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# The impact of religious announcements on stock prices and investment decisions on the Saudi stock exchange

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## 1. Introduction

In 1932, the first joint-stock company was established in Saudi Arabia ; then the number of companies kept increasing until early 1980s, where the trading was officially regulated. In mid-2003, the Capital Market Authority (CMA) was established to regulate and supervise the Saudi Stock Exchange. In mid-2018, the Saudi Stock Exchange (Tadawul) joined MSCI Emerging Markets Index. Based on the market capitalization of listed domestic companies in US\$, Saudi Stock Exchange "Tadawul" has become the largest stock market in the Middle East and Northern Africa. In mid-2015, the market capitalization of Tadawul was 569.87 billion USD, and it was ranked as the 18th in the world in 2018 (Ovaska and Fitch, 2015; World Bank, 2020c). More recently, in March 2023, the market capitalization of Tadawul reached 2.71 trillion USD, with 257 listed domestic companies, ranking as the 10th around the world (Tadawul, 2023; TradingHours.com, 2023).

Different studies regarding the Saudi financial market have already been published. However, most of them analysed the relationship between the stock market prices dynamics and different global factors (Jouini, 2013, Hammoudeh et al., 2016), such as oil price and US interest rates (Hammoudeh and Choi, 2006; Arouri et al., 2010; Arouri and Rault, 2012), or aimed to assess the market efficiency (Al-Ajmi and Kim, 2012; Asiri and Alzeera, 2013; Dahel and Laabas, 1998; Elango and Hussein, 2008; Jamaani and Roca, 2015). More recently, the link between "Sharia compliance" and finance has been more deeply investigated. In the area of corporate finance, some authors compared the long term performance (Pepis and De Jong, 2019), the capital structure (Guizani, 2020) and the speed of adjustment between Sharia/not Sharia firms (Alnori and Alqahtani, 2019). Regarding market finance, some others suggested that religious concerns may explain a Sharia-compliance effect on the long-run market performance following IPOs (Alqahtani and Boulanouar, 2017a), or a better resistance to contagion effects during a systemic financial crisis (Kenourgios et al., 2016). Also, some authors carried out a behavioural finance analysis a possible herd behaviour on the GCC countries' stock markets. This mimetic behaviour has been previously related to oil prices changes (Ulussever and Demirer, 2017) or to the market structure under different market regimes (Balcilar et al., 2013; Youssef and Mokni, 2018),

but also more recently to religious beliefs (Medhioub and Chaffai, 2019 ; Ooi and Ahmad, 2022 ; Gabori and al., 2022). Indeed, academic literature already begun to point out that the investors' behaviour may be influenced by faith and religious tenets (Canepa and Ibrubbian, 2014; Klein et al., 2017, Oran et al., 2018), which can induce a segmentation of the stock market, or differences in the dynamics of Islamic stocks prices, compared to conventional ones (Alhomaiddi and al., 2019; Rizaldy and Ahmed, 2019). Some studies have also already explored the fact that financial markets in Muslim countries may react to different announcements, among them sukuk versus conventional bond issues (Godlewski et al., 2013 ; Klein et al, op. cit.; Muzrifah et al., 2017), additions or deletions from Islamic market indexes (Jaballah et al., 2018), or sukuk credit rating changes (Zulkarnain et al., 2017). However, none have been yet dedicated to the influence of Imams' announcements on stock prices, although there are some findings showing that subjective knowledge (Shehatah, et al., 2021) and opinions can influence investors' financial decisions, even more if they are individual investors (Al-Razeen and Kharbhari, 2004).

Interestingly, one of the main characteristics of the Saudi Stock Exchange is the large proportion of individual investors, which distinguishes this financial market from other mature and non-mature markets in both developed and developing countries. As reported by Samba Bank in November 2009, the Saudi Stock Exchange is dominated by local individuals, since 88% of "buy transactions" are made by individuals, whereas 10% of stock market transactions are usually originated by individual investors in the large OECD markets, such as London and New York (Samba Group, 2009).<sup>1</sup> The proportion of individual investors (i.e., non-institutional) is fluctuating over time, but keeps important, as presented in table 1 below:

Year	2015	2016	2017	2018	2019	2020	2021	2022*
%	83%	76%	78%	73%	64%	90%	75%	66%

\*= 3rd quarter Source: (CMA, 2023)

<sup>1</sup> In late 2013, 2% of the traded volumes in the US stock markets were placed by individuals, around 35% in India and approximately 60% in China, while in the Saudi market more than 85% of volumes were traded by individuals (Jadwa Investment, 2014). During 2015, the percentage of daily

transactions accounted by individuals were almost the same at 84% (Capital Market Authority, 2016).

*Table 1: Percentages of Trades for individual investors in the Saudi Stock Exchange from 2015 to 2022 (4th quarter)*

The second specificity related to the domination of individuals is the religiosity of Saudi market participants. If a market is characterised by a great number of individuals who, according to the cultural environment in which they evolve, are “highly religious”, we might expect security prices to be influenced by religious instructions concerning financial trading. This effect is likely to exist in Saudi Arabia, where “authorised Imams” (Islamic scholars) make annual announcements regarding the “religious status” of each of the firms listed on the Saudi Stock Exchange (Tadawul), in order to convey their religious opinion about whether these listed firms are Sharia-compliant or non-Sharia Sharia-compliant.

The main aim of this study is to assess the Saudi stock market reaction to such religious announcements, which involves a two-step procedure. Given that individual investors are predominant and likely to be influenced by Imams’ opinions, we first build and disseminate a questionnaire that will help to “reveal” their opinion of Imams’ announcements and firms’ Sharia status. Then, we implement an appropriate event-study methodology to capture possible abnormal stock returns, which, if any, will be considered as a reaction to the Imams’ announcements.

## 2. Religiosity and financial behaviour: what are the possible links?

### 2.1 Previous finding

Different studies have already referred to investors’ opinions and “sentiments” to explain some of the behaviour observed on financial markets (De Long et al., 1990; Lee et al., 1991; Miller, 1977). Some of these studies assume that individuals’ different opinions regarding their decision to hold, sell or buy securities could increase the volume of traded stocks (De Long et al., 1990; Miller, 1977). In addition, Lee et al. (1991) suggest that the “sentiments” of individual investors may also affect the returns of the securities that they hold and trade.

Furthermore, the behaviour of individuals may be explained by non-financial determinants, and is likely to be influenced by several characteristics, such as their level of education, environment, wealth, culture and religion, age, native language, etc. (Abreu and Mendes, 2012; Canepa and Ibnrubbian, op. cit.; Cordell et al., 2011; Goetzmann and Kumar, 2008; Grinblatt and Keloharju, 2001; Kim and Venkatachalam, 2011; Peress, 2004). Investors are also subject to common human errors, and some are not fully rational in their decisions, which also results from cognitive errors, biases, beliefs or sentiments, etc. (Ramiah et al., 2015; Shleifer and Summers, 1990).

Religion and culture are important features, as some investors’ trading decisions are guided not only by laws, but also by moral values and business ethics. In Saudi Arabia, government policies and citizens’ behaviour are deeply influenced by Islam, with subsequent restrictions applied to investment choices. For instance, Haram stock (sin stocks) is the name given to shares issued by companies involved in suspicious money transactions from a religious point of view, such as usury (Riba), or in a prohibited field of investments, such as alcohol, gambling, tobacco, drugs, etc. Although it is legally allowed to invest in non-Sharia-compliant firms (thus, in Haram stock), ethical norms and cultural

influence induce a large proportion of society to follow Islamic instructions in the business field.

Some studies have already shed light on religion and its effect on investors’ behaviour. They reported that, despite possible higher market returns for “sin stocks”, these securities are being highly neglected by some investors due to social norms (Hong and Kacperczyk, 2009). These authors argued that some investors tend to take social norms into consideration more than financial profitability. In addition, Kim and Venkatachalam (2011) observed that market participants are likely to introduce non-financial factors into their investment decisions. Moreover, Kumar (2009) found that socioeconomic characteristics, such as religion, influence individuals’ investment decisions regarding stock preferences. Borgers et al. (2015) also suggested that, in such an environment, “*fund managers do not tilt heavily towards controversial stocks because of social considerations and practical constraints*”.

In the context of Islamic corporate finance in the Saudi market, Alnori and Alqahtani (2019) investigated whether being Sharia-compliant or non-Sharia-compliant influenced the capital market structure of non-financial firms listed in the Saudi Stock Exchange, for the period 2005-2016. They stated that “*Sharia-compliant firms have significantly lower levels of leverage and slower speed of adjustment measured by both book and market proxies of capital structure, compared with non-sharia-compliant firms*”. Concerning the aftermarket performance of Sharia and non-Sharia-compliant IPOs, Alqahtani and Boulanouar (2017a) analysed 72 IPOs listed in the Saudi stock market during the period 2004-2010 to examine their one-year aftermarket performance. They found that Sharia-compliant firms performed better than non-Sharia ones. **Alhomaidi et al. (2019)** also found that in Saudi Arabia, the religious certification has an impact on the stock market segmentation, and significantly affects how information is incorporated into asset prices.

Regarding the investors’ behaviour, Al-Razeen and Karbhari (2004) implemented an empirical study to analyse how differently the investors could perceive corporate information. Their findings revealed that “*individual investors were found to attach lower importance to obtaining information directly from companies than the other groups*” and conversely, were more influenced by indirect information, such as friends’ advices, rumours, etc. Ibnrubbian (2012) found that investors in the Saudi market prefer to invest in Sharia-compliant firms (Halal stocks), despite the greater profitability of non-Sharia-compliant firms (Haram stocks). He also mentioned that they tend to avoid investing in non-Sharia-compliant stocks (Haram stocks) during the holy month (Ramadan), as such investment is considered as an unholy action during this period. In line with this outcome, Alqahtani and Boulanouar (2017b) found that individual investors have a greater tendency to subscribe to Sharia-compliant IPOs than non-Sharia compliant ones. Moreover, a report by the Capital Market Authority in Saudi Arabia mentioned that the number of individual investors subscribing to an IPO is likely to drop by 80% if all Imams (Islamic scholars) agree to classify the firm as non-Sharia-compliant and forbid this investment from a religious point of view (Al-Mansour, 2018).

Therefore, we assume that some investors might consider the legitimacy of a stock from a religious point of view before deciding to invest, or even before interpreting economic or financial information. In other words, if a stock is issued by a Sharia-compliant firm, investors are likely to analyse the relevant financial information in order to react appropriately as financial investors; by contrast, investors might disregard the information disclosed if a company is regarded as a non-Sharia compliant firm.

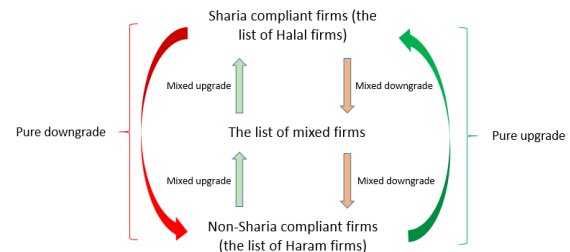
## 2.2 Imam's announcements in the Saudi stock exchange

Ashraf (2016) reports that “stocks are subject to the screening criteria for selection imposed by the principles of Islamic jurisprudence (Shari’ah). Equities must pass three basic screens: revenue source, business activity, and financial factors to be included in an Islamic fund. However, screening criteria are not universal especially for the financial factors”. In the Saudi Stock Exchange (Tadawul), some Imams analyse firms’ balance sheets and core business in order to categorise listed firms into three types (Halal, Haram, mixed). A “Haram firm” is considered as non-Sharia compliant regarding its core business and sources of funding; therefore, it is forbidden to invest or speculate in these firms, according to Islamic law (Sharia law), but not legally prohibited. “Halal firms”, by contrast, are considered as fully compatible with Islamic principles regarding their activity and sources of funding, which implies that such firms’ stocks will not be considered as “sin stocks”. “Mixed firms” denotes firms that are globally Sharia-compliant regarding their core business and main sources of funding; however, financing some of their activities or subsidiaries is not in line with Sharia precepts, which means that some of the funds involve or deal with Riba (non-Islamic interest).<sup>2</sup>

Concerning authorised Imams, there are three leading Imams (Al-Shoubaily, Al-Osaimy, and Al-Fouzan) who religiously classify the firms listed in the Saudi stock market, approximately once a year. Hence, each year some companies are moved from the list of Sharia-compliant firms (Halal list) to the list of non-Sharia-compliant firms (Haram list), and vice-versa. Additionally, some companies in the Imams’ lists are moved from the list of Sharia-compliant firms (Halal list) to the list of mixed firms, and/or from the non-Sharia-compliant firms (Haram list) to the list of mixed firms, and vice-versa. From now on in this study, the change of classification from the list of Sharia-compliant firms to the list of non-Sharia-compliant firms will be considered as a pure “religious downgrade”, and the change of classification from the list of non-Sharia-compliant firms to the list of Sharia-compliant firms as a pure “upgrade”. Additionally, the change of classification from Sharia-compliant firms to the mixed list is called “mixed downgrade”, and the change of classification from the list of non-Sharia-compliant firms to the mixed list is named a “mixed upgrade” (See figure (1) below). It should be mentioned that these terms have neither an “ideological” nor a “pejorative” meaning, they are only employed to identify the direction of each announcement. In our empirical

study, only the “pure downgrades” and “pure upgrades” will be taken into account.<sup>3</sup>

Figure 1: Chart illustrating the changes in classifications in the three types of Imams’ lists



Thus, we hypothesise that religion may play an essential role in the Saudi stock market. Highly religious investors in the Saudi Stock Exchange are likely to follow the Imams’ opinions and consider the religious status of a firm as one of their main decision factors, which will consequently affect their willingness to hold, buy or sell some financial securities in their portfolios. Moreover, we assume that religiosity can affect financial market behaviour as much as other financial indicators, and that this could be reinforced by the domination of individuals. More precisely, we might expect stock market prices to react to Imams’ announcements: positively to upgrades as they are considered as good “religious” news, and negatively to downgrades, which are considered as bad news from a religious point of view.

## 3. First methodological step: questionnaire and interpretation of answers

### 3.1 Data and methodology

We begin our methodological investigation with a questionnaire, in order to find out and analyse individual investors’ behaviour in the Saudi stock market. This approach is helpful to support or reject our initial assumption regarding the expected reaction of individual investors to religious announcements. It also “reveals” the individual investors’ opinions regarding the Imams’ announcements.

To achieve this, we conducted a questionnaire with closed-ended answers and distributed it through the new media channels. More in detail, we decided to disseminate the questionnaire in forums specialised in the Saudi stock market, where almost all of the forum members trade and/or invest in “Tadawul”. We also circulated the survey on Twitter every day, using specialised Hashtags referring to the Saudi Stock Exchange. Finally, we also managed to distribute it through specialised groups in WhatsApp.

Regarding our choice of considering social media as the main distribution channel amongst individuals, it should be noted that such media occupy a huge place in Saudi society, even amongst the elderly. Furthermore, using electronic channels and emphasising that all responses will be treated anonymously is believed to reduce the possibility of bias in answers, or even fake answers, especially for questions regarding religion,

<sup>2</sup>Financial investments in mixed firms are religiously permitted according to some, but not all, Imams. The Imams who allow this practice require that the investors must relinquish a part of the dividends to purify their earnings; however, the investors do not need to relinquish any of the profits if they are only speculating and do not earn dividends when holding the shares.

<sup>3</sup> Mixed classifications are not taken into account because they do not denote a pure signal or a religious “downgrade” or a pure “upgrade”, but are rather considered as a “grey area”, possibly leading to a divergence between investors’ decisions.

customs and traditions. Thus, our choice is in line with Klein et al. (1967), who studied the possible distortion in a questionnaire that could occur from differences between identified and non-identified participants. They found that a considerable probability of faking answers and distortion can appear if participants' answers are not treated anonymously, even with a promise of confidentiality. In addition, it is commonly accepted that, unlike personal interviews, questionnaires do not have any influence that may create biasing effects in participants' answers, such as visual, verbal, social distance factors, etc. (Barath and Cannell, 1976; Collins, 1970; Dohrenwend et al., 1968). Furthermore, we might add that different authors have relied on the internet as a channel to reach their target audience (i.e., Chianasta and Wijaya, 2014; Jothi et al., 2011; Kayam and Hirsch, 2012).

It should also be mentioned that this questionnaire was distributed in the Arabic language instead of English, because of a pre-supposed low level of English among the target audience. This choice not only enables us to avoid any misunderstanding among participants, but also strongly encourages individual investors who do not speak any English to participate.

To check for the minimum number of participants required to reach a sample size that may be considered as representative, we applied two different methods. The first method was the one used in the study by Chianasta and Wijaya (2014), who disseminated their questionnaire via the internet by following the formula (Equation 1). They considered that the minimum suitable sample size should be at least:

$$(N > 50 + 8m) \quad (\text{Equation 1})$$

Where,

N = the minimum "needed" sample size

m = the number of questions in the questionnaire

As our full questionnaire consists of 29 questions, the minimum number of participants has to be 282.<sup>4</sup>

$$(N > 50 + 8 \cdot 29) = N > 282$$

The second approach relies on a statistical method introduced by Creative Research Systems (2016), which calculates the minimum representative sample size by determining a level of confidence, margin error, and the reference population (Equation 2), assuming a standard normal distribution:

$$\text{Sample size (ss)} = \frac{Z^2 \cdot p \cdot (1-p)}{c^2} \quad (\text{Equation 2})$$

$$\text{Sample size by considering the population} = \frac{ss}{1 + \frac{ss - 1}{pop}}$$

where;

Z = is the critical value of the standard normal distribution. To set 95% as a confidence level, we selected 1.96 as the value of the Z-parameter.

p = the percentage of people in the sample who pick a particular answer or choice. To increase the accuracy, we must maximise the term (p\*(1-p)); thus, we use the worst-case percentage (50% = 0.5)

c = the margin of error = ±5%

Pop = the reference population. According to the Saudi Central Bank (SAMA), 2,737,003 investors participated in online trading in 2017 (SAMA, 2018).

$$\text{sample size} = \frac{1.96^2 \cdot 0.5 \cdot (1 - 0.5)}{0.05^2} = 385 \text{ participants}$$

$$\begin{aligned} \text{Sample size by considering the population} \\ = \frac{384}{1 + \frac{384 - 1}{2,737,003}} = 385 \text{ participants} \end{aligned}$$

Relying on this methodology, 385 responses is the minimum required sample size. Regarding population size, this method ignores a population exceeding 1,000,000 as the sample size generated by the model will keep giving 385 for a 95% confidence level and a 5% margin of error when the population size exceeds 1,000,000 (Creative Research Systems, 2016).

In total, we received 930 responses to the survey, with only 454 of them fully completed. Additionally, due to a filtering process relying on the possibility to check the time spent by each participant on answering the questionnaire on the Limesurveys platform, we also eliminated 27 responses. The reason is because these participants are considered as outliers regarding the time they spent on the questionnaire. Ultimately, 427 participants were kept in the final sample.

We first aim to split this sample into two different subgroups: "highly religious investors" versus "less religious investors". To do so, we rely on participants' answer to the following question: "In which types of company do you trade?" We selected the participants who answered "I trade only in Sharia-compliant firms" to qualify them as "highly religious investors" and considered as "less religious investors" those who chose "I trade only in non-Sharia-compliant firms" or "I trade in both type of firms".<sup>5</sup> Moreover, the questionnaire consists of closed questions, with answers measured either by a Likert scale of five and seven points, or by a binary scale [0, 1] depending on the question asked.

To check for a different behaviour for each type of investor, we apply a comparison test to verify whether the answers significantly differ between the two subgroups. However, these mean comparison tests rely on a normality assumption of the distribution, so that it was first necessary to check for the accuracy of this hypothesis. To do so, we performed two different normality tests (Kolmogorov-Smirnov and Shapiro-Wilk) on the summed scores of the Likert-scale for the entire sample, as proposed by Carifio and Perla (2008) and De Winter and Dodou (2010).

Once the normality assumption was checked, the parametric test (t-test) was applied, to compare the means of the two sub-groups. Additionally, we also implemented non-parametric tests: a Wilcoxon rank-

<sup>4</sup> Only one part of the whole questionnaire is used for the present study, which requires only 11 questions. The questionnaire is available upon request.

<sup>5</sup> See appendix 1, question 9.



sum test/Mann-Whitney U test (MWW test) and a Chi-square test.

### 3.2 Results and discussion

Let us recall that we set out to examine whether the sub-group of “highly religious investors” significantly differs from the sub-group of “less religious investors”, regarding their respective answers to the questionnaire. The first noticeable outcome of our survey is that the proportion of highly religious investors turns out to be 64% in our sample, compared to 36% less religious investors. It should be noted that this piece of information has never been provided in any publication by the Saudi Market Authority. The large number of investors who declare that they are concerned by the Sharia-compliant status of the shares in their investment choices is an important result by itself, as it reinforces our assumption that the Saudi stock market may react to religious announcements, and therefore justifies the event study that we implemented (cf. part 4).

To confirm this assumption, we also observed the answers provided to several questions introduced into the questionnaire, for each of the two sub-groups.<sup>6</sup> Firstly, we looked at the answers provided to question 10. This question aims to check whether or not the investors seek the announcements of the authorised Imams prior to subscribing in IPOs and purchasing shares.<sup>7</sup> The outcomes of the mean comparison tests (Table 2 below) show significant results at 1% for parametric and non-parametric tests (with a mean 4.53 and median 5 on a Likert scale of 5 points for the “highly religious group”, compared respectively to 2.64 and 3 for the “less religious group”). It leads us to reject the null hypothesis and allows us to conclude that highly religious investors clearly pay attention to the Imams’ announcements before purchasing shares.

This finding also supports our hypothesis, which states that religion is expected to play an essential role in the Saudi stock market, in that it may induce investors to follow Imams’ announcements. By extension, the religious factor is likely to affect whether or not individuals are willing to keep some stocks in a portfolio and to modify the “perceived value” of these securities, from a religious point of view.

Table 2: Do investors pay attention to Imams’ announcements before participating in IPOs or purchasing shares?

Key to understanding: The mean and median refer to a 5-point Likert scale. In this question, 5 on a Likert scale refers to “always” whereas 1 refers to “Never”.

Religious investors	High	Less
Mean	4.53	2.64
Median	5	3
Standard error of mean	0.05	0.1
Standard deviation of mean	0.85	1.31
	<b>Significance level</b>	
T-test	0.00 ***	
Chi-square test	0.00 ***	

<sup>6</sup> The whole questionnaire consists of 29 questions, of which only 11 are related to the topic of this study. Only the ones linked to this article and regarding “investment behaviour and religiosity” are reproduced and detailed in this paper. The full questionnaire is available upon request.

**MWW test** | 12.73 \*\*\*  
Significant level (\* 10%, \*\*5% \*\*\* 1%).

In a next step, the participants were asked, hypothetically, if they were investing and trading in a firm, and this firm was delisted from the list of the Sharia-compliant firms by the authorised Imams, even though the investment in this company was still profitable, what would they do? The participants had to stipulate their choice for each scenario, on a Likert scale from 1 to 5, where 5 refers to “absolutely yes” and 1 refers to “absolutely not”. Three scenarios were presented to them, A) keep investing in this firm, B) sell the shares of this firm and buy in another Sharia-compliant firm, C) sell the shares of this firm and buy in any other Sharia or non-Sharia-compliant firm.<sup>8</sup> The synthesis of the answers is provided in Table 3 below.

Table 3: What would investors do, if a firm was delisted from the “Sharia-compliant list” by an Imam? Key to understanding: The mean and median refer to a 5-point Likert scale. In this question, 5 on a Likert scale refers to “absolutely yes” whereas 1 refers to “absolutely not”.

1- Scenario A (keep investing).

Religious investors	High	Less
Mean	1.63	3.47
Median	1	3
Standard error of mean	0.06	0.11
Standard deviation of mean	1.06	1.32
	<b>Significance level</b>	
T-test	0.00 ***	
Chi-square test	0.00 ***	
MWW test	11.85 ***	

Significant level (\* 10%, \*\*5% \*\*\* 1%)

2- Scenario B, question 11 (sell and buy in another Sharia firm)

Religious investors	High	Less
Mean	4.21	2.25
Median	5	2
Standard error of mean	0.07	0.1
Standard deviation of mean	1.15	1.19
	<b>Significance level</b>	
T-test	0.00 ***	
Chi-square test	0.00 ***	
MWW test	12.58 ***	

Significant level (\* 10%, \*\*5% \*\*\* 1%)

3- Scenario C, question 11 (sell and buy in any firm, Sharia or non-Sharia)

Religious investors	High	Less
Mean	1.35	2.08
Median	1	2

<sup>7</sup> See appendix 1, question 10.

<sup>8</sup> See appendix 1, question 11.

<b>Standard error of mean</b>	0.05	0.09
<b>Standard deviation of mean</b>	0.91	1.12
	<b>Significance level</b>	
<b>T-test</b>	0.00 ***	
<b>Chi-square test</b>	0.00 ***	
<b>MWW test</b>	7.13 ***	

Significant level (\* 10%, \*\*5% \*\*\* 1%)

Scenario A in Table 3 above shows a mean of 1.63 and a median of 1 for highly religious investors, which illustrates that they clearly become reluctant to keep holding stock in their portfolio when a firm turns out to be non-sharia-compliant, whereas less religious investors show a lower level of rejection (with a mean of 3.47 and 3 as a median). All of the tests confirm this different behaviour.

Symmetrically, scenario B shows that the highly religious investors demonstrate an obvious tendency to replace the “sin-stock” with another Sharia-compliant stock, compared to the less religious investors (with a mean of 4.21 and a median of 5, versus a mean of 2.25 and a median of 2, respectively).

Finally, we proposed another hypothetical situation to the participants, with three possible scenarios.<sup>9</sup> *If all investors are trading/investing in Sharia-compliant firms and, at one point, all of the Sharia-compliant firms are downgraded by the credit rating agencies (CRAs) operating on the Saudi market (Standard & Poor’s, Moody’s, Fitch), how would they react?* Three answers were possible: A) *keep investing in these firms*, B) *sell the shares of these firms and move the investments to non-Sharia-compliant firms*, C) *leave the stock market and change investment field*.<sup>10</sup>

Table 4-a below allows us to deduce that, for the first scenario, highly religious investors have a slightly higher tendency to keep investing in these firms regardless of the downgrades. For the second scenario, highly religious investors clearly reject the other option, which is to move the investments to non-Sharia-compliant firms, compared to less religious investors (Table 4-b below). In the third scenario, highly religious investors present a larger probability of leaving the stock market and changing the investment field compared to less religious investors (Table 4-c below). The tests tend to confirm (at a 1% threshold) that, in case of bad financial news conveyed by a credit rating agency, highly religious investors tend to pay less attention to this information compared to the signal conveyed by religious announcements.

Table 4: How would investors react in a case where CRAs downgraded the sharia-compliant issuers? Key to understanding: The mean and median refer to a 5-point Likert scale. In this question, 5 on a Likert scale refers to “absolutely yes” whereas 1 refers to “absolutely not”.

1- Scenario A: *keep investing in these firms*

Religious investors	High	Less
<b>Mean</b>	3.28	2.78
<b>Median</b>	3	3
<b>Standard error of mean</b>	0.08	0.1
<b>Standard deviation of mean</b>	1.33	1.3
	<b>Significance level</b>	
<b>T-test</b>	0.00 ***	
<b>Chi-square test</b>	0.00 ***	
<b>MWW test</b>	3.69 ***	

Significant level (\* 10%, \*\*5% \*\*\* 1%)

2- Scenario B: *sell the shares of these firms and move the investments to non-Sharia-compliant firms*

Religious investors	High	Less
<b>Mean</b>	1.61	2.53
<b>Median</b>	1	3
<b>Standard error of mean</b>	0.06	0.09
<b>Standard deviation of mean</b>	1.03	1.1
	<b>Significance level</b>	
<b>T-test</b>	0.00 ***	
<b>Chi-square test</b>	0.00 ***	
<b>MWW test</b>	7.93 ***	

Significant level (\* 10%, \*\*5% \*\*\* 1%)

3- Scenario C: *leave the stock market and change the investment field*

Religious investors	High	Less
<b>Mean</b>	2.62	2.02
<b>Median</b>	3	2
<b>Standard error of mean</b>	0.08	0.09
<b>Standard deviation of mean</b>	1.32	1.08
	<b>Significance level</b>	
<b>T-test</b>	0.00 ***	
<b>Chi-square test</b>	0.00 ***	
<b>MWW test</b>	4.30 ***	

Significant level (\* 10%, \*\*5% \*\*\* 1%).

As a synthesis of this first methodological step, we can infer from the questionnaire’s answers that our assumption according to which religiosity may affect the behaviour of the investors is supported, especially when there is a large proportion of “highly religious” individuals. Therefore, it may also affect the market value of securities, similar to other financial indicators. In a second step, we aim to check for possible changes in stock prices due to religiosity, and verify to what extent the Saudi stock market reacts to religious announcements.

that all the investors are likely to analyse the information, and decide to react or to not to the announcement. Accordingly, searching for a difference in the answer, depending on the subgroup “highly religious” versus “less religious”, also reveals what may be the dominant factor explaining individual investors’ decisions, i.e. either the default risk (CRAs’ announcements) or their religion (the Imams’ announcements).

<sup>9</sup> Appendix 1, question 17.

<sup>10</sup> As pointed out earlier, investors might look first at the legitimacy of a stock from a religious point of view, prior to investing or even before interpreting an announcement. Therefore, in this question conditioning the credit rating agencies’ announcements to the sharia-compliant ensures

## 4. Second methodological step: event study and main findings

The methodological approach explained in the previous section was a preliminary but necessary step, designed to “reveal” individual investors’ opinion about Imams’ announcements and firms’ Sharia status. In this section, we employ the event study methodology to find out whether or not our assumptions regarding the expected reaction to Imams’ announcements (and confirmed by the questionnaire) may induce changes in stock prices (i.e. abnormal returns).

### 4.1 Data and methodology

We apply the event study methodology, as developed by Brown and Warner (1985) and Fama et al., (1969), in order to examine the stock reaction and capture the abnormal returns, if any, as a response to the Imams’ announcements. Such a methodology is considered as suitable, and was already implemented to assess the impact of different types of announcements on the stock market, in different Muslim countries (Godlewski et al., 2013 ; Klein et al, op. cit.; Mitchel et al., 2014; Muzrifah et al., 2017; Zulkarnain et al., 2017 Jaballah et al., 2018).

The study period is from 2004 to 2016, for the three main Imams, Al-Shoubaily, Al-Osaimy, and Al-Fouzan, who classify the listed firms in the Saudi Stock Exchange “Tadawul”, based on the religious status of the firms. As explained earlier, we chose to take into account only a clear re-classification, i.e., pure upgrades and pure downgrades. Hence, 133 upgrades and 74 downgrades construct our final full sample.

We chose to rely on the unifactorial market model (Equation 3 below) to estimate the possible abnormal returns associated with the Imams’ announcements. The underlying assumption behind the unifactorial market model is that the return of a security ( $R_{it}$ ) depends on the return of the market  $R_{mt}$ , and possibly on a constant term,  $\alpha_i$ , which is uncorrelated to the market return. Therefore, the error term  $\varepsilon_{it}$  can be considered as an abnormal return (Coutts et al., 1994) if significantly different from zero.

Equation 3: the single-factor market model

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$$

Where,

$R_{it}$  = the return of the security (stock)  $i$  on date  $t$

$R_{mt}$  = the return of the stock market index (the Saudi Stock Exchange TASI – Tadawul All Share Index) on date  $t$

$\varepsilon_{it}$  = the error term

$\alpha$  and  $\beta$  = the estimated intercept and slope coefficients for the security  $i$

We assume that estimating the abnormal returns through the unifactorial market model instead of relying on CAPM is more appropriate. First, Hubler et al. (2019) report that the great majority of market event studies published to date rely on the conventional and most simple market model to calculate normal returns (among others, Bissoondoyal-Bheenick et al., 2014; Hui Li et al., 2004; Jorion and Zhang, 2007; Schweitzer et al., 1992).

Besides, two reasons question the relevance of CAPM in our study: not only is there no consensus about which free-risk rate should be used to calculate the possible abnormal excess-returns (Saudi Interbank Average, 12 Months SAMA Bill Rates, SAIBOR 12 months, American treasury bills, etc.), but above all is the question of whether such a market rate is relevant: whereas we mention the market is mostly driven by individuals, few or none of them may invest in securities whose return depends on such a free-risk rate, either because those securities are not available to all market participants, or because they are not considered as Sharia-compliant (given that the return may consist of a forbidden interest rate “usury/Riba”).

### 4.1.1 Estimation process

As in Abad-Romero and Robles-Fernandez, 2006; Barron et al., 1997; French et al., 1987; and Hubler et al., 2014, we use the Generalised Auto-Regressive Conditionally Heteroscedastic “GARCH” (p,q) model developed by Bollerslev (1986) (equation 4 below) to better estimate the parameters ( $\alpha$  and  $\beta$ ) of the market model. In this study, the GARCH (p,q) model estimation ensures that by taking into account the past values of squared errors and the past conditional variances, the values of  $\alpha$  and  $\beta$  are more precisely estimated, with an error term being i.i.d, unless abnormal returns occurred due to the religious announcements. The optimal order of the GARCH process was selected for each time-series corresponding to an event. This was done by selecting the order of the GARCH and checking to ensure the best probability that the residuals of the GARCH model behave in “white noise” according to the Q-test, and also taking into account the Log-Likelihood, and AKAIKE, SCHWARTZ, HANNAN-QUINN, and SHIBATA information criteria.

Equation 4: GARCH (p,q) model introduced by (Bollerslev, 1986)

$$\sigma_t^2 = \gamma_0 + \sum_{i=1}^q \gamma_i \varepsilon_{t-i}^2 + \sum_{j=1}^p \lambda_j \sigma_{t-j}^2 = \gamma_0 + \gamma(L) \varepsilon_t^2 + \lambda(L) \sigma_t^2$$

Where,

$$\begin{aligned} \sigma_t^2 &= \text{the conditional variance, } \gamma_0 > 0, \gamma_i \geq 0, i = 1, \dots, q \\ \lambda_j &\geq 0, j = 1, \dots, p & p \geq 0, \quad q > 0 \end{aligned}$$

### 4.1.2 Estimation window, event windows and contamination issues

For each of the religious events affecting a firm, we use 120 days as an estimation period [-140, -21] to estimate the parameters of the market model; the event period consists of 41 days [-20, +20], where day [0] is appointed as the event day. It should be noted that the choice we made regarding the estimation and event period is fairly similar to other previous studies, although there is no perfect consensus regarding its length in the academic literature. For example, Elayan et al. (2003) used -25,+25 as an event period and (-177, -26) as an estimation period. 100 days was used as an estimation period in the study by Abad-Romero and Robles-Fernández (2007). Additionally, 120 days was applied as an estimation period in the study of the Swedish market by Hui Li et al. (2004) and the Israeli market by Afik et al. (2014). Consequently, we chose to select similar periods due to the small number of events and the short gap between announcements.



As it is often the case in event studies dedicated to market finance, there may be an issue regarding a possible contamination phenomenon between events: given the nature of the events (religious announcements), we consider an event as possibly contaminated if another Imam announcement (pure upgrade, pure downgrade, or moving to/from mix) occurs during the event period (41 days including the announcement date). In section (4.2), we present the results of both samples, the full sample (contaminated sample) and the uncontaminated sample. In the case of the uncontaminated sample, we exclude all of the contaminated events. For the full sample, we decide to keep all of the religious announcements, except those occurring for the same firm and over the same event period, but in different directions (e.g. an Imam gives a “pure upgrade” to firm A, and another gives it a mix upgrade or confirms that it should be kept in the Haram list).

#### 4.1.3 Calculation of abnormal returns

We calculate the daily stock returns using the logarithmic return, as in Sehgal and Mathur, 2013; Yolsal, 2011, with the following formula (Equation 5):

$$R_{i,t} = \ln \frac{P_{i,t}}{P_{i,t-1}} \quad (\text{Equation 5})$$

Where,

$R_{i,t}$  = the return on day t for the stock i,

$P_{i,t}$  = the closing price on day t for the stock i,

$P_{i,t-1}$  = the closing price on the previous day t-1 for the stock i.

Then we calculate the abnormal return using the market model below in Equation 6:

$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{mt}) \quad (\text{Equation 6})$$

Where,

$AR_{it}$  = the abnormal return of security i on date t

$R_{it}$  = the daily return of security i on date t

$R_{mt}$  = the return of the market index (the Saudi Stock Exchange TASI – Tadawul All Share Index) on date t

$\alpha_i$  and  $\beta_i$  = are the estimated parameters with the GARCH (p,q) model

The cumulative abnormal returns are calculated as in Equation 7 below:

$$CAR_{iT} = \sum_t^T AR_{it} \quad (\text{Equation 7})$$

Where,

$CAR_{iT}$  = cumulative abnormal return of security i from date t to date T

$AR_{it}$  = abnormal return of security i on date t

Then the Cumulative Average Abnormal Returns (CAARs) for a specific event window are:

$$CAAR = \overline{CARs}_{t,T} \quad (\text{Equation 8})$$

Where,

$\overline{CARs}_{t,T}$  = the average of the cumulative abnormal returns from date t to date T.

Once the CARs and CAARs have been calculated, they have to be tested, to check whether or not they can be considered as statistically significant (i.e., different from 0, which can be called an “abnormal return”, over the considered period). In line with different event studies (especially rating event studies such as Abad-Romero and Robles-Fernandez, 2006; Ferri et al., 2013; Hubler et al., 2014; Konijna and Rijkema, 2010), and considering the size of the sample of events, a parametric-test (t-test) is applied and reinforced by a non-parametric test (Wilcoxon).

All of the observations were downloaded from Bloomberg; however, some of the data have missing days. If the missing days occur during the event window, we decide to eliminate the entire event (as it was not possible to assess an abnormal stock market reaction). Moreover, if missing data are observed during the estimation period, and exceed 12 days (10% of the estimation period), we eliminate them as well.

## 4.2 Results and discussion

### 4.2.1 Religious downgrade announcements

Table (5) below presents the results of the event study performed on the Imams’ announcements, concerning the downgraded firms (re-classified from Sharia-compliant firms to non-Sharia-compliant firms). By looking at the two samples, the full sample and the uncontaminated one, we can conclude that these announcements are followed by a significantly negative stock market reaction.

The full sample presents 74 negative events and shows negative stock reactions on the post-announcement windows. The event day [0] shows no significant results; however, day [1] shows statistically significant results (at a 1% threshold for the t-test) with CARs of -0.82%. This significant result is also confirmed with the Wilcoxon test at 5%.<sup>11</sup> The post-event window [+1, +3] presents a negative stock reaction with CAARs of -1.65%, with a t-test and Wilcoxon test being significant at a 5% threshold. This negative stock market response also prevails over the event window [+1, +7], with CAARs of -3.40%, with a t-test significant at 5%.

The pre-announcement windows, as well as the symmetric event windows surrounding the religious announcement, show no significant abnormal returns. Therefore, we can infer from these results that the stock market reaction over the post-event period is due to the Imams’ announcements themselves, which do not seem to be anticipated.

<sup>11</sup> Some of the Imams’ opinions are announced either just before or after the closure of the Stock Exchange Market. The majority of our sources cannot provide specific information about the time of disclosure of these

announcements. Hence, this may explain a reaction on day [1] rather than day [0].

Table 5: Test of the cumulative average abnormal returns (CAARs) associated with Imams' announcements: downgrades from Sharia-compliant firms to non-Sharia-compliant firms.

Windows	Full Sample				Untaminated sample			
	N	CAARs	t-test	Wilcoxon	N	CAARs	t-test	Wilcoxon
[-5, +5]	74	-1.20%	-1.101		58	-0.68%	-.517	
[-1, +1]	74	-0.33%	-.734		58	0.14%	.270	
[-5, -1]	74	1.04%	1.555		58	1.07%	1.281	
[-1, 0]	74	0.49%	1.192		58	0.67%	1.294	
[0]	74	0.33%	1.297		58	0.46%	1.452	
[0, +1]	74	-0.48%	-1.282		58	0.06%	-.154	
[1]	74	-0.82%	-3.051***	**	58	-0.53%	-1.853	
[+1, +3]	74	-1.65%	-2.257**	**	58	-1.57%	-1.738	
[+1, +5]	74	-2.58%	-2.201**		58	-2.21%	-1.520	
[+1, +7]	74	-3.40%	-2.274**		58	-3.65%	-1.939*	

\*\*\*, \*\*, \* significance at 1%, 5%, 10% respectively.

#### 4.2.2 Religious upgrade announcements

Table (6) below presents the results of the tests for the event study performed on the Imams' announcements, concerning pure upgrades. By looking at the two samples, the full (i.e., "contaminated") one and the uncontaminated one, it can be seen that these announcements are followed by a slightly positive stock reaction. However, the reaction tends to be weaker in magnitude than that occurring after Imams' downgrades. Also, only the uncontaminated sample, which consists of 83 events, exhibits an obvious stock reaction compared to the full sample.

Regarding the post-announcement windows, the two-day event window [0, +1] shows positive cumulative average abnormal returns (CAARs) of 0.54%, statistically significant at a 5% threshold for the t-test, (also significant at 10%, considering the Wilcoxon test). Similar results are shown for the day following the Imams' announcement [+1].

Over the pre-announcement windows, as well as over the symmetric event windows surrounding the event, we cannot conclude a significant stock market reaction. Therefore, we can infer from these results that the stock market response over the post-event period is due to the Imams' announcements, which do not seem to be anticipated.

Table 6: Test of the cumulative average abnormal returns (CAARs) associated with Imams' announcements: upgrades from Sharia-compliant firms to non-Sharia-compliant firms.

Windows	Full Sample				Untaminated sample			
	N	CAARs	t-test	Wilcoxon	N	CAARs	t-test	Wilcoxon
[-5, +5]	133	0.02%	0.040		83	-0.02%	-0.043	
[-1, +1]	133	0.12%	0.450		83	0.50%	1.401	
[-5, -1]	133	0.07%	0.241		83	0.03%	0.067	
[-1, 0]	133	0.00%	0.002		83	0.12%	0.359	
[0]	133	-0.01%	0.045		83	0.16%	0.737	
[0, +1]	133	0.11%	0.540		83	0.54%	2.036**	*

[+1]	133	0.12%	0.864		83	0.38%	2.112**	*
[+1, +3]	133	0.27%	0.978		83	0.09%	0.240	
[+1, +5]	133	-0.05%	-0.126		83	-0.21%	-0.422	
[+1, +7]	133	-0.29%	-0.627		83	-0.63%	-1.004	*

\*\*\*, \*\*, \* significance at 1%, 5%, 10% respectively.

#### 4.2.3 Key results

We can infer from this event study that religious announcements may be considered as a signal that is interpreted by investors and impacts their behaviour. The stock market reaction is in line with the expected direction, regarding what was explained in the previous section.

The Imams' "downgrades" are associated with a negative stock market response, thus conveying informational content about the firms' religious orientation. We can assume that some of the investors, the ones who feel concerned by the legitimacy of the stock from a religious perspective, tend to get rid of the stocks of firms classified as non-Sharia-compliant as soon as they receive a downgrade.

By extension, this finding is also in line with the work of Ibnrubbian (2012), who concludes that investors in Saudi Arabia have a preference to invest in Halal sectors (where the majority of firms are considered as Sharia-compliant).

While less obvious, the Imams' upgrades are associated with a positive stock reaction, which indicates that these announcements also convey valuable information to the market and are interpreted as a signal about firms' Islamic orientation. Hence, this finding supports our hypothesis that upgrade announcements by Imams are likely to affect the market positively. One possible explanation of this weaker reaction to religious upgrades (compared to that arising after downgrades) could be that investors need time to analyse the stocks from a financial point of view after the removal of the religious barrier before deciding whether to buy them (assuming that those stocks were not considered as a possible choice of investment amongst highly religious investors prior to the religious upgrade).

## 5. Conclusion

Both the cultural or religious environment and the predominance of individual investors are crucial characteristics to better understand the Saudi Stock Exchange (Tadawul) dynamics and behaviour. This study aimed to better evaluate the influence of the Islamic religion on financial investors' decisions. We first investigated, through a questionnaire distributed to individual investors, to what extent their religious concerns could affect their financial decisions. Then, we assessed the influence of Imams' opinions (announcements by Islamic scholars) on stock prices, by implementing an event study covering all of their announcements for the listed firms on the Saudi Stock Exchange "Tadawul" over the 2004-2016 period.

The questionnaire analysis highlights that "high religiosity" may lead individual investors to follow Imams' announcements. Besides, the religious factor is likely to affect their willingness to buy, sell or keep the financial securities in their portfolio, depending on the

“religious status” of the issuer. Consequently, it may also affect the market value of these securities.

Next, the results of the event study confirm that religious downgrades (re-classification from Sharia-compliant firms to non-Sharia-compliant) are significantly followed by a negative stock reaction, while upgrades (re-classification from non-Sharia-compliant firms to Sharia-compliant) induce a positive stock market response. These findings confirm that such religious announcements convey informational content, which may be a key factor to better understand the dynamics of the Saudi stock market, apart from economic and financial information. These findings are important to take into account, especially for foreign investors who are gradually starting to invest in the Saudi market, considered as an “accessible emerging market” since 2015. Moreover, religiosity and its consequences on investors’ behaviour may also affect firms’ financial characteristics: for instance, the investors’ decision to hold, buy or sell securities for religious considerations may affect the profitability, the financial risk or the ability for a company to raise funds. As a consequence, it should be noticed that the link between religiosity, investors’ behaviour and finance is also worth to be closely studied by information providers, such as external financial analysts and Credit Rating Agencies.

Finally, regarding the limitations and implications of this study, we should recognize that some of the results could have been even more conclusive with an increased availability of information. More specifically, the linkage between the behaviour of the individual investors (captured by the questionnaire) and the market reaction associated with the Imam’s announcements would have been strengthened, if we could identify the daily trading percentages for each of categories of market participants (individual investors versus institutional investors). Such data would have been worth, to more clearly confirm or infirm some of our assumptions, especially regarding the magnitude of the reaction to religious information. It would also allow the researchers to better assess the timeliness and the temporality of the market reaction, and to check whether the individuals were the first to react to the Imams’ announcements, and among them, those who could be considered as “highly religious”. Unfortunately, despite the demand addressed to the Saudi Capital Market Authority, we could not obtain these detailed information.

A larger panel of countries would also improve the assessment of the relationship between the importance of individual investors, their sensitivity to religious announcements and their impact on financial decisions. It would have been interesting to enlarge this study to other Gulf Council Countries’ (GCCs), especially to those where the percentage of individual investors is significantly lower than on the Saudi financial market. However, such “authorized Imams” opinions with official disclosure do not exist in other GCCs, which prevents a larger market event-study to be implemented.

Despite these methodological limitations, this study should be read as a useful basis for further research on the topic of religiosity, financial behaviour and market reactions to religious information

## APPENDICES

### Appendix 1:<sup>12</sup>

Question 9 from the questionnaire, used as a reference to distinguish the highly religious investors from the less religious investors:

In which types of company do you trade?

1. I trade only in Sharia-compliant firms.
2. I trade only in non-Sharia-compliant firms.
3. I trade in both Sharia-compliant and non-Sharia-compliant firms.

Question 10 from the questionnaire:

Prior to participating in IPOs or purchasing shares, to what extent do you seek the announcements of the authorised Imams regarding the list of Sharia-compliant firms?

1. Always.
2. Often.
3. Sometimes.
4. Seldom.
5. Never.

Question 11 from the questionnaire:

Suppose you were currently trading on a company's shares, and one of the authorised Imams announced that the firm was becoming non-Sharia-compliant that year; however, you considered that the investment in this company was still profitable from a financial point of view. What would you do?

		Absolutely not	Probably not	Possibly	Probably yes	Absolutely yes
a	You keep investing in this company.	○	○	○	○	○
b	You sell this company's shares and buy shares in another Sharia-compliant firm.	○	○	○	○	○

c	You sell this company's shares and buy some in any firm, either Sharia-compliant or not.	○	○	○	○	○
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Question 17 from the questionnaire:

Hypothetically, if you are investing/trading in Sharia-compliant firms and, at one point, all of the Sharia-compliant firms are downgraded by the credit rating agencies operating on the Saudi market (Standard & Poor's, Moody's, Fitch), due to an increase in the risk of these companies, what would you do?

		Absolutely not	Probably not	Possible	Probably yes	Absolutely Yes
a	You keep your investments in these firms (Sharia-compliant firms).	○	○	○	○	○
b	You move your investments to non-Sharia-compliant firms, that did not experience the same downgrade by the CRAs.	○	○	○	○	○
c	You may leave the stock market and change the investment field.	○	○	○	○	○

<sup>12</sup> The entire questionnaire is larger and consists of 29 questions, which cover other problematics in the Saudi market. It is not reproduced in this

article, and only questions of interest for the present study are detailed. The full survey is available upon request.

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