect that if Islamic institutional traders preserve their Islamic norms, they will speculate less than do non-Islamic institutional traders. For instance, in the case of the KSE, although there is no legal control on stock market speculation, Islamic firms must have an internal *Shariah* audit committee to ensure that the transactions of the Islamic institution are in compliance with *Shariah* rules. We expect that the internal *Shariah* audit committees control firms' excessive speculation activities, as these activities are prohibited in Islam.

Consistent with our hypothesis that Islamic stock market traders are expected to be more gambling-averse than are non-Islamic traders, we expect Islamic stocks to have less lottery-type characteristics than do non-Islamic stocks. However, if non-Islamic (gambling-tolerant) traders speculate on Islamic stocks, they may create lottery-type Islamic stocks. Observing the ownership structure of Islamic stocks, we expect that Islamic stocks with high non-Islamic ownership will have higher lottery characteristics. In other words, gambling-tolerant (non-Islamic institutional) traders create "lottery-type Islamic stocks". This leads us to propose the following:

Hypothesis 3: Islamic stocks are more likely to exhibit lottery-type characteristics as ownership of non-Islamic institutions increases in them.

5.3 Research Methodology

5.3.1 Measuring Lottery-Type Stocks

We define lottery-type stocks, following Kumar & Page (2014), as those with lottery ticket characteristics, these being stocks in the highest quantile of expected idiosyncratic skewness (*EISS*).

The key predictors of idiosyncratic skewness in our model are firm size, turnover, lagged idiosyncratic skewness, and idiosyncratic volatility. For each individual stock, we calculate the end of the month t idiosyncratic volatility and skewness using data from the previous six months. We follow Boyer et al. (2010) and Kumar (2009) in calculating idiosyncratic volatility "$ISV_{i,t}$":

$$ISV_{i,t} = \left(\frac{1}{D(t)} \sum_{d \in T(t)} \varepsilon_{i,d}^2 \right)^{1/2}, \tag{5.1}$$

where $T(t)$ is the set of trading days in the previous six months, $D(t)$ is the number of trading days in the previous six months set $T(t)$, and $\varepsilon_{i,d}$ is the estimated residual from the Fama & French (1993) three-factor model for stock i on day d, using the time series of the daily stock returns over the previous six months $T(t)$.

To calculate idiosyncratic skewness ISS, we follow Boyer et al. (2010) and Kumar (2009):

$$ISS_{i,t} = \frac{1}{D(t)} \frac{\sum\limits_{d \in T(t)} \varepsilon_{i,d}^3}{ISV_{i,t}^3}, \tag{5.2}$$

where $\varepsilon_{i,d}$ is the estimated residual from the three-factor model for stock i on day d over $T(t)$, and $ISV_{i,t}$ is the idiosyncratic volatility calculated as Equation (5.1).

Historical skewness measures suffer from instability (Harvey & Siddique 2000). Further, Kumar & Page (2014) argue that sophisticated investors' gambling decisions are derived in relation to estimated, rather than historical, skewness. Thus, in our study, we follow Boyer et al. (2010) and Kumar & Page (2014) and estimate the expected idiosyncratic skewness (*EISS*) by first estimating, at the end of each month t, separate cross-sectional regressions:[8]

$$ISS_{i,t} = \beta_{0,t} + \beta_{1,t-T} ISS_{i,t-T} + \beta_{2,t-T} ISV_{i,t-T} + \boldsymbol{\lambda}_t^{'} \boldsymbol{X}_{i,t-T} + \varepsilon_{i,t}, \tag{5.3}$$

where $\boldsymbol{X}_{i,t-T}$ are the firm-specific variables vector observed at the end of each month $t-T$, including turnover ($TOV_{i,t-T}$), momentum ($MOM_{i,t-T}$), firm size $LSIZE_{i,t-T}$, and industry dummy variables.

[8]This regression is similar to Chen et al.'s (2001) panel estimation, with the difference being that we follow Boyer et al. (2010) and Kumar (2009) by estimating the model separately at the end of each month.

The $TOV_{i,t-T}$ is the daily average share turnover of the firm during months $t-T-2$ through $t-T$. The $MOM_{i,t-T}$ is calculated as the stock i cumulative return over the months $t-T-12$ to $t-T-1$. $LSIZEi, t-T$ is the firm log of the market capitalization.

We estimate monthly coefficients from the above regression and use these estimates with the current values of firm-specific variables to predict the expected idiosyncratic skewness for the following month. We calculate this skewness on a monthly basis based on the information available at the time, to produce monthly stock-by-stock measures of expected skewness, using the following equation:

$$EISS_{i,t} = \beta_{0,t} + \beta_{1,t} ISS_{i,t} + \beta_{2,t} ISV_{i,t} + \boldsymbol{\lambda}_t^{'} \boldsymbol{X}_{i,t}. \tag{5.4}$$

5.3.2 Identifying Institutional Investors' Religious Identity

In certain Islamic countries with mixed stock markets, the articles of association for the firm allow us to clearly distinguish religious and non-religious institutional traders. For example, in Kuwait, both Islamic and non-Islamic firms and shares traded in the KSE are regulated by the law (No. 7, 2010) of the Capital Market Authority (CMA). In addition, all institutions seeking to be licensed to operate

in compliance with Islamic *Shariah* rules must:[9]

(i) have articles of association that include a statement permitting the institution to operate in compliance with Islamic *Shariah* rules,

(ii) have in their organizational structure an internal *Shariah* audit system that is governed by a clear policy to ensure compliance with *Shariah* rules, and

(iii) Have an external independent *Shariah* auditor who specializes in auditing *Shariah* compliance for the Islamic institutions' commercial and investment transactions.

5.3.3 Institutional Investors' Holdings Tests

To test our first hypothesis, we analyze institutional investors' stock holdings conditional on their religiosity, conducting mean equality tests, median equality tests, and panel regressions.

Firstly, every month, for each institutional portfolio, we compute the portfolio weight allocated in each quantile of *EISS*, with lottery-type stocks defined as stocks located in the highest quantile of *EISS*. Then, we conduct mean and median equality tests for the monthly holdings between Islamic and non-Islamic institutional portfolios. The mean equality test is the equality of the monthly time-series average of means between Islamic and non-Islamic institutional portfolio weights

[9]For more information, see the law (No. 7, 2010) of the CMA, from Clause 204–209.

in each $EISS$ quantile. The median equality test is the equality test of the monthly time-series median of means between Islamic and non-Islamic institutional portfolio weights in each $EISS$ quantile.

Baltagi (2008) and Hsiao (2014) suggest that panel data regression reduces problems associated with estimation bias and multicollinearity, controls for individual heterogeneity, and specifies the time-varying relation between dependent and independent variables. Thus, we conduct the following panel regression:

$$LW_{i,t} = \alpha_0 + \alpha_1 IID_{i,t} + \alpha_3 PSIZE_{i,t-1} + \alpha_4 HHI_{i,t-1} + \varepsilon_{i,t}, \quad (5.5)$$

where $LW_{i,t}$ is the lottery-type stocks weight for institutional investor i in month t. The independent variables are as follows. $IID_{i,t}$ is the institutional investor dummy variable equal to 1 if the institutional investor is Islamic, and 0 if the institutional investor is non-Islamic; $PSIZE_{i,t-1}$ is the portfolio size calculated as the log of the market value of the total institutional equity portfolio; $HHI_{i,t-1}$ is the Herfindahl index for portfolio concentration, computed using the portfolio weights; and ε_t is the error term. The coefficient α_1 indicates whether the Islamic institutional investors hold more or less lottery-type stocks than do non-Islamic institutional investors.

Because the data are pooled (panel), heteroskedasticity and au-

tocorrelation may influence the ordinary least squares (OLS) results. Thus, we use a cluster-robust variance and covariance estimators to give us more conservative standard errors (Arellano 2003). In addition, we include monthly dummies and institutional investor type-dummies.

5.3.4 Lottery-Type Stocks Returns Test

To test Hypothesis 2, we conduct a series of univariate and time-series tests.

Firstly, we conduct a series of univariate tests to determine monthly holdings-returns for Islamic and non-Islamic institutional traders.[10] We test the performance of lottery-type stocks focusing on Islamic and non-Islamic institutional investors' holdings by sorting them into quintiles based on their *EISS*, and calculating the mean and median returns of the average time-series holdings at each quantile.

Secondly, we examine the monthly time-series returns difference between the lottery-type stocks portfolios of Islamic and non-Islamic institutional investors in relation to the CAPM:

$$IMN_t = \alpha + \beta MRP_t + \varepsilon_t, \tag{5.6}$$

[10]Because information obtained by institutional traders is short-lived, it is necessary to measure the returns of institutional traders' monthly holdings.

where IMN_t is the monthly return of Islamic institutional investors' lottery-type stocks portfolios minus those of non-Islamic institutional investors, specifically, an equal weighted portfolio long in Islamic holdings of lottery-type stocks and short in non-Islamic holdings of lottery-type stocks; α is the intercept representing the excess return of lottery-type stocks held by Islamic institutional investors; MRP_t is the monthly market risk premium; and ε_t is the exogenous error term.

In addition, we incorporate the factors of Fama & French (1993) into the previous time-series test:

$$IMN_t = \alpha + \beta_1 MRP_t + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_t, \tag{5.7}$$

where SMB_t is the return of a small minus big market capitalization portfolio in month t, and HML_t is the return of a high minus low book-to-market portfolio in month t.

5.3.5 Islamic Lottery-Type Stocks Test

To test Hypothesis 3, we determine the ownership structure for Islamic lottery-type stocks. Consistent with our hypothesis, we expect that non-Islamic traders speculate on Islamic lottery-type stocks. Particularly, we expect that Islamic stocks with higher non-Islamic ownership will have more lottery-type characteristics. Allowing that excessive

speculation is prohibited in Islam and Islamic institutional traders are expected to speculate less than do those that are non-Islamic. Thus, we anticipate that as non-Islamic ownership increases in Islamic stocks, these stocks will tend to be more lottery-type.

Firstly, we conduct a series of univariate tests to determine the ownership structure of the Islamic stocks sorted in quantiles based on their $EISS$, where the highest quantile of $EISS$ is categorized as Islamic lottery-type stocks. The ratio of non-Islamic to Islamic ownership $NIR_{i,t}$ is measured for each Islamic stock i in month t as:

$$NIR_{i,t} = \frac{(1 + NIO_{i,t})}{(1 + IIO_{i,t})} - 1, \tag{5.8}$$

where NIO is the percentage of non-Islamic ownership in stock i in month t, and IIO is the percentage of Islamic ownership in stock i in month t.

Secondly, we conduct the following panel regression:

$$NIR_{i,t} = \alpha_0 + \alpha_1 ILTD_{i,t} + \boldsymbol{\beta X}_{i,t} + \varepsilon_{i,t}, \tag{5.9}$$

where $NIR_{i,t}$ is the ratio of non-Islamic to Islamic ownership in Islamic stock i in month t; $ILTD_{i,t}$ is a dummy variable equal to 1 if the stock is Islamic lottery-type, and 0 if the Islamic stock is non-lottery-

type; stock $\boldsymbol{X}_{i,t}$ as the firm-specific characteristics; and ε_t as the error term. The firm-specific characteristic variables $\boldsymbol{X}_{i,t}$ are the idiosyncratic skewness for stock i for the month t, $ISS_{i,t}$; the idiosyncratic volatility for stock i for the month t, $ISV_{i,t}$; the log market capitalization for stock i for the month t, $LSIZE_{i,t}$; the monthly industry rolling beta for stock i, calculated from the previous three years; the monthly turnover ratio for stock i for the month t, $TOV_{i,t}$; the average monthly return for stock i in the previous 12 months, $RET_{i,t}$; the governmental institutions' ownership percentage in stock i for the month t, $GO_{i,t}$; and the family institutions' ownership percentage in stock i for the month t, $FO_{i,t}$. The coefficient α_1 indicates whether the non-Islamic ownership is positively or negatively related to the probability of the Islamic stock being lottery-type.

Firstly, we estimate our model using an ordinary least squares (OLS) framework. In addition, we include stock level industry dummies to control for the industry effect. Because, $NIR_{i,t}$ may be highly correlated across-time and in the cross-section (between stocks), we repeat the tests with "seemingly unrelated regression" (SUR) in a generalized least squares (GLS) framework (see, Greene 2007).

5.4 Data

The primary data for our study consists of the monthly stock holdings for both Islamic and non-Islamic firms listed on the Kuwait Stock Exchange (KSE). The holdings data was obtained from the Aljoman Center for Economic Consultancy, which includes all institutional holdings that exceed 5% of the ownership of the stock for the period from 2007–2014. Besides the institutional datasets, several other datasets are used in this study. Monthly return, volume, number of shares outstanding, market capitalization, firm age, and quarterly book value of common equity were obtained directly from Thomson Datastream. We calculated the monthly SMB_t and HML_t, Fama & French (1993) size and book-to-market return mimicking portfolios, respectively, where SMB_t is the difference in returns between small and big market capitalization portfolios in month t, and HML_t is the difference in returns between high and low book-to-market portfolios in month t. We rank all stocks based on their market capitalization and use the 50th percentile as a breakpoint between small and big size portfolios. The book-to-market breakpoints are the 30th and 70th percentile to generate high, medium, and low book-to-market portfolios. We used Style Research Ltd online tools to construct the monthly Fama & French (1993) factor portfolios.

Table 5.1 shows Kuwait religious and market indicators. As previously noted, the population of Kuwait is highly religious with an 86.5% level of religiosity, with the majority of the population being Muslim (86.4%). Table 5.2 shows the summary statistics for the portfolios of the institutional investors in our data, which shows that the majority of the institutional investors are non-Islamic. The portfolio size and concentration are different between Islamic and non-Islamic. Thus, we need to control for these differences when we compare Islamic and non-Islamic investors' portfolios. Furthermore, the summary statistics show that Islamic institutional investors hold more lottery-type stocks than do those that are non-Islamic, which contradicts our first hypothesis and, thus, requires more detailed testing.

5.5 Results

5.5.1 Institutional Investors' Holdings Tests

Following Hypotheses 1, we expect that Islamic institutional traders are more averse to owning lottery-type (gambling) stocks than are non-Islamic institutional traders.

In contrast to our first hypothesis, the results of the mean and median equality tests in Table 5.3 suggest that Islamic institutional traders hold more lottery-type (gambling) stocks than do non-Islamic

institutional traders. Islamic institutional investors hold 37% of their portfolio in lottery-type stocks, which is more than the 25% held by those that are non-Islamic.

To insure that our results are not biased due to the characteristics of institutional portfolios, we conduct a panel regression controlling for the portfolio size and concentration. The results of the panel regression in Panel A of Table 5.4 are consistent with the mean and median equality tests (the Islamic institutional investors' dummy IID is significantly positive, indicating that Islamic institutional investors hold more lottery-type stocks than do those that are non-Islamic). The results in Panels B and C of Table 5.4 confirm our conclusions when we repeat the tests including monthly dummies as well as when we include institution-type dummies.

5.5.2 Lottery-Type Stock Returns Test

Following Hypotheses 2, we expect that "gambling-averse" Islamic institutional investors outperform "gambling-tolerant" non-Islamic institutional investors when the former invest against their norms in lottery-type stocks. In other words, Islamic institutional investors are willing to invest against their norms only when they expect high performance through access to private information (see, Kumar & Page 2014).

Consistent with our second hypothesis, the results of the mean test in Panel A of Table 5.5 suggest that lottery-type stocks held by Islamic institutional investors outperform those held by non-Islamic institutional investors by an average of 0.06% monthly (t-statistic = 2.48). The results of the median test in Panel B of Table 5.5 suggest that lottery-type stocks held by Islamic institutional investors outperform those held by non-Islamic institutional investors by a median of 0.04% monthly (t-statistic = 2.48).

To ensure that our results are not biased, we conduct a time-series regression controlling for established market return factors, the market risk premium of the CAPM, size, and book-to-market returns mimicking portfolios of Fama & French's 1993 three-factor model. The results of the time-series tests in Table 5.6 suggest that the portfolios of lottery-type stocks held by Islamic institutional investors outperform those held by non-Islamic institutional investors in relation to the CAPM and three-factor model, both with an α that yields 10bps per month at the 5% level of significance.

5.5.3 Islamic Lottery-Type Stocks Test

Following Hypotheses 3, we expect that as the ownership of non-Islamic institutions increases in Islamic stocks, Islamic stocks are more likely to exhibit lottery-type stock characteristics.

In contrast to our third hypothesis, the results of the univariate tests in Table 5.7 shows that as the percentage of non-Islamic-to-Islamic-ownership ratio NIR increases in Islamic stocks, they exhibit a lower $EISS$ (the measure of lottery-type stocks). Moreover, the results of the regression tests in Table 5.8 suggest that as the non-Islamic-to-Islamic-institutional-investor-ownership ratio NIR increases in Islamic stocks, they exhibit lower lottery-type characteristics. Specifically, the OLS regression results in Panel A of Table 5.8 suggest that the Islamic lottery-type stock dummy $ILTD$ in the eight regression steps is negatively related to the NIR, and is significant in four of the eight regressions. These results are more highly significant when we control for industry differences, as revealed in Panel B of Table 5.8, where $ILTD$ in the eight regression steps is negatively related to the NIR, and significant in seven of the eight regressions. Finally, we derive similar conclusions using a "seemingly unrelated regression" (SUR) in a generalized least squares (GLS) framework, as shown in Panel C of Table 5.8.

These results are consistent with our previous results for testing Hypothesis 1 and suggest that Islamic institutional investors deviate from their religious norms by owning higher portions of lottery-type stocks in their portfolios than do non-Islamic institutional investors.

5.6 Conclusion

Extant research suggests that religiosity is negatively related to investors' speculation behavior and preference for holding lottery-type stocks (e.g., Kumar 2009, Hilary & Hui 2009, Kumar et al. 2011). Nevertheless, "gambling-averse" religious investors may deviate from their norms against holding lottery-type stocks if they have significant insider information and expect higher returns (Kumar & Page 2014). The questions we address in this study are whether the negative relationship between investors' preference to hold lottery-type stocks and religiosity holds in an Islamic context, and whether Islamic institutional investors deviate from their norms when they expect higher returns from lottery-type stocks.

Our main results can be summarized as follows. In contrast with our first hypothesis, we find that Islamic institutional investors hold more lottery-type stocks in their portfolios than do non-Islamic institutional investors. This deviation from Islamic norms may be due to Islamic institutional traders having stronger information signals to induce them to trade stocks with high skewness. Our analysis suggests that lottery-type stocks held by Islamic institutional investors earn, on average, 0.06% per month higher than those held by non-Islamic institutional investors (t-statistic = 2.48). Finally, our analysis sug-

gests that as the percentage of non-Islamic institutional ownership increases in Islamic stocks, they exhibit lower lottery-type stock characteristics, supporting the idea that Islamic institutional traders deviate from their norms against holding lottery-type stocks and gambling in stock markets.

The implications of our study are important for regulators and Islamic *Shariah* auditors in countries that provide Islamic operation licenses. We suggest that regulators and Islamic *Shariah* auditors may need to more effectively regulate to ensure that the operations of Islamic institutions are free from excessive uncertainty (*Gharar*), as they ensure that their transactions are free from interest (*Riba*).

Appendix I to Chapter 5: Tables

Table 5.1: Religious Indicators and Market Descriptive Statistics for Kuwait
This table presents Kuwait religious and stock market indicators. The total population and percentage of Muslims to total population are based on the PEW Research Center's 2011 report "The Future of the Global Muslim Population". The religiosity index is from the World Values Survey (2010–2014). The total market capitalization as of 31 December 2014 and the average market capitalization for listed firms are in U.S. dollars from Bloomberg. The number of listed Islamic firms as of December 31, 2014, is from Al-Mashora and Al-Raya for the Islamic Financial Consultancy.

Variable	*Value*
Total Population (millions)	2.74
Muslims to Total Population (%)	86.4
Religiosity Index	86.5
Market Cap in US$ (millions)	101,179
Average Firm Market Cap in US$ (millions)	562
Number of Listed Firms	203
Number of Islamic Firms	62
Percentage of Islamic Firms (%)	31

Table 5.2: Summary Statistics of Institutional Investors' Portfolios

This table presents the summary statistics of the Islamic and non-Islamic institutional investors' portfolios from 2007–2014. The mean is the time-series average of means and the median is the time-series median of means. Number of Institutions is the monthly number of institutions with holdings. $PSIZE$ is the monthly natural logarithm of the portfolio assets in local currency in thousands. HHI is the Herfindahl index portfolio concentration computed using the portfolio weights. Lottery-Type Weight is the proportion of the portfolio allocated in lottery stocks, defined as those in the highest quintile of expected idiosyncratic skewness ($EISS$). Return is the monthly equal-weighted return to institutional holdings.

Panel A: Average Time-Series of Means		
	Islamic Institutional Investors	*Non-Islamic Institutional Investors*
Number of Institutions	46	137
PSIZE	20.64	26.10
HHI	0.545	0.544
Lottery-Type Weight (%)	37	28
Return (%)	-0.070	-0.035
Panel B: Median Time-Series of Means		
	Islamic Institutional Investors	*Non-Islamic Institutional Investors*
Number of Institutions	47	139
Portfolio Size	17.29	25.01
HHI	0.550	0.553
Lottery-Type Weight (%)	37	28
Return (%)	-0.057	-0.039

Table 5.3: Quantiles of Portfolio Distributions

This table presents the monthly institutional portfolio distribution allocated in each quantile of *EISS*. Lottery-type stocks are defined as those in the highest quintile of expected idiosyncratic skewness (*EISS*). The mean is the time-series average of means and the median is the time-series median of means. Panel A presents the mean equality tests between Islamic and non-Islamic institutional investors' proportion allocated in each quantile of *EISS*. Panel B presents the median equality tests between Islamic and non-Islamic institutional investors' proportion allocated in each quantile of *EISS*. The p-values of the median equality test correspond to a Wilcoxon/MannWhitney (MWW) signed rank median test.

Panel A: Mean Equality Test			
	Islamic Institutional Investors	*Non-Islamic Institutional Investors*	*P-Value (t-test)*
Q1 (Non-Lottery)	0.14	0.18	(0.00)
Q2	0.15	0.18	(0.00)
Q3	0.16	0.19	(0.00)
Q4	0.19	0.17	(0.03)
Q5 (Lottery)	0.37	0.28	(0.00)
Panel B: Median Equality Test			
	Islamic Institutional Investors	*Non-Islamic Institutional Investors*	*P-Value (MWW)*
Q1 (Non-Lottery)	0.12	0.18	(0.00)
Q2	0.14	0.18	(0.00)
Q3	0.15	0.19	(0.00)
Q4	0.17	0.16	(0.47)
Q5 (Lottery)	0.37	0.28	(0.00)

Table 5.4: Institutional Portfolio Lottery-Type Stock Weights

This table presents the panel regressions of institutional lottery-type stock holdings on religion measures for Islamic and non-Islamic institutions and other control variables. The dependent variable is the monthly weight of the institution's portfolio held in lottery-type stocks. $IID_{i,t}$ is the institutional investor dummy variable that is equal to 1 if the institutional investor is Islamic, and 0 if the institutional investor is non-Islamic. $PSIZE_{i,t-1}$ is the log of the market value of the total institutional equity portfolio. The portfolio concentration is the Herfindahl index $HHI_{i,t-1}$ computed using the portfolio weights. Panel A presents the OLS regression results for the monthly weight of lottery-type stocks. Panel B presents the regression results for the monthly weight of lottery-type stocks including monthly dummies. Panel C presents the regression results for the monthly weight of lottery-type stocks including institution-type monthly dummies. Banks and insurance companies are considered "Conservative", while investment companies, independent investment advisors, and investment funds are considered "Aggressive". The sample period is from January 2007 to December 2014. Cluster-robust standard errors are in parentheses. ***1%, **5%, and *10% indicate levels of significance.

Panel A: OLS Regression				
	α	*IID*	*PSIZE*	*HHI*
(1)	0.303***	0.073***		
	(0.009)	(0.025)		
(2)	0.383***	0.076***	-0.039***	
	(0.014)	(0.023)	(0.004)	
(3)	0.457***	0.072***	-0.044***	-0.073**
	(0.039)	(0.023)	(0.004)	(0.036)
Panel B: Including Monthly Dummies				
	α	*IID*	*PSIZE*	*HHI*
(1)	0.306***	0.073***		
	(0.011)	(0.025)		
(2)	0.386***	0.076***	-0.039***	
	(0.015)	(0.023)	(0.004)	
(3)	0.496***	0.072***	-0.044***	-0.073**
	(0.039)	(0.023)	(0.004)	(0.036)
Panel C: Including Institution-Type Dummies				
	α	*IID*	*PSIZE*	*HHI*
(1)	0.312***	0.091***		
	(0.012)	(0.028)		
(2)	0.390***	0.087***	-0.039***	
	(0.015)	(0.026)	(0.004)	
(3)	0.482***	0.087***	-0.044***	-0.092**
	(0.039)	(0.026)	(0.004)	(0.036)

Table 5.5: Quantiles of Portfolio Returns

This table presents the monthly equal-weighted return to institutions' holdings of stocks in each quintile of *EISS*. Lottery-type stocks are defined as those in the highest quintile of expected idiosyncratic skewness (*EISS*). The returns are expressed in percentages. The sample period is from January 2007 to December 2014. The value of the one-way test is reported below the means and medians in parentheses. The values of the mean test correspond to t-statistics, and the values of the median test correspond to a Wilcoxon signed rank median test.

Panel A: Time-Series Average of Means			
	Islamic Institutional Investors	*Non-Islamic Institutional Investors*	*(Islamic)-(Non-Islamic) Institutional Investors*
Q1 (Non-Lottery)	-0.09	-0.11	0.02
	(-2.19)	(-3.85)	(0.49)
Q2	-0.03	-0.03	0.00
	(-0.68)	(-1.04)	(0.15)
Q3	0.00	0.03	-0.03
	(0.03)	(1.08)	(-1.26)
Q4	0.10	0.09	0.00
	(2.51)	(3.00)	(0.14)
Q5 (Lottery)	0.17	0.11	0.06
	(4.80)	(4.21)	(2.48)
Panel B: Time-Series Median of Means			
	Islamic Institutional Investors	*Non-Islamic Institutional Investors*	*(Islamic)-(Non-Islamic) Institutional Investors*
Q1 (Non-Lottery)	-0.09	-0.07	-0.01
	(3.05)	(3.35)	(0.20)
Q2	-0.04	0.01	-0.03
	(0.88)	(0.46)	(0.36)
Q3	-0.01	0.06	-0.01
	(0.00)	(1.36)	(1.46)
Q4	0.10	0.07	-0.04
	(2.43)	(2.53)	(0.43)
Q5 (Lottery)	0.12	0.10	0.04
	(4.39)	(4.15)	(2.48)

Table 5.6: Return Time-Series Regression Tests

This table reports the coefficients of the portfolio long lottery-type stocks held by Islamic institutional investors and short lottery-type stocks held by non-Islamic institutional investors (IMN_t) from January 2007 to December 2014. MRP_t is an equally weighted market risk premium. SMB_t is the portfolio mimicking the return difference between the stocks of companies with small and big market capitalization. HML_t is the portfolio mimicking the return difference between high and low book-to-market stocks. The standard errors are in brackets and have been adjusted for serial correlation using Newey-West correction. ***1 %, **5%, and *10% indicate levels of significance.

	α	*MRP*	*SMB*	*HML*
(1)	0.001**	0.007		
	(0.000)	(0.004)		
(2)	0.001***	0.007	0.005	
	(0.000)	(0.004)	(0.004)	
(3)	0.001**	0.006	0.006	0.002
	(0.000)	(0.005)	(0.005)	(0.004)

Table 5.7: Quantiles of Islamic Stock Ownerships

This table presents the monthly NIR of Islamic stocks sorted by stock *EISS* in percentages. NIR is the ratio of non-Islamic to Islamic ownership in Islamic stock i in month t. Lottery-type stocks are defined as those in the highest quintile of expected idiosyncratic skewness (*EISS*). The mean is the time-series average of means and the median is the time-series median of means. The sample period is from January 2007 to December 2014. The value of the one-way test is reported below the means and medians in parentheses. The values of the mean test correspond to t-statistics, and the values of the median test correspond to a Wilcoxon signed rank median test.

	Mean NIR	*Median NIR*
Q1 (Islamic Non-Lottery)	6.02	5.02
	(5.91)	(5.35)
Q2	12.37	12.17
	(8.22)	(6.61)
Q3	14.36	12.49
	(9.28)	(7.42)
Q4	13.48	12.76
	(10.65)	(7.39)
Q5 (Islamic Lottery)	11.95	11.97
	(11.63)	(7.57)

Table 5.8: Islamic Lottery-Type Stock Analysis

The dependent variable is $NIR_{i,t}$, the ratio of non-Islamic to Islamic ownership in Islamic stock i in month t. $ILTD_{i,t}$ is the dummy variable equal to 1 if the Islamic stock i is lottery-type, and 0 if the Islamic stock i is non-lottery-type; $ISS_{i,t}$ is the idiosyncratic skewness for stock i for the month t; $ISV_{i,t}$ is the idiosyncratic volatility for stock i for the month t; $LSIZE_{i,t}$ is the log market capitalization for stock i for the month t; $TOV_{i,t}$ is the monthly turnover ratio for stock i for the month t; $RET_{i,t}$ is the average monthly return for stock i in the previous 12 months; $GO_{i,t}$ is the governmental institutions' ownership percentage in stock i for the month t; and $FO_{i,t}$ is the family institutions' ownership percentage in stock i for the month t. Standard errors are in parentheses. ***1%, **5%, and *10% indicate levels of significance.

Panel A: OLS Regression

	α	*ILTD*	*ISS*	*ISV*	*LSIZE*	*TOV*	*RET*	*GO*	*FO*
(1)	0.108***	-0.012							
	(0.005)	(0.008)							
(2)	0.108***	0.004	-0.001						
	(0.005)	(0.009)	(0.001)						
(3)	0.096***	-0.002	0.004**	0.248***					
	(0.006)	(0.009)	(0.002)	(0.059)					
(4)	0.258***	-0.015*	0.002	0.141**	-0.038***				
	(0.012)	(0.009)	(0.002)	(0.058)	(0.002)				
(5)	0.254***	-0.012	0.001	0.076	-0.039***	2.840***			
	(0.013)	(0.010)	(0.002)	(0.066)	(0.003)	(0.426)			
(6)	0.263***	-0.027**	0.000	0.048	-0.041***	2.677***	0.499***		
	(0.013)	(0.012)	(0.003)	(0.085)	(0.003)	(0.456)	(0.178)		
(7)	0.289***	-0.023*	-0.001	0.007	-0.051***	2.852***	0.564***	0.715***	
	(0.014)	(0.012)	(0.003)	(0.084)	(0.003)	(0.453)	(0.177)	(0.100)	
(8)	0.312***	-0.021*	-0.002	-0.011	-0.052***	2.817***	0.484**	0.717***	-0.566***
	(0.014)	(0.012)	(0.003)	(0.084)	(0.003)	(0.449)	(0.176)	(0.100)	(0.084)

Panel B: OLS Regression Including Industry Dummies

	α	*ILTD*	*ISS*	*ISV*	*LSIZE*	*TOV*	*RET*	*GO*	*FO*
(1)	0.201***	-0.029***							
	(0.006)	(0.007)							
(2)	0.209***	-0.019**	0.000						
	(0.006)	(0.008)	(0.001)						
(3)	0.202***	-0.022***	0.003*	0.144***					
	(0.006)	(0.008)	(0.001)	(0.051)					
(4)	0.135***	-0.022***	0.003**	0.162***	0.018***				
	(0.016)	(0.008)	(0.001)	(0.051)	(0.004)				
(5)	0.122***	-0.019**	0.004**	0.159**	0.019***	1.316***			
	(0.017)	(0.009)	(0.002)	(0.059)	(0.004)	(0.386)			
(6)	0.127***	-0.023**	0.002	0.090	0.018***	1.079**	0.718***		
	(0.018)	(0.011)	(0.002)	(0.077)	(0.004)	(0.418)	(0.161)		
(7)	0.172***	-0.019*	0.000	0.038	0.004	1.230	0.829	0.975	
	(0.018)	(0.011)	(0.002)	(0.075)	(0.005)	0.410***	0.158***	0.090***	
(8)	0.177***	-0.010	-0.001	0.000	0.012**	0.903**	0.712***	0.979***	-0.908***
	(0.018)	(0.011)	(0.002)	(0.074)	(0.004)	(0.404)	(0.156)	(0.089)	(0.086)

Table 5.8 *(continued)*

Panel C: GLS Regression Including Industry Dummies									
	α	*ILTD*	*ISS*	*ISV*	*LSIZE*	*TOV*	*RET*	*GO*	*FO*
(1)	0.052***	-0.021***							
	(0.001)	(0.0005)							
(2)	0.046***	-0.011***	0.000						
	(0.001)	(0.0005)	(0.000)						
(3)	0.042***	-0.012***	0.002*	0.089***					
	(0.001)	(0.001)	(0.0001)	(0.005)					
(4)	-0.158***	-0.012***	0.002**	0.095***	0.017***				
	(0.013)	(0.001)	(0.0001)	(0.005)	(0.0004)				
(5)	0.199***	-0.006***	0.002**	0.071**	0.019***	0.69***			
	(0.002)	(0.001)	(0.0002)	(0.008)	(0.0003)	(0.067)			
(6)	0.116***	-0.006***	0.002	0.016	0.018***	0.570***	0.499***		
	(0.002)	(0.001)	(0.0003)	(0.011)	(0.0005)	(0.078)	(0.027)		
(7)	0.014***	-0.005***	0.000	-0.007	0.003***	.666***	0.626***	0.978***	
	(0.002)	(0.001)	(0.0003)	(0.012)	(0.0007)	(0.079)	(0.027)	(0.007)	
(8)	0.170***	-0.002**	-0.001***	-0.020*	0.012***	0.433**	0.528***	0.980***	-0.905***
	(0.024)	(0.001)	(0.0003)	(0.012)	(0.0005)	(0.076)	(0.025)	(0.006)	(0.011)

Appendix II to Chapter 5: Summary of Main Previous Studies

This appendix consists of summaries for the studies related to social norms and lottery-type stocks. Table 5.9 reports several aspects of the reviewed studies, including their aims, data length, data type, econometric techniques used, and main findings.

Table 5.9: Related Studies of Social Norms and Lottery-Type Stocks

Study (Authors & Date)	Aims	Sample & Period	Data Type	Econometric Techniques	Main Findings
Kumar (2009)	To examine whether the propensity to gamble and investment decisions are correlated	◇ U.S.: 1991–1996	Stock-level; panel of portfolio holdings and trades of a group of individual investors from a U.S. brokerage house	◇ Cross-sectional regressions ◇ Panel regressions ◇ Time-series regressions	Individual investors prefer stocks with lottery features and investors who live in Catholic (Protestant) environments have a stronger (weaker) preference for lottery-type stocks
Kumar et al. (2011)	To investigate whether gambling propensity would be stronger in regions with higher concentrations of Catholics relative to Protestants	◇ U.S.: 1980–2005	Stock-level data, county-level religious and demographic characteristics, and institutional ownership data	◇ Univariate and multivariate tests ◇ Multivariate regression models	In regions with a high (Catholic/Protestant) ratio, investors exhibit a stronger propensity to hold lottery-type stocks
Kumar & Page (2014)	To test whether norm-constrained investors deviate from such norms when they predict to earn high abnormal returns	◇ U.S.: 1980–2008	Stock-level data, county-level religious and demographic characteristics, and institutional ownership data	◇ T-tests ◇ Multivariate regression models	Norm-constraining institutions deviate from their norms against holding lottery-type or sin stocks when they expect to earn relatively high abnormal returns
Huang et al. (2014)	To investigate the reasons Chinese mutual funds hold lottery-type stocks	◇ China: 1998–2012	Funds-level and institutional ownership data	◇ T-tests ◇ Multivariate regression models	In general, Chinese institutional investors do not gamble in stock markets, but when they do gamble, they earn abnormal returns on lottery-type investments; this abnormal return is greater for firms with more ability to obtain insider information

Chapter 6

Conclusion

6.1 Recapitulation

In this thesis, we avail of data from the Gulf Cooperation Council (GCC) countries to provide a meaningful illumination of the impact of religiosity on stock market behavior. Our dataset is from highly religious societies that have clear religious investment rules and explicitly identify both institutional investors and stocks as either "Islamic" or "non-Islamic".

The first essay of this thesis (Chapter 3) examines whether investor social norms in relation to religiosity impede market development. We test the conjecture that in markets that are dominated by strong social norms, those stocks that conflict with the accepted norms are relatively neglected. In this context, we find significant differences in returns, liquidity and liquidity risk between non-Islamic (neglected) and Islamic stocks. Specifically, neglected non-Islamic stocks have higher returns, less liquidity and more liquidity risk in comparison to

Islamic stocks. Such liquidity differences are likely to be an important consideration for both retail and institutional investors. Furthermore, such liquidity segmentation is likely to be of concern for market regulators seeking to enhance market efficiency. Thus, our results highlight the possible challenges that GCC countries will face as they seek to emerge as globally competitive stock markets.

The second essay of this thesis (Chapter 4) examines whether a negative relationship between investor speculation and religiosity explains the phenomenon of stock market seasonality based on religious events. Our main results can be summarized as follows. First, the stock markets of the GCC countries exhibit a lower level of speculation during the Muslim holy month of *Ramadan*. Second, these markets show no *Ramadan* abnormal returns when we do not control for the change in volatility due to a decline in speculation behavior. However, the significant drop in stock market and idiosyncratic volatility during *Ramadan* leads to higher risk-adjusted returns. We conclude that the *Ramadan* effect in previous studies is due to a drop in stock market speculation, and not the outcome of positive investor sentiment (as suggested by previous studies). During *Ramadan*, Muslims devote their time to religious practices and their religiosity increases. As such, they speculate less because excessive stock market speculation is either forbidden or undesirable in Islam.

The third essay of this thesis (Chapter 5) examines whether the negative relationship between investors' preference to hold lottery-type stocks and religiosity holds in an Islamic context, and whether Islamic institutional investors deviate from their norms when they expect high returns from lottery-type stocks. Our main results may be summarized as follows. In contrast with our expectation, we find that Islamic institutional investors hold more lottery-type stocks in their portfolios than do non-Islamic institutional investors. This deviation from Islamic norms may be due to Islamic institutional traders having stronger information signals (expect high returns) to induce them to trade stocks with high skewness. Our analysis suggests that lottery-type stocks held by Islamic institutional investors earn, on average, 0.06% per month higher than those held by non-Islamic institutional investors (t-statistic = 2.48). The implications of our study are important for regulators and Islamic *Shariah* auditors in countries that provide Islamic operation licenses. We suggest that regulators and Islamic *Shariah* auditors may need to be vigilant in monitoring the activities of Islamic institutions, to ensure that they are free from excessive uncertainty (*Gharar*), as they ensure that their transactions are free from interest (*Riba*).

Overall, we conclude that Islamic beliefs have a significant influence on investors' behavior and stock market outcomes. The regula-

tors in Islamic societies will need to consider such religious influence as their stock markets seek to emerge as globally competitive stock markets. In addition, they may need to strengthen regulations to ensure that the operations of Islamic institutions comply with Islamic *Shariah* rules.

6.2 Limitations and Future Research

During the preparation of this thesis, we encountered limitations in data availability, which is normal for researchers working with data for developing countries. For example, institutional holding data is not available for the countries of our study, with the exception of Kuwait; for this reason, in the third essay of our thesis (Chapter 5), we limited our data to Kuwait.

We suggest that the following topics be investigated in the future by researchers who are interested in this field: (i) differences in liquidity between Islamic and non-Islamic stocks using intraday liquidity measurements, (ii) *Ramadan* return seasonality using a structural time-series model, (iii) differences in speculation behavior between Islamic and non-Islamic retail traders, using Islamic and non-Islamic brokerage firm data.

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