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Asset Returns: Theory and  
Evidence from Islamic Finance  
Industry

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## *Abstract*

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JEL Classification

D03; E44; G01; G14; G21; G32

Keywords

Financial innovation; Coarse thinking; Financial crisis; Islamic finance;

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# Religiosity, Neglected Risk and Asset Returns: Theory and Evidence from Islamic Finance Industry

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## Abstract

This paper studies the sociological influence of religion on the risk and return in the financial markets with particular context of Islamic finance, a rapidly emerging and expanding financial industry. The paper builds a theoretical model to show how intermediaries serve their customers' religious needs by creating innovative Islamic financial instruments. The customer's emphasis on religiosity exposes the industry to a theological risk, which can increase the financial fragility of the system. In our model, the theological risk emerges as a neglected component, which can be realized in the event of a bad news challenging the religious legitimacy of (Islamic) finance structures. To corroborate our theoretical findings, we present two sets of results. First, using stock prices data for 104 Islamic bond (Sukuk) issuers, we show that Sukuk issuers experienced a significant decline in their stock prices, following multiple formal and informal announcements in 2008, which challenged the religious legitimacy of Islamic bond structures. Second, using data from 1360 newly issued Malaysian Sukuk from 2006 to 2016, we find that following the regulatory changes the Sukuk margins have increased significantly. This suggests that there may be a significant difference between what Islamic and conventional customers may be willing to pay for Sukuk, exposing the industry to a unique form of religious risk.

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## **1. Introduction**

The sociological influence of religion and its impact on the financial markets has been widely discussed in the literature. The extant literature investigates the impact of religious beliefs on economic attitudes (Guiso et al., 2003), corporate decisions (Hilary and Hui, 2009), investor portfolio choices (Kumar et al., 2011), employee stock option based compensation (Spalt, 2013), mutual fund risk-taking (Shu et al., 2012) and corporate information disclosure (McGuire et al., 2012; Callen and Fang, 2015). Some studies have found evidence that religious influences can affect risk aversion and the rate of return on investment. Most of these studies are conducted in a context where religious identity plays an indirect role, similar to other social identities such as gender (Sila et al., 2016) and ethnicity (Chen and Li, 2009; Benjamin, Choi and Strickland, 2007). The effect on financial behavior is dependent on the norms of the group (Akerloff and Kranton, 2000). The challenge with this stream of literature is that the studies are conducted in a context where the decision itself is devoid of religious significance. It is well established in the social psychology literature that the impact of beliefs and identities get subdued when the situational context dominates, as is the case in the financial markets (Pittinsky et al., 1999). To analyze the impact of religiosity on the financial markets, it is important that the context itself be imbued with religious significance. The Islamic finance industry, therefore, provides an appropriate context to examine how religiosity affects the market place (Elnahas et al., 2017), the demand for financial instruments and their return and risk etc. (Benjamin et al., 2016; Jiang et al., 2015). However, whether the customer's reliance exposes the industry to a unique form of theological risk is unexplored in the existing literature.

The Islamic finance industry offers a unique proposition to its religiously conscious customer base, in that its products are compliant with religious laws that offer a higher utility to customer who

values religiosity. The process of religious compliance also comes at a price, as it exposes the industry to a number of additional risks. Many of these risks relate to the particular nature of products, such as asset ownership risk (Abedifar et al., 2013). So, another important phenomenon that the literature has largely ignored is the impact on risk and return that emanates from the religious preferences of its customers. Islamic finance customers prefer that the financial products and instruments offered to them adhere to the religious precepts. Hence, the trait of focusing on religious legitimacy exposes the Islamic finance industry to an additional risk, which can distort its prices and the ensuing demand. The significance of religiosity can be highlighted by the customer's response to the uncertainty surrounding the religious compliance of Islamic products. In an environment fraught with asymmetric information, there is always a possibility that a financial product bought by the Shariah conscious customer might later turn out to be un-Islamic (Azmat, Skully and Brown, 2014). This could be due to a lack of clarity on Shariah standards, an oversight by Shariah advisors or simply because of religious differences between the advisors. This uncertainty exposes the industry to theological risks. It also underscores the importance of religiosity and its impact on the financial markets.

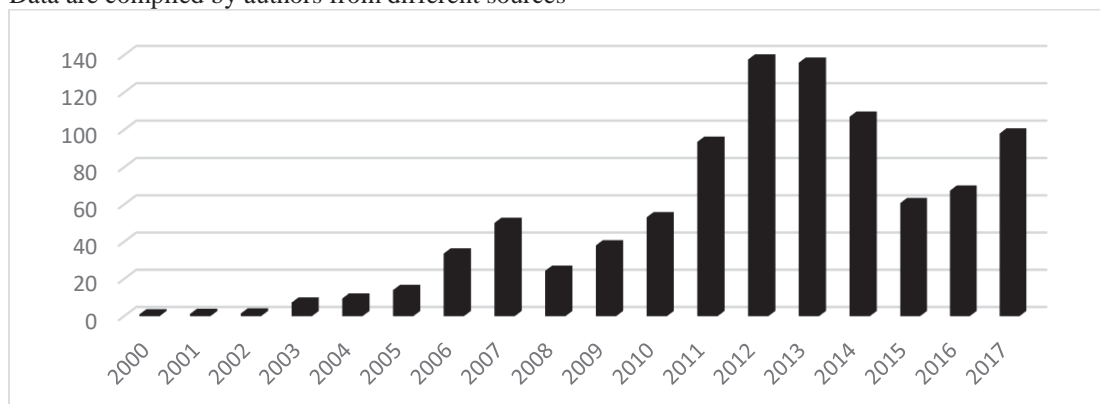
If the preference for religiosity and its uncertainty is anticipated then it should be reflected in the observable returns and risks in the market. Empirical studies on the presence of religious premium is mixed. For instance, while Abedifar et al., 2013 find no evidence of Islamic premium, Azad et al. (2018) find evidence of religious or piety premium that leads to arbitrage. However, unlike these and other prior studies, we argue in this paper that the religious preference can be captured in the form of neglected risk.

There is a recent stream of literature, mostly in the wake of global financial crisis, which suggests that customers have the tendency to neglect certain risks, which once discovered at a later stage,

can affect the asset prices and volume. Shleifer and Vishny (2011), for example, ascribe the financial innovation before the 2008 financial crisis and the resulting decrease in prices after the crisis to first ignoring and later discovery of these neglected risks. The phenomenon that we observe in Fig. 1 is an ideal example of Islamic finance innovation and failure. This figure shows that there was 50% drop in Sukuk issuance in 2008 and 2015 respectively, in comparison to 2007 and in 2013-14. Data collected from Thomson Reuters DataStream triggers the reason of such a sudden drop of issuance. We find that of 1599 unique corporate Sukuk issues between January 1996 to November 2018, 678 issues were considered Shariah non-compliant by AAOIFI, only 383 issues were considered Shariah compliant as per AAOIFI, while the remaining 538 issues totally lacked AAOIFI endorsements. Seemingly, investors relied on issuers' own Shariah board endorsements and/or a third party fatwa in the absence of AAOIFI endorsements. This is a clear evidence of information asymmetry and negligence of Shariah compliance (religious) risk. Therefore, neglecting such risk at the time of product innovation and design could pose serious threat to the success of the products. Our model explains a number of Islamic finance puzzles, including the booming industry largely led by Islamic bond (Sukuk), the presence of Shariah premium in pricing and the potential of a possible down turn, emanating from the neglected Shariah risk.

**Figure 1: History of Sukuk issuance (billion US\$)**

Data are compiled by authors from different sources



Our model assumes that there is an underlying pool of assets that can generate cash flows for the intermediaries. These might be a mix of loans extended to firms, while for Islamic banks these would include cash flows from Islamic financial transactions. These cash flows are then used to structure conventional or Islamic finance products. The Islamic investor buys these securities, if they perceive the underlying source of income to be Islamic. The number of securities the intermediary issues depends on the investor's perception about the religiosity of the underlying income.

The religiosity in our model is captured by assuming that investors are coarse thinkers. What it means is that their religious preferences can potentially affect their expectations in evaluating the expected returns from Islamic financial product. Thus, incorporating a coarse thinker instead of Bayesian thinker in the model allows one to capture the impact of religiosity on the asset's risk and return profile. The rationale behind thinking Islamic investors as coarse thinkers is that they rarely look the Shariah board endorsements as long as the products are identified as "halal". In the event of a bad news that challenges the religious legitimacy of an Islamic product, our model explains the extent to which the demand and prices would change. It also explains the recovery process after the initial overreaction.

We test some of our theoretical propositions using two sets of empirical data. While there are many channels to evaluate the impact of theological risk on the financial markets, we take the Shariah non-compliance as a measure of theological/neglected risk and examine its impact on the asset's returns. The first set of empirical data revolves around the events of 2008 when Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) made announcements questioning the religious legitimacy of some Islamic bond structures. We examine how the announcements (both formal and informal) made by AAOIFI on the issue of religious compliance



adversely impacted the rapidly expanding (Islamic) bond market. Particularly, using stock price data of 104 Islamic bond-issuing firms, we analyze how theological risk affected the share price of Islamic bond (Sukuk) issuers. Our analysis shows that stock prices of Sukuk issuers experienced significant decrease during multiple announcements surrounding the changes in Islamic bond Shariah standards. One might argue that it was a mere consequence of global financial crisis. Interestingly, however, instead of being adversely affected by the GFC, the Sukuk market was rather expanded during the same period. And the negative effect on Sukuk market was observed (around late October, 2008) when the GFC effect almost obliterated. Thus, the AAOIFI announcements in relation to religious legitimacy had obvious consequence on the growth, risk and return of the Sukuk market.

The second set of empirical data revolves around the events of 2015 when the Central Bank of Malaysia introduced a regulatory change where they reduced the supply of sovereign Sukuk significantly. In the Malaysian market, the Central Bank of Malaysia has been the biggest issuer of Sukuk. In 2015, there was a policy change by the central bank which entailed that sovereign Sukuk would only serve the liquidity needs of Islamic banks and not conventional banks. Using data from 1361 new Sukuk issues in Malaysia from 2005 to 2016, we test the impact of the change in policy. We hypothesize that in the presence of such an exogenous shock where supply is reduced, in a way to only serve the needs of the Islamic banks, the returns (and margins) offered by the Sukuk maybe more representative of the risks and the willingness to pay of the Islamic customers. The results suggest that after the regulatory intervention by the central bank in 2015, holding other factors affecting Sukuk risk constant, there was a significant increase in the margin of new Sukuk issues. This could mean that Islamic customers may want a higher margin for the Sukuk but may end up receiving a lower margin because the market may be absorbed by

conventional customers. This difference between what the Islamic customers are willing to pay and what the conventional ones may be paying may expose the market to a unique risk. So if one type of customer is excluded from the market for religious reasons, it may cause the Sukuk margins and the prices to change. This may be another form of religious risk where the Sukuk market had experienced a change in price when the conventional banks for regulatory reasons are excluded from buying some forms of sovereign Sukuk.

This paper contributes to literature on social identity and religiosity along with the emerging literature on Islamic finance. For the literature on social identity and religiosity, most of the studies are conducted in a context devoid of religious significance. This dilutes the real effect of religiosity on the risk and return of the financial instruments. Many of these studies provide only weak evidence of the impact of religiosity on the financial markets. Instead, we conduct our analysis in the context of Islamic finance, where the situation itself has religious significance. And, we find strong evidence of religiosity impacting the financial markets. Our study also contributes to the literature on Islamic finance. Some Islamic finance studies empirically test the presence of a religious premium in the returns offered by Islamic financial institutions. The evidence is not clear, as most of the excess returns are explained by other determinants of risk (Abedifar et al., 2013). The existing studies are conducted by comparing average daily returns over a period of time, which can neutralize the effect of religiosity. Such as over the time, the impact of market forces including competition can dilute the religious premium. We have conducted our analysis in a setting where the market experienced a shock, in the form of a bad news about the Islamic finance industry's religiosity. A customer, who values religiosity, reacts aggressively and this reaction can be used as a measure of religious influence (i.e., neglected theological risk). Majority of the firms in our

sample demonstrate that the industry is sensitive to news regarding its religiosity and, hence, carries a significant religious premium. We also found evidence for another unique kind of religious risk where when conventional banks were excluded by the regulator from buying sovereign Suku, it may have caused the margins in the entire Sukuk market to increase significantly.

The rest of the paper is organized as follows. Literature review is provided in section 2. The model is presented in section 3. Section 4 performs empirical analysis and the study is concluded in section 5.

## **2. Literature review**

This section discusses multiple streams of literature related to religiosity. It starts with the sociological perspective of religiosity, where we analyze how norms of religious identity can affect the economic behavior of an individual. The section further proceeds to the discussion of the Islamic finance literature, particularly those that test for the presence of religious premium in the returns offered by Islamic instruments. Finally, the section examines the literature on the investor's predilection to neglected risk which once discovered can cause the market to overreact.

### **2.1 Religious identity and financial markets**

Social identities can substantially affect economic behavior of individuals. Upon the salience of a particular social identity, the individual behavior can become more aligned with the norms and the prescribed behavior of the identity. The individual might experience a loss of utility, if the behavior deviates from the identity norms. The impact of different social identities, particularly gender, ethnicity and religion have been widely captured in the literature (Estélyi and Nisar, 2016; Cohn et al., 2015; Shi and Tang, 2015; Cohn et al., 2014; Hoff and Pandey, 2014; Dai, 2007; Charness et al., 2007; Rigotti and Hoff, 2007; Hoff and Pandey, 2006 and Eckel and Grossman, 2005).

Our focus is more on religious identity salience. Since most religions refer to the domain of the spiritual than the material along with strong emphasis on the issues of morality, ethics and fairness, the norms of the identity might result in an emphasis on non-material gains. In the context of pro-social behavior such as charity, the salience of religious identity results in an increase in philanthropic behavior (Lambarraa and Riener, 2015; Shariff and Norenzayan, 2007). In the pro-social context, both the identity and the context are in resonance. This implies that the context and the cues in the decision further strengthens the identity, creating a discernable difference when the identity is salient as opposed to when the identity is non-salient.

A substantial evidence from the prior literature suggests that individual's decisions are dictated by her multiple identities (Collier, 2016; Cadsby et al., 2013; Amartya, 2006; Pittinsky, et al., 1999). Mandel (2003) presents that an individual's decisions are determined by a mix of shifting selves from interdependent self, harmonizing with other members of social group, to an independent self, standing unique for one's own interest. When people choose one course of action over another, one reason for their choice is their personal sense of self, or identity (Akerloff and Kranton, 2000). However, identity is not singular. Instead, multiple identities operate simultaneously at a particular moment of choice. For example, a person may simultaneously think of herself in different role such as a parent and as an employee. These multiple identities may come in conflict in terms of the demands placed on individuals, forcing them to make choices with tradeoffs involved. For example, a weekend may be spent either at work or with family. The tradeoff involves calculation of costs and benefits of a particular course of action associated with a particular identity and comparing it with the costs and benefits associated with the expectations of another identity (Vryan et al., 2003). Individuals endowed with multiple (and conflicting) identities struggle to balance these different identities. As the environment becomes conducive, one type of identity becomes

more dominant than the other. For instance, an individual going to a church on Sunday is likely to have a stronger salience of the religious identity, but the same individual sitting in his workplace vying for a job or a promotion that is contested by other individuals is likely to experience a strong burst of competitive streak.

The effect of salient identity may change due to situational cues or due to costs and benefits of pursuing a course of action associated with the particular identity. The salience of different identities may be ordered on a hierarchy, with higher-order identities more likely to be enacted in a particular situation (Stryker, 1980). Hence, the role of a particular identity in making decisions depends upon its existing level of salience (in salience hierarchy), the context providing cues to enactment of a particular identity, and the costs and benefits associated with the choice while enacting the identity.

In experiments and context where the institutional setting is one of the markets, the impact of religious identity salience is found to be less significant. One possibility is that the environmental cues and the decision's context do not reinforce the identity. In the case of choice where the context is such that the utility is maximized by getting a higher return, while minimizing the risk, the impact of religious identity salience is likely to be diluted. The literature has reported a varied impact of religious identity salience on the economic decisions. Benjamin (2016) provides evidence that when religious identity is primed for Protestants, they increase their contributions towards public goods, whereas Catholics decrease their voluntary contributions. The study, however, finds no significant difference between Protestants and Catholics on temporal discounting, risk aversion and work effort. This indicates that there might be some norms of religiosity that are common to major religions, at the same time there are also subtle differences in norms between them. Some religions might have a greater impact on the risk and return behavior,

while other religions may place more emphasis on the justice, fairness and transparency in the financial matters.

Most of these studies are conducted in a context where religious identity salience influences decisions indirectly as in the case of social identities such as gender and ethnicity. The challenge with this stream of literature is that the studies are conducted in the contexts where the decision itself is devoid of religious significance. Some studies show that religious identity salience affects atheists equally resulting in an increase of pro-social behavior. Religious primes in these experiments might be operating through channels other than religiosity, such as morality and ethics. It implies that these studies could not directly measure the impact of religious identity, as norms attached with other alternative identities acted as a mediator and influenced the behavior in these contexts. To control for this mediation, this paper is exploring the behavior of individuals operating in a religious context, provided by the Islamic finance industry. In empirical setting, we examine the impact of news regarding the religiosity on the risk and returns of Islamic financial instruments.

## **2.2 Piety (Shariah) premium and Islamic finance**

Shariah conscious customers, who prefer adhering to their religious beliefs in evaluating their financial decisions are ready to pay a premium (namely, piety or Shariah premium) for the products which are religiously compatible. Concomitantly, Islamic financial institutions, having awareness of the religious preference of their customers, might charge their customers a premium, which should be reflected in the returns differential. Theoretical literature has provided evidence that existence of Islamic finance industry, in spite of higher costs and multiple risks, is contingent upon the customers who are likely to absorb lower Shariah premium (Azmat et al., 2014).

The literature has found mixed evidence regarding the presence of Shariah premium in the Islamic finance industry. Abedifar et al. (2013) provide no empirical support to the existence of any extra rents extracted by Islamic banks by charging more to the borrowers, and paying less to the depositors. In the capital markets, some studies have explored the differential in returns between Islamic and conventional instruments with mixed results. Some favor the conclusion that returns offered by Islamic instruments can be explained by their inherent risk while others suggest that there might be some impact of religiosity in their returns (Abedifar et al., 2013 and Baele et al., 2014).

Most of the studies in the literature are conducted by comparing average returns over a period of time. This can neutralize the effect of religiosity, as over time the impact of market forces including competition can dilute the religious premium (Azmat et al., 2016). If the preference of the Islamic customer and the risk associated with the Islamic products are anticipated in advance, it would be reflected in the market price, creating a differential from the conventional financial instruments. The presence of competition could erode this differential. As suggested by Khan (2010), there is little difference, in terms of risk and return, between Islamic and conventional instruments. Any differential in returns, which result not from the risk of the underlying Islamic instruments but from willingness of the Islamic customer to pay a premium for serving their religious needs (Azmat et al., 2014), should be neutralized by arbitrage from the non-religious investors. It could be further eroded away by conventional financial institutions who are willing to offer Islamic products at the conventional rates. It comes as no surprise that the literature has found weak evidence regarding the presence of a Shariah premium in returns.

One way to overcome this challenge is to conduct the analysis in a natural experiment where the market experiences a shock, in the form of a bad news relating to the religiosity of Islamic finance

industry. The industry's overreaction to the news could be used as a measure of religious influence. We explore in this paper if the industry is sensitive to news regarding religiosity of the instruments and whether it carries a significant religious premium. The next sub-section discusses why markets might over react to news.

### **2.3 Neglected risk and over-reaction**

If the market overreacts in the advent of news, it implies that the investors have neglected some kind of risks, which the new information might have brought to their knowledge. Shleifer et al. (2011) argues that the financial crisis of 2008 was caused by neglected risks, which resulted in an over-subscription of financial instruments followed by fire-sale when the neglected component of the risks were manifested to the investors. The 2008 financial crisis implies that this neglected risk is usually a temporary feature of financial markets and is only associated with innovative financial instruments. Others (e.g., Gennaioli and Shleifer, 2010; Murphy and Shleifer, 2004) argue that it could also be a permanent feature of the financial markets, characterized by the existence of coarse thinking investors in the market.

Gennaioli, Shleifer and Vishny (2012) suggest that investors might have local thinking, a process in which investors ignore the possibility of certain states of the economy, particularly the extreme ones. Mullainathan, Schwartzstein and Shleifer (2008) explain the over-reaction by referring to human minds' ability to co-categorize seemingly related situations. Co-categorization can provide the mental ease, allowing one to venture from the unknown to the known. There is a downside to it as it makes the individual prone to manipulation and persuasion. When an Islamic product is backed by a 'fatwa' (i.e., opinion) from a religious scholar, the investors might be at ease regarding the religious legitimacy of the product and end up assigning a higher quality to the product, along with a greater willingness to pay a premium for it.



We argue in this paper that the presence of neglected risk in the Islamic finance industry could be an outcome of financial innovation particularly because Islamic finance products are relatively new compared to conventional products. This means that, unlike conventional finance investors, the Islamic finance investors might find it difficult to distinguish the products from their conventional counterparts as well as to understand the risks attached to them. In addition to the above complexities associated with Islamic finance, the lack of clarity on the religiosity, i.e., religious legitimacy of the Islamic instruments could expose the market to an overreaction. Furthermore, assuming that customers are coarse thinkers, they might overreact to the persuasive strategies of the Islamic financial institutions. The Islamic finance industry has created multiple structures of persuasion, which go beyond simply neutralizing asymmetric information and can eventually cause customers to assign a higher quality to their products (Hayat and Hassan, 2017; Abedifar et al., 2016; Berg et al., 2016). These include the use of religious terminology for its products and fatwas by Shariah scholars to persuade their customers regarding their religious legitimacy.

If certain risks regarding the Islamic products' religiosity are neglected, then in the event of a bad news questioning the instrument's religiosity, the market is likely to overreact. The extent of the overreaction is an outcome of the customer's religiosity. In the next section, we build a theoretical model to demonstrate this connection.

### **3. Model**

In this section, we build a theoretical model to understand the impact of neglected risks on the returns and pricing of Islamic financial instruments. Our basic setup of the model is in line with Gennaioli, et al. (2012). We start with the case of Bayesian thinkers, who are perfectly rational in their approach. We analyze how the demand and prices of Islamic financial instruments might

change when a financial intermediary introduces an innovative structure. We then incorporate coarse thinkers in our model. Unlike Bayesian thinkers, coarse thinkers tend to neglect certain risks. This allows us to examine the impact of neglected risks, particularly pertaining to the religiosity of Islamic financial products, on their demand and prices. We then explain how the market might overreact to news challenging the religious legitimacy of Islamic instruments.

### **3.1 Basic Setup**

We assume a three period model, ( $t = 0, 1, 2$ ), where investors can invest in two asset types: 'a' and 'b'. Both the assets pay off at the end of third period,  $t = 2$ . Returns for asset 'a' depends on the cash flows 'Y' from an underlying project. The returns of the project could be an outcome of economic conditions and firm performance. Asset 'b' is a riskless bond which pays fixed positive amount 'R'.

Intermediaries own these assets and they sell claims on their returns to customers in  $t = 0$ . Investors in our model are endowed with wealth  $w$ . Investors are risk averse and defer their consumption to  $t = 2$ . Investors have the option to transfer resources from  $t = 0$  to  $t = 2$ , having stronger preference to postpone consumption until  $t = 2$ . Investors seek to buy assets from intermediaries. At  $t = 0$ , asset 'a' and 'b' are traded. Prices of both the assets are affected by the competition in the financial markets and the Shariah consciousness of the customers. At  $t = 1$ , noisy signal  $s$  is observed regarding the religious legitimacy of the assets. This forces the investors to reconsider their portfolio. At  $t = 2$ , payoffs of the claims are realized and distributed to the holders of claims.

### **3.2 Bayesian thinkers before financial innovation**

Bayesian thinkers are rational decision makers; they can fully discern the extent to which the underlying income for the assets is religiously compliant. At  $t = 0$ , investors decide how much

assets to buy. Each investor maximizes the lifetime wealth captured by Equation (1) given the budget constraint.

$$\begin{aligned} \text{Max}_{a,b} w &= P_A a + P_B b + \theta R b + \theta \cdot E(Y) a \\ \text{s.t. } w &= P_A a + P_B b \end{aligned} \quad (1)$$

In equation (1),  $a$  represents number of risky financial instruments and  $b$  represents risk-free asset.  $\theta$  captures the preference of investors to postpone the income until last period,  $t = 2$ . Under Bayesian thinking, no re-trading occurs in  $t = 1$ . Intermediaries supply  $a$  and  $b$  assets to maximize:

$$\text{Max}_{a,b} \Pi = P_A a + P_B b + R(1 - b) + E(Y)[1 - a] \quad (2)$$

To calculate equilibrium prices, reservation prices for investors and intermediaries are calculated from the profit maximizing functions (equations 1-2). Investors' reservation price for the risk-free asset is  $\theta R$  and for the risky asset is  $\theta \cdot E(Y)$ . As the customers are highly risk averse, they value the risky asset at the lowest possible payoff. If the prices of securities are lower than their reservation price, investors purchase securities using all their wealth.

Equation (2) gives intermediaries reservation prices as  $R$  for  $b$  and  $E(Y)$  for  $a$ . Intermediaries sell all the securities which have prices above their reservation price.

We make two important assumptions. First, we assume that intermediaries value risky assets more than investors even after receiving a bad signal and can be written by:

$$E(Y | \underline{s}) > \theta \cdot Y_h \quad (3)$$

Second, we assume that investors are wealthy enough to buy the total supply of risk free asset at their reservation price and is given by:

$$w > \underline{w} = \max[\theta(R + Y_h), \theta(R + Y_l)] \quad (4)$$

Based on the two assumptions above, financial markets having Bayesian thinkers in the absence of any financial innovation would reach an equilibrium at  $t = 0$  as shown by:

$$a = 0, b = 1, P_A = E(Y), P_B = \theta R \quad (5)$$

Equation (5) implies that investors who are risk averse, absorb all the Islamic bonds causing the price to increase to their maximum. The risky assets are not traded. The case of financial innovation is discussed next.

### 3.3 Bayesian thinkers with financial innovation

We model financial innovation as the repackaging of income earned from risky assets by financial intermediaries. The Islamic banks use these claims to reduce the shortage of Islamic bonds. The intermediaries (Islamic banks) structure the new claims that offer a return ‘R’ similar to that of a riskless bond. The amount of these new riskless Islamic bonds that intermediaries can issue is dependent on the Shariah compliant income earned by Islamic banks. The maximum payment that they can promise to Shariah conscious customers depends on the religiosity of the underlying income. The customer’s perception of the income’s religiosity becomes all the more important. So the volume V of new Islamic bonds supplied after financial innovation must satisfy:

$$V^B = \frac{E^B(Y)}{R} \text{ and } V < V^B \quad (6)$$

where V is volume of bonds issued before financial innovation.

If  $V > \frac{E^B(Y)}{R}$ , the new claims would not be riskless as the intermediaries would be unable to pay the promised return ‘R’ to claimants. Whereas if  $V < \frac{E^B(Y)}{R}$ , the newly issued bonds are riskless.

Equation (6) illustrates that the Islamic financial intermediary’s ability to issue innovative financial instruments hinges upon what proportion of the underlying income the customer deems to be Islamic. A subtle assumption of our model is that part of the underlying income on which Islamic financial intermediaries are structuring the products could be non-Islamic. The presence of the non-Islamic income provides the justification for Islamic finance innovation, otherwise the

customer in our model could invest in conventional financial instruments without violating the codes of religiosity.

We capture the religiosity in the model by assuming that the financial intermediary sends signals about the nature of the Islamic product. The Bayesian investor receives the signal and infers the veracity of the signal given her prior beliefs. Then she would decide, based on the strength of the signal, the probability to which the underlying product is Islamic. Conditional on this probability of the underlying product being Islamic and the strength of the signal, the Bayesian investor would deduce the expected Islamic income. This is captured by Equation (7).

$$E^B(Y) = E^B(Y_I|P_I, S_I, C_1) \cdot P^B(P_I|S_I, C_1) \cdot P^B(S_I|C_1) \quad (7)$$

After financial innovation, supply of Islamic bonds increases by  $\frac{E^B(Y)}{R}$  amount. The proportion of the income that the Bayesian investor perceives to be Islamic determines the amount of new Islamic bonds that could be launched in the market.

Following the financial innovation, supply of new bonds does not entirely remove the shortage of Islamic bonds. Investors have enough wealth to absorb even the additional supply of bonds. As a result, price of new claims stays at reservation price of investors.

$$V^B X (\theta - 1)R = E(Y)(\theta - 1) \quad (8)$$

Equation (8) suggests that the intermediary's profits are a determinant of the income, which the customers perceive to be Shariah compliant. The total volume of Islamic bonds would increase after the financial innovation while the price would remain unchanged. At  $t = 0$ , number of total Islamic bonds issued are  $b = I + E^B(Y)/R$  at price  $P_B = \theta R$ .

The welfare consequence of innovation can be both in terms of social and monetary benefits. Shariah conscious investors are the recipients of social benefits as they absorb the increased supply of Islamic bonds. The monetary benefit is earned by the intermediaries as they get to sell a higher

volume of the repackaged Islamic financial products at the investor's reservation price. The new claims are sold at the investor's reservation price. We discuss next the impact of financial innovation when investors deviate from Bayesian thinking.

### 3.4 Coarse thinkers and financial innovation

Coarse thinkers in our model undergo a judgment bias due to their limited ability to differentiate between the related situations they encounter. Mullainathan, Schwartzstein and Shleifer (2008) present a model of coarse thinking in which customers co-categorize situations and treat them as one resulting in a bias. This causes deviation from Bayesian expectations who can distinguish between different situations and form better expectations.

Similar to our model for a Bayesian thinker, the model for coarse thinkers assumes that Shariah conscious investors form expectations about the religiosity of the income from the Islamic finance products. These expectations are also determined by the signals the investors receive from the issuer, the market or the regulator. We model coarse thinking by assuming that upon receiving the signal regarding the religious legitimacy of the financial product, the investor is unable to distinguish between the Islamic and conventional products and considers the underlying income to be Islamic. Their expectation of the Shariah compliant income would be a weighted average of the Bayesian's expected income across the different product types. This is captured by Equation (9).

$$E^{C1}(Y) = E^C(Y_I|P_I, S_I, C_1) \cdot P^C(P_I|S_I, C_I) \cdot P^C(S_I|C_I) + E^C(Y_I|P_C, S_I, C_1) \cdot P^C(P_C|S_I, C_I) \cdot P^C(S_I|C_I) \quad (9)$$

At  $t = 1$ , the news regarding the religious legitimacy of Islamic products is revealed causing the investors to revise their expectations of Islamic income. If the news (or signal) is good, confirming the religiosity of the Islamic financial products, the expectations remain the same (as shown in Equation (9)). In the event of a bad news that challenges the Shariah compliance of the financial

products, the expectations are updated, as shown in Equation (10). The new expectations of Islamic income are lower than the initial expectations.

$$E^{C2}(Y) = E^C(Y_I|P_I, S_I, C_1) \cdot P^C(P_I|S_I, C_I) \cdot P^C(S_I|C_I) \quad (10)$$

where  $E^{C2}(Y) < E^{C1}(Y)$

### Equilibrium at $t = 0$

In the presence of coarse thinker, the number of new Islamic bonds the intermediary can issue is given by Equation (11).

$$V^C = \frac{E^{C1}(Y)}{R} \quad (11)$$

where

$$E^{C1}(Y) = E^C(Y_I|P_I, S_I, C_1) \cdot P^C(P_I|S_I, C_I) \cdot P^C(S_I|C_I) + E^C(Y_I|P_C, S_I, C_1) \cdot P^C(P_C|S_I, C_I) \cdot P^C(S_I|C_I) \quad (12)$$

$$\text{and } V^B < V^C \quad (13)$$

Equations (11) to (13) suggest that the intermediaries can issue a greater number of new claims in the presence of coarse thinkers as opposed to Bayesian thinkers. If the investors have enough wealth, the new claims are sold at the reservation price of investors. However, if their wealth is not significant enough, the price of the claims drops below the reservation price. Larger number of issued claims result in higher profits for intermediaries as shown by Equation (14).

$$V^C X (\theta - 1)R = E(Y)(\theta - 1) \quad (14)$$

The discussion above leads to Proposition 1.

**Proposition 1:** In the presence of coarse thinkers, intermediaries can increase the supply of innovative financial products. The volume of new claims and their prices are given by Equation (15) and (16).

$$b = I + V^C \quad (15)$$

$$(a) P_B = wR / (R + E^C(Y)), (b) P_B = \theta R \quad (16)$$

### **Proof of proposition 1:**

The adjustment in the investor's expectations regarding the Shariah compliance of the underlying income may cause the supply of Islamic bonds to increase,  $b = 1 + \frac{E^{C1}(Y)}{R}$ . If investors are wealthy enough to absorb this excess supply at their reservation price, i.e.,  $w/\theta \cdot R > \frac{E^{C1}(Y)}{R}$ , equilibrium price would adjust to be  $P_B = \theta R$ . In case the wealth is not significant enough, i.e.,  $w < \theta(R + E^{C1}(Y))$ , then the investors would spend all of their wealth to purchase the new claims and their equilibrium price would readjust to  $P_B = wR / (R + E^C(Y))$ .

### **Equilibrium at t = 1**

On receiving a news or a signal  $s$  at  $t = 1$ , the coarse thinker may react differently from their Bayesian counterparts. If the signal is good, reinforcing the religious legitimacy of Islamic financial products, the coarse thinkers are likely to behave similar to Bayesian thinkers, as the new information is not causing them to readjust their expectations. But when the signal is bad, the coarse thinkers overreact and /drastically adjust their expectations about the Islamic income. The total Islamic income that has been promised by the intermediaries to the investors is  $E^C(Y)$  and the number of claims issued are

$$V^C = \frac{E^{C1}(Y)}{R} \quad (17)$$

After the signal, the actual Islamic income available to make the payments is less than the pledged amount. The returns intermediaries are able to pay is given by Equation (18).

$$\frac{E^B(Y)}{E^{C1}(Y)} \cdot R < R \quad (18)$$

After observing the bad news regarding the nature of the Islamic income, the newly issued innovative instruments reduce in their appeal to the investors. They realize that the new claims are not perfect substitutes of actual Islamic bonds.



Moreover, after the arrival of bad news, reservation prices of both investors and intermediaries for the traditional Islamic bonds stay the same but for the newly issued Islamic bonds the price decreases. Reservation prices of investor for new claims would decrease to  $\frac{E^B(Y)}{E^{C1}(Y)} \cdot \theta R$  and for the intermediary it would decrease to the extent as indicated in Equation (19).

$$R \cdot \left[ \left( \frac{E^B(Y)}{E^{C1}(Y)} \right) \cdot \Pr(E^B(Y)|\underline{s}) + \Pr(E^{C1}(Y)|\underline{s}) \right] \quad (19)$$

For simplicity we assume

$$\left[ \left( \frac{E^B(Y)}{E^{C1}(Y)} \right) \cdot \Pr(E^B(Y)|\underline{s}) + \Pr(E^{C1}(Y)|\underline{s}) \right] = \rho \quad (20)$$

where  $\rho < 1$ , implying that expected payment for new claims have decreased.

**Proposition 2:** After the arrival of bad news, the price of innovative Islamic bonds decreases depending on the following conditions:

- (i) If the reservation price of the intermediary is less than the investor, i.e  $\rho < \frac{E^B(Y)}{E^{C1}(Y)}$ , no trade would take place and price would settle at the investors reservation price  $\frac{E^B(Y)}{E^{C1}(Y)} \cdot \theta R$

- (ii) If  $\rho > \frac{E^B(Y)}{E^{C1}(Y)}$ , the price would depend on the wealth  $w$  intermediaries are carrying in  $t=2$ . For  $w = 0$ ,  $P_B = \frac{E^B(Y)}{E^{C1}(Y)} \cdot \theta R$ , and for  $w = 1$ ,  $P_B = \rho \cdot R$

If  $\rho < \frac{E^B(Y)}{E^{C1}(Y)} \theta$ , the valuation of investors for the new Islamic bonds is greater than the valuation of intermediaries, so the equilibrium price would be  $\frac{E^B(Y)}{E^{C1}(Y)} \cdot \theta R$ . And if  $\rho > \frac{E^B(Y)}{E^{C1}(Y)} \theta$ , the intermediaries would be willing to buy some of the claims, depending on their wealth.

Proposition 2 explains that the wealth of intermediaries at the time of fire sales determines the extent of financial fragility in the economy.

The decrease in the market price has two components, the rational reaction to the bad news, which would affect both the investor and the intermediary, and the irrational overreaction by the coarse thinker, which could be an outcome of her religiosity. In this paper, we define this rational reaction to bad news that affect both the coarse thinkers and intermediary as the Shariah premium of investing in Islamic bonds. More specifically, Shariah premium is the difference between initial price  $P_B$  of the Islamic bonds and the intermediary's reservation price. We consider the irrational overreaction of the coarse thinker as the neglected Shariah risk. The amount Shariah conscious customers paid above reservation price of intermediaries were due to their false beliefs regarding the religious legitimacy of Islamic bonds. It is an irrational reaction and the outcome of coarse thinking. Even though the news is not verified, the investors dump the securities immediately upon receiving the news. It also implies that coarse thinking increases the financial fragility of the system.

The expected value of Islamic income assigned by coarse thinkers shifts from  $E^{C1}(Y)$  to  $E^{C2}(Y)$ , where  $E^{C1}(Y) > E^{C2}(Y)$  and  $E^{C2}(Y) \leq E^B(Y)$ . The above discussion motivates the following Proposition 3.

**Proposition 3:** Expected loss in case of a bad news challenging the religious legitimacy in Islamic financial instrument is an outcome of both the Shariah premium and neglected Shariah risk.

$$\frac{wR}{R+E^C(Y)} - \rho \cdot R = \text{Shariah premium}$$

$$\left[ \left( \frac{E^B(Y)}{E^C(Y)} \right) \cdot \Pr(E^B(Y)|\underline{\xi}) + \Pr(E^C(Y)|\underline{\xi}) \right] \cdot R - \frac{E^B(Y)}{E^{C1}(Y)} \cdot \theta R = \text{Neglected Shariah risk}$$

## **4. Empirical analysis**

This section discusses the data, methodology and results to support our theoretical propositions. One of the major financial innovations that occurred in the Islamic finance industry is the introduction of the Sukuk structure, identical to a conventional bond. Hence, we focus on the bad news and regulatory changes that may have affected the Sukuk market. We use two sets of empirical data to support our theoretical model. Firstly, we examine how the announcement of a bad news regarding the religiosity of Sukuk may have impacted the market. Secondly, we test how a change in regulations which reduced the supply of Sukuk may have affect the margins of new Sukuk issues.

### **4.1 Bad news about religious compliance**

In this section, we study the impact of the bad news that challenged the Shariah compliance of this innovation, i.e., the Sukuk. To reiterate, we explained in our theoretical discussions that if the news (or signal) is good, confirming the religiosity of the Islamic financial products, the expectations remain the same (see Equation (9)). However, in the event of a bad news that challenges the Shariah compliance of the financial products, the expectations are updated as shown in Equation (10). The new expectations of Islamic income are lower than the initial expectations. Consequently, the Sukuk issuers' stocks or bond prices are expected to plummet following the negative signal regarding the Shariah compliance. In 2007-2008, Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) questioned the legitimacy of certain Islamic bond structures. For a Sukuk to be Shariah compliant, AAOIFI released some accounting standards, which if not followed, would make the structure non-Shariah compliant. In this section,

we examine how the formal and informal releases of news regarding the religiosity of Islamic bonds (Sukuk) can affect the issuer's stock prices.

#### 4.1.1 Data and events

First, we identify the event dates, when AAOIFI was either deliberating the problematic structures, had officially announced their fate or had issued standards declaring them non-Shariah compliant. We then empirically investigate the stock price behavior of the Sukuk issuers around the event dates. Four major events were considered for our empirical analysis. These events are described in Table 1. The dates for these events are taken from the AAOIFI website and Bloomberg news.

**Table 1: Major events affecting Sukuk issuance**

<b>Event dates</b>	<b>Event details</b>
September 8, 2007	Informal disclosure of news in AAOIFI meeting
February 14, 2008	Formal announcement in the AAOIFI meeting
October 20, 2008	Informal announcement of accounting standards
October 30, 2008	Formal Issuance of accounting standards

Our sample started with all the Sukuk issuing firms around the world. However, only 129 firms were found to be listed. And, stocks of some of the Sukuk issuers were thinly traded, hence were excluded from the sample. Our final sample includes stock price behavior of 104 firms around the event dates.

#### 4.1.2 Methodology

Measuring abnormal returns are crucial to understand the importance of announcement dates and their impact on the Sukuk issuers' stock returns. The main idea of the abnormal return in event study is to isolate the effect of the event date from the other market movements. We measure the impact of religiosity on asset returns by studying the effect of AAOIFI announcements (as noted in Table 1) deliberating the problematic structures (i.e., non-Shariah compliance) of Sukuk. In so

doing, we estimate the abnormal returns (AR) and cumulative abnormal returns (CAR) of the Sukuk issuers' stock prices around the event dates.

Each of the announcements noted in Table 1 is considered as an event and is set the date of the event as day 0. Following the existing literature (see for instance, Godlewski, Turk-Ariss and Weill, 2013), we adopt a market model approach that relates the return of a given issuer's (i) stock to the return on the market index on event date t.

$$R_{i,t} = \alpha_i + \beta_i R_{M,t} + \varepsilon_{i,t} \quad (21)$$

$$\text{with } E[\varepsilon_{i,t}] = 0 \quad (22)$$

$$\text{and } \text{VAR}[\varepsilon_{i,t}] = \sigma_{si}^2 \quad (23)$$

where  $R_{i,t}$  is the actual return on the share price of Sukuk issuer  $i$  on day  $t$  and  $R_{M,t}$  is the (continuously compounded) return on market index<sup>1</sup> and  $\varepsilon_{i,t}$  is mean zero with a constant variance error term. Returns are defined as the log differences of the prices. The market model assumes that  $\varepsilon_{i,t}$  are not correlated with  $R_{M,t}$  and  $R_{i,t}$  with  $i \neq j$ , and homoscedastic. As a result, regression coefficient  $\beta_i$  is defined to measure sensitivity of  $R_{i,t}$  on the benchmark index. This approach is also called as *Market Adjusted Model*. MacKinlay (1997) defines the restriction of market model as alpha equal to zero and beta equal to one for each stock.

We estimate the model parameters by OLS regression, considering a 90-day estimation window prior to the event date.<sup>2</sup> Next we generate daily abnormal returns over a certain event window following the announcement of AAOIFI news. Therefore, abnormal return ( $AR_{i,t}$ ) is calculated as;

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<sup>1</sup> We follow Álvarez-Díaz et al. (2014), who argue that the DJIM has better power than the other Dow Jones Islamic indices in explaining the variability of stock returns, hedging and diversification. Country specific indices are also used for robust results.

<sup>2</sup> Using longer or shorter estimation windows prior to the event date provides similar results.

$$AR_{i,t} = R_{i,t} - E[R_{i,t}|\Omega_{i,t}] \quad (24)$$

where  $R_{i,t}$  is realized return and  $E[R_{i,t}|\Omega_{i,t}]$  is the expected (or normal) return conditional on the realization of the event or new information,  $\Omega_{i,t}$ . Maskara and Mullineaux (2011), among others, suggest to consider different event windows to capture the variation of asset returns and their significance. Hence, we consider five different event windows: three symmetric windows (1-day [0, 0], 3-day [-1, +1], and 5-day [-2, +2]) and two asymmetric windows (4-days [-1, 2] and [-2, 1]). We extend the event window prior to day 0 to reflect the abnormal returns that may be realized before the announcement date. It is worth noting that the financial markets in emerging economies are not as efficient as in advanced economies, and information related to issue of new securities is likely to be leaked prior to formal announcement of the news (see also Godlewski, Turk-Ariss and Weill, 2013).

For each event window, we compute the *Cumulative Abnormal Returns*, (CAR) as:

$$CAR_{i(\tau_1, \tau_2)} = \sum_{\tau_1}^{\tau_2} AR_{i,t} \quad (25)$$

where  $\tau_1$  and  $\tau_2$  are respectively the lower and upper bounds of an event window. We also standardize cumulative abnormal return (SCAR) by dividing CAR by  $\sigma(CAR) = (T\sigma^2(AR_{i,t}))^{1/2}$ , where T is the number of days within a given event window and  $\sigma^2(AR_{i,t})$  is the variance of the abnormal return estimated in equation (24). For the cross-average of each measure, we conduct the *Cumulative Average Abnormal Returns* (CAARs) for the statistical test as an average of CAR and defined as:

$$CAAR_{\tau_1, \tau_2} = \frac{1}{N} \sum_{i=1}^N CAR_{i(\tau_1, \tau_2)} \quad (26)$$

Where  $N$  is the number of firms in the sample window on day  $t$ . Cumulative (average) standardized abnormal returns (CSAR) can be obtained by dividing CAAR by  $\sigma(CAAR) = (\frac{1}{N^2} \sum_{i=1}^N \sigma(CAR))^1/2$ .

Following null hypotheses are tested using both parametric (time series standard deviation test, cross sectional test, Patell, 1976 test; Boehmer et al., 1991 or BMP test, among others) and non-parametric tests (rank test of Corrado and Zivney, 1992 and sign test of Cowan, 1992, among others)<sup>3</sup>:

$$H_0: CAR = 0 \quad (27)$$

$$H_0: CAAR_{ts} = 0 \quad (28)$$

$$H_0: CAAR_{cs} = 0 \quad (29)$$

$$H_0: CAAR_{BMP} = 0 \quad (30)$$

The BMP test statistic which is robust to the event-induced variance phenomenon is defined as

$$T_{BMP} = \frac{\frac{1}{N} \sum_{i=1}^N SAR_i}{\sqrt{\frac{1}{N(N-1)} \sum_{i=1}^N (SAR_i - \frac{1}{N} \sum_{i=1}^N SAR_i)^2}} \quad (31)$$

Where,  $N$  is the number of Sukuk issuing firms and  $SAR_i = \frac{AR_i}{\sigma_{AR_i}}$  is the standardized abnormal return.

#### 4.1.3 Empirical findings and discussion

Table 2 shows the descriptive statistics of the Sukuk issuers' stock returns during the period from January 2007 to December 31, 2009. As can be seen from this table, mean return for the first sample period (September, 2007) is positive compared to other sample periods. However, this is an average return of all firms. Also, there was no formal announcement of Shariah non-compliance

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<sup>3</sup> Rank test and sign test methods are not explained to conserve the space.

of the Sukuk structure. As soon as the formal announcement was made by AAOIFI, the markets have reacted aggressively and prices have been dropped substantially. The worst performance came in October 2008, when around 90 percent firms faced losses. February 2008 event also had a negative impact on the stock return. During this period, around 55 percent firms faced a downturn in the stock prices. As expected, volatility (measured through standard deviation) was the highest in October 2008 events (October 20<sup>th</sup>), followed by the events in February 2008 and September 2007.

**Table 2: Descriptive statistics around the event dates and other samples**

This table presents the descriptive statistics of the Sukuk issuers' stock price changes (returns). The results are based on analysis of daily data from January 1, 2007 to December 31, 2009.

	Mean	Med	Max	Min	Std. Dev.	Skew	Kurt	Total Firms	Firms with -ve returns
Sept_2007	0.002	0.001	0.051	-0.037	0.021	0.286	4.041	104	40
Feb_2008	-0.001	0.000	0.058	-0.056	0.025	0.162	4.614	104	58
Oct_2008	-0.010	-0.004	0.073	-0.104	0.042	-0.357	4.877	104	92
Full Sample	-0.001	0.000	0.170	-0.180	0.031	-0.077	14.309	104	79
Normal Period	0.000	0.000	0.178	-0.185	0.030	0.195	15.571	104	51

Fig. 2 highlights the stock price changes during the selected event dates. As can be seen from this figure, September 2007 event accompanied with a slightly volatile period, a price drop was noticed during February 2008. It also shows a sudden downturn in October 2008, when the regulator issued a bad news questioning the Shariah legitimacy of Islamic bonds. Since the negative downturn was most obvious during the October 2008 events, it will be worthwhile to observe the volatility of stock prices during this period. Fig. 3 shows that the volatility of stock prices were the highest in October compared to other months in 2008.

**Figure 2: Stock price of the Sukuk issuers**

This figure shows the cross-sectional average of stock price (expressed in logarithm) for the period from January 1, 2007 to December 31, 2009. Figure is based on the data collected from Thompson Reuters DataStream.





**Figure 3: Conditional volatility stock price/return**

This figure shows the conditional volatility of stock price using the cross sectional average of Sukuk issuers stock prices for the period from April 1, 2008 to December 31, 2009. Conditional volatility is estimated through GARCH (1,1) process. Data are collected from Thompson Reuters DataStream.

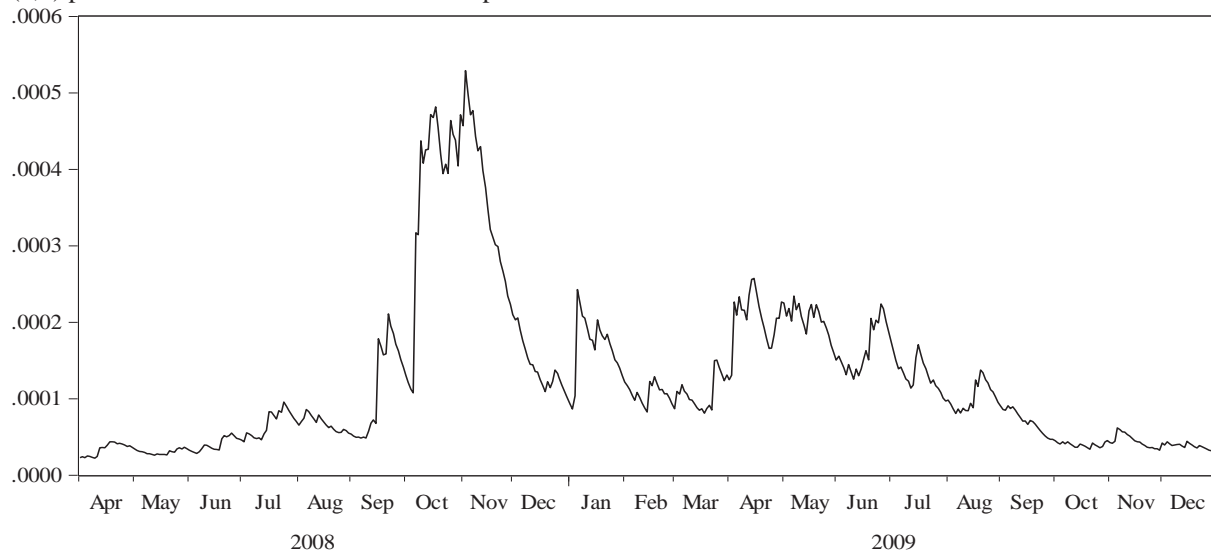


Table 3 reports Sukuk issuers' cumulative abnormal returns (CAR) and cumulative average abnormal returns (CAARs) considering all the events. Using the market adjusted return model, we find that Sukuk issues associate with a significant negative stock market reaction across all event windows except event window [-1,2] for which mixed results are found in terms of statistical significance under different test statistics. In this event window, CAARcs and sign tests are significant but are not significant as per other methods and test statistics. The percentage of negative CAR is lower for the smaller event windows than the larger event windows. The highest negative CAR is associated with the asymmetric window [-2, 1] followed by the largest symmetric

event window  $[-2, 2]$  and 3-day symmetric window  $[-1, 1]$  indicating that the negative CAR increases as the event window widens. Overall, these tests suggest that the market reacts negatively, on average, to the news related to the Shariah legitimacy of Sukuk. We interpret these results as evidence of neglected risk in decision making by investors.

As a robustness check, we analyse the event specific CARs and CAARs. This helps to differentiate the influence of each event on the CARs and CAARs. As Table 4 shows, the market reaction was negative around the event of September 7, 2007. CAR is slightly positive and significant on the event date  $[0, 0]$  but insignificant for other event windows. For the other event windows September 2007 announcement accompanies with negative CARs and CAARs. The largest significantly negative CAR is associated with the asymmetric event window  $[-1, 2]$ . Similar to September 2007 event, the AAOIFI announcement of February 14, 2008 has a slightly positive effect on CAR and CAARs on the event date but negative for other event windows.

Events in October 2008 have had the most significant effect on the CARs and CAARs. The CARs are highly negative and significant across all event windows, except one event window  $[-1, 2]$  where positive but statistically insignificant CAR is observed. The AAOIFI announcement of October 20, 2008 shows that the largest percentage of negative CARs is associated with the asymmetric event window  $[-2, 1]$  followed by the negative CARs of 3-day symmetric window and that of the event day.

The AAOIFI announcement of October 30, 2008 exhibits the largest percentage of negative CARs. CAR is negative and statistically significant across all event windows. The largest percentage of negative CARs is associated with the asymmetric event window  $[-2, 1]$  followed by the negative CARs of 5-day and 3-day of both symmetric and asymmetric windows. Hence, October events

brought about the most significant effect on the Sukuk issuers when the regulator issued a bad news questioning the Shariah legitimacy of Islamic bonds. We further reiterate that these results are evidence of neglected risk in decision making by investors.

**Table 3: Sukuk issuers' cumulative average abnormal returns (all events)**

This table shows cumulative abnormal return (CAR) and time series cumulative average abnormal returns (CAAR<sub>TS</sub>), cross sectional cumulative average abnormal returns (CAAR<sub>CS</sub>) and cumulative average abnormal returns (CAAR<sub>BMP</sub>) using BMP. Two non-parametric test results are also reported. All tests are run using five different event windows. A 90-day estimation window is used for event study. \*\*\* and \*\* indicate level of significance at 1%, and 10%, respectively.

Date	CAR	CAAR <sub>TS</sub>	Prob.	CAAR <sub>CS</sub>	Prob.	CAAR <sub>BMP</sub>	Prob.	Corrado Rank	Prob.	Cowan Sign	Prob.
(0...0)	-0.57%	-2.6169***	0.0089	-2.9285***	0.0034	-1.9196**	0.0549	-0.2270	0.8204	-6.1583***	0.0000
(-1...1)	-1.56%	-4.0998***	0.0000	-5.4805***	0.0000	-3.2429***	0.0012	-0.6588	0.5100	-8.3220***	0.0000
(-2...2)	-3.43%	-6.9918***	0.0000	-9.6697***	0.0000	-7.5767***	0.0000	-1.2121	0.2255	-10.4857***	0.0000
(-1...2)	-0.57%	-1.3052	0.1918	-1.9417**	0.0522	-0.6537	0.5133	-0.5276	0.5978	-7.1569***	0.0000
(-2...1)	-4.41%	-10.0623***	0.0000	-12.1127***	0.0000	-9.4165***	0.0000	-1.3981	0.1621	-11.9836***	0.0000

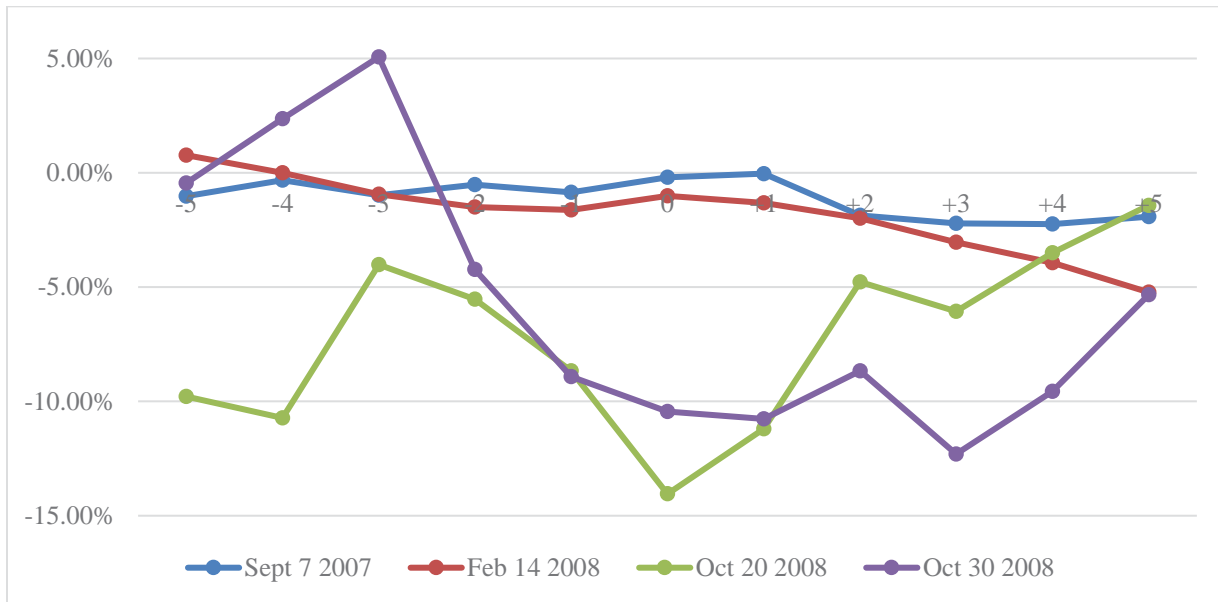
**Table 4: Sukuk issuers' cumulative average abnormal returns (event-wise)**

This table shows cumulative abnormal return (CAR) and time series cumulative average abnormal returns (CAAR<sub>TS</sub>), cross sectional cumulative average abnormal returns (CAAR<sub>CS</sub>) and cumulative average abnormal returns (CAAR<sub>IS</sub>) using BMP. Two non-parametric test results are also reported. All tests are run using five different event windows. A 90-day estimation window is used for event study. \*\*\*, \*\* and \* indicate level of significance at 1%, 5% and 10%, respectively.

	CAR	CAAR <sub>TS</sub>	Prob.	CAAR <sub>CS</sub>	Prob.	CAAR <sub>BMP</sub>	Prob.	Corrado Rank	Prob.	Cowan Sign	Prob.
<b>Sept 7 2007</b>											
(0...0)	0.66%	1.8210*	0.0686	2.4708***	0.0135	2.9912***	0.0028	0.9757	0.3292	5.2852***	0.0000
(-1...1)	0.49%	0.7798	0.4355	1.3181	0.1875	1.6716*	0.0946	0.5902	0.5551	3.2759***	0.0011
(-2...2)	-0.88%	-1.0978	0.2723	-1.8669*	0.0619	-1.6535*	0.0982	0.1519	0.8793	-0.1948	0.8455
(-1...2)	-1.34%	-1.8529*	0.0639	-3.5953***	0.0003	-3.8035***	0.0001	-0.1924	0.8475	-3.4829***	0.0005
(-2...1)	0.94%	1.3009	0.1933	1.9582**	0.0502	2.3321***	0.0197	0.8733	0.3825	4.7372***	0.0000
<b>Feb 14 2008</b>											
(0...0)	0.62%	1.8205*	0.0687	1.9323**	0.0533	2.4945***	0.0126	0.6048	0.5453	0.1949	0.8455
(-1...1)	0.19%	0.3156	0.7523	0.4533	0.6503	1.5854	0.1129	0.3248	0.7454	-1.8146*	0.0696
(-2...2)	-1.04%	-1.3557	0.1752	-1.9781	0.0479	-1.5347	0.1249	-0.2234	0.8232	-3.2761***	0.0011
(-1...2)	-0.48%	-0.7048	0.4809	-1.0290	0.3035	-0.3583	0.7201	0.0153	0.9878	-2.7281***	0.0064
(-2...1)	-0.37%	-0.5376	0.5908	-0.7962	0.4259	0.2564	0.7977	0.0162	0.9871	-2.1800**	0.0293
<b>Oct 20 2008</b>											
(0...0)	-5.38%	-11.9051***	0.0000	-17.2397***	0.0000	-17.1933***	0.0000	-1.6688*	0.0952	-16.1783***	0.0000
(-1...1)	-5.67%	-7.2479***	0.0000	-11.8738***	0.0000	-12.3283***	0.0000	-1.4176	0.1563	-14.5752***	0.0000
(-2...2)	-0.76%	-0.7521	0.4520	-1.1753	0.2399	-1.1016	0.2706	-0.7592	0.4477	-4.5556***	0.0000
(-1...2)	0.75%	0.8315	0.4057	1.2023	0.2293	1.6177	0.1057	-0.4172	0.6765	-1.5497	0.1212
(-2...1)	-7.19%	-7.9492***	0.0000	-13.4833***	0.0000	-13.6043***	0.0000	-1.6593*	0.0970	-15.5772***	0.0000
<b>Oct 30 2008</b>											
(0...0)	-1.53%	-2.3962***	0.0166	-2.9132***	0.0036	-3.9733***	0.0001	-0.6385	0.5231	-9.8057***	0.0000
(-1...1)	-6.54%	-5.9178***	0.0000	-9.2125***	0.0000	-10.5175***	0.0000	-1.2887	0.1975	-10.5688***	0.0000
(-2...2)	-13.73%	-9.6297***	0.0000	-17.9410***	0.0000	-18.2429***	0.0000	-1.6612*	0.0967	-13.6211***	0.0000
(-1...2)	-4.44%	-3.4780***	0.0005	-5.0687***	0.0000	-6.3607***	0.0000	-1.0016	0.3165	-9.6149***	0.0000
(-2...1)	-15.84%	-12.4133***	0.0000	-25.2321***	0.0000	-24.0513***	0.0000	-1.9717**	0.0486	-14.7658***	0.0000

For illustrative purposes, we provide the evolution of CARs in Fig. 4 over a [-2, 2] time window for firms issuing Sukuk. We note that the CAR of October 2008 was much more volatile than the two other events in 2007 and 2008. Both events in October 2008 show diminishing CAR, which slowly normalises (but negative) five days following the event date.

**Figure 4: Sukuk issuers' stock CAR around the event dates**



## 4.2 Policy changes and reduction in Sukuk issue/supply

In this section, we study the impact of a policy change where the Central Bank of Malaysia introduced a regulatory change that reduced the supply of sovereign Sukuk significantly. The policy required that sovereign Sukuk would only serve the liquidity needs of Islamic banks and not conventional banks. We hypothesize that after the exogenous reduction in Sukuk supply, the Sukuk margins maybe more representative of the risks and the willingness to pay by the Islamic customers.

### 4.2.1 Data and methodology

We use the data from 1361 new Sukuk issues in Malaysia from 2005 to 2016. The data were taken from the IFIS database and Zawya. The data for margins, tenure, size and year were taken from the Zawya, while the data for Sukuk ratings were taken from the IFIS database. The data contains both corporate and sovereign Sukuk.

We use the following model to test the impact of regulatory change on the Sukuk margin.

$$Margin_i = \beta_0 + \beta_1(Volume_i) + \beta_2(Tenor_i) + \beta_3(Year2014) + \beta_4(Year2015) + \varepsilon \quad (32)$$

$$Margin_i = \beta_0 + \beta_1(Volume_i) + \beta_2(Tenor_i) + \beta_3(Ratings_i) + \beta_4(Year2014) + \beta_5(Year2015) + \varepsilon \quad (33)$$

$$Margin_i = \beta_0 + \beta_1(Volume_i) + \beta_2(Tenor_i) + \beta_3(Ratings_i) + \beta_4(Year2014) + \beta_5(Year2015) + \beta_6(Year2008) + \beta_7(Year2009) + \varepsilon \quad (34)$$

'Margins' are the total returns (or coupon payments) offered by the issuers. 'Volume' captures the size of the issue. 'Tenor' captures the time to maturity of the issue in months. 'Rating' represents the credit ratings of the issue, (3=AAA, 2=AA, 1=A and below). The "Year" variables are dummy variable which equals one for the particular year and zero otherwise. We have used year variables 2015 in Equation (33) to capture the regulatory change. We also include a year variable for 2014

to test if the regulatory change was in anyway anticipated in the earlier year. To capture the GFC crisis effect we use year dummies for 2008 and 2009 as shown in Equation (34).

#### **4.2.2 Results**

Table 5 reports the results of Equations (32) to (34) for a sample of Malaysian Sukuk from 2006 to 2016 using OLS. The results suggest that there was a significant increase in Sukuk margins of new issues in 2015 when the central bank of Malaysia introduced a regulatory change that limited the supply of sovereign Sukuk to serve only the Islamic banking industry. The control variables are also significant with the expected sign. The Sukuk ‘volume’ is negative and significant suggesting that larger issues are normally less risky than smaller issues and have a lower margin. The ‘tenor’ is significantly positive, implying that long term Sukuk are more risky and should have higher margins. The credit ‘ratings’ are significantly negative. This suggests that the issues with better ratings should have a lower margin. The year dummy for 2015 is positive and significant showing that the regulatory change may have caused an increase in the Sukuk margins. The year dummy variable for 2014 was insignificant suggesting that probably the market did not anticipate the regulatory change a year earlier, and its impact only set in the following year, i.e., 2015. We also controlled for the crisis impact. As expected, the margins rose in the aftermath of the crisis, both in 2008 and 2009. The results overall suggest that Islamic customers and banks may want a higher margin for the Sukuk but may end up receiving a lower margin because the market may be absorbed by conventional customers and banks. This difference between what the Islamic customers are willing to pay and what the conventional ones may be paying may expose the market to a unique risk. So, if one type of customer is excluded from the market for religious reasons, it may cause the Sukuk margins and the prices to change.



**Table 5: Impact of Regulatory Change on Sukuk Margins**

This table reports the estimation results of Eq. (32) to Eq (34) using OLS. The dependent variable is the Sukuk Margins, whereas, the independent variables are volume, tenor, creditratings (AAA=3, AA=2, A (and lower) =1). Dummy variables are used to control for the year effect for 2015 when there was a regulatory change. Other year variables control for the year effect of 2014. The crisis effect is controlled by the year variables for 2008 and 2009. Results are based on new Sukuk issues in Malaysia from 2006 to 2016. In parentheses are t-stats. Asterisks denote significance at the \*10%, \*\*5% and \*\*\*1% level.

	<b>Model 1 (Eq 32)</b>	<b>Model 2 (Eq 33)</b>	<b>Model 3 (Eq 34)</b>
<b>Dependent Variable</b>	<i>Margin</i>		
<i>Intercept</i>	0.04473*** (0.00058235)	0.05475*** (0.00129)	0.0559*** (0.0013)

<i>Volume</i>	-0.00001*** (0.000002)	-0.000006*** (0.000002)	-0.000005** (0.000002)
<i>Tenor</i>	0.0004*** (0.00004)	0.0008*** (0.00006)	0.0008*** (0.00006)
<i>Rating</i>		-0.0056*** (0.00048)	-0.0059*** (0.0005)
<i>Year2014</i>	0.0011 (0.0007)	0.0003 (0.0008)	0.0004 (0.0007)
<i>Year2015</i>	0.0038*** (0.0007)	0.0043*** (0.0013)	0.0045*** (0.0013)
<i>Year2008</i>			0.0072** (0.0031)
<i>Year2009</i>			0.0041*** (0.0013)
<b>No of Observations</b>	1361	992	992
<b>R-Square</b>	0.1000	0.2572	0.2676
<b>Adjusted R-Square</b>	0.0974	0.2535	0.2624

## 5. Conclusion

The paper studies the impact of religiosity on the risk and return in the financial markets. We argue that the customer's religiosity can affect the demand and returns of financial instruments, while exposing the industry to a theological risk. Previous literature explored the impact of religion but did not exclude the influence of contextual factors from the norms of the religious identity, and hence could only find limited impact of religion on financial markets. We study the impact of religiosity in the context of Islamic finance industry, where the context itself is imbued with the religious significance.

We build a theoretical model that shows how financial intermediaries can create innovative products to satisfy the religious needs of their customers. The amount of new Islamic financial products issued and the price charged, in our model, is an outcome of the customer's conviction about the religious compliance of the underlying income. We assume that customers are coarse thinkers, they can overreact or underreact when forming expectations about the religiosity of Islamic financial instruments. Initially when a new financial instrument is offered that promises a safe return, while offering religious compliance, the Islamic customers would overreact resulting in an oversubscription of Islamic financial products. The growth of the Islamic finance industry in the last decade could be explained by the overreaction that coarse thinkers experience in our model. The presence of coarse thinking leaves an element of neglected risk in the system. In our model, the neglected risk is the theological risk that the customers discover only at the advent of a bad news challenging the religiosity of Islamic instruments. Our model shows how the demand and prices of the Islamic instruments react to this bad news. We also offer empirical evidence of the neglected theological risk by showing how Islamic bond (i.e., Sukuk) issuers experienced significant decline in the stock prices when the regulator disclosed news and issued standards rejecting certain Islamic bond structures. We use this overreaction in the issuer's stock price as a measure of religiosity and theological risk. We also examine another form of religious risk where the regulator restricted the supply of Sukuk to Islamic banks and precluded conventional banks from holding Sovereign Sukuk. We found that Sukuk margins increased significantly following the exogenous policy change, which shows there may be a difference between what Islamic customers are willing to pay for Sukuk as opposed to their conventional counter parts. We use this as an evidence of the industry's exposure to religious risk.

Our paper has important implications for policy makers, investors and Islamic bond issuers. Our model shows that the customer's focus on the religious aspect of Islamic financial instruments has resulted in the growth of this industry. However, it has also exposed the industry to a theological risk making the industry financially fragile. Beyond other risks that are common to both conventional and Islamic finance industry, the regulator needs to be wary of the theological risk present in the Islamic finance industry. Secondly, the investors need to be aware that their overreaction both in terms of oversubscription and the fire sale is an outcome of the coarse thinking process. An increase in the knowledge of Islamic financial instruments and their subtle features, rather than simply relying on the recommendation of the financial intermediary should reduce the element of coercion in decision making. Finally, the Islamic bond issuers would need to develop a long-term view when issuing Islamic instruments. Issuing controversial Sukuk will later expose them to theological (Shariah) risk.

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