Fall 2020

Saudi Stock Market reaction to Different Major Events

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By

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A dissertation submitted to the Faculty of Claremont Graduate University in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Economics.

Claremont Graduate University

2020

APPROVAL OF THE REVIEW COMMITTEE

This dissertation has been duly read, reviewed, and critiqued by the Committee listed below, which hereby approves the manuscript of Ahmed Aljarba as fulfilling the scope and quality requirements for meriting the degree of Doctor of Philosophy in Economics.

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Abstract

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This study implements event study analyses to investigate participants' reactions to nine different, important events impacting the Saudi Arabian stock market. It analyzes the dynamics of security prices in the Saudi Arabian stock market during the first five days surrounding the event dates. I tested the significance of abnormal returns and cumulative abnormal returns of all the 20 sectors during the (-5,+5) days event window. I found that the market participants react both positively and negatively to different events examined in the study, which was reflected in both the positive and negative cumulative average abnormal returns. The results could be a crucial contribution to the literature, which lacks empirical analyses that study financial market responses to different important events in Saudi Arabia. The results also provide some insights about market reaction in Saudi Arabia during different atypical situations and could be an important toolkit for investors in different sectors of the Saudi stock market and allow them to identify when to hedge risk.

Acknowledgements

I am very grateful to all those who have helped me during this long journey. I would like to thank my parents for their endless love and support. Indeed, thank you will not be enough for what they have done for me and I would not have become the man I am today nor have successfully finished this journey without them.

To my faculty members, I thank you for your guidance and support. A special big thank you to my amazing chair and advisor Dr. Paul Zak for being a great coach. Without his tremendous support, guidance, feedback, and encouragement, this PhD would not have become a reality.

Lastly, to my wonderful friends and colleagues, I think you all for helping and supporting me through all the challenges in this journey. I am going to miss the long nights working together on projects, our discussions, and all the fun we have had over the years.

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CHAPTER 1

INTRODUCTION

This study will examine the impact of major events on the Saudi stock market. It is an event study that examines the impact of nine major events on the Saudi stock market and analyzes the reaction of its sectors. The purpose of this study is to implement event study analyses for the dynamics of stock prices during a (-5,+5) days window surrounding the event dates. I tested the developments of stock price returns for the firms acting in different sectors of the Saudi Arabian market in response to nine different events. The research will allow one to study how the Saudi stock market digests information and what information effects the market and how. By looking at the daily Cumulative Average Abnormal Returns (CAAR) and the Average Abnormal Returns (AAR) of each sector during the event window, I can find which events would have an impact on the market. as well as which sectors are more responsive to new information and events. The study will help us better understand the Saudi stock market in comparison to more efficient markets, such as the U.S. Stock market. Analysis will be conducted on data for the time period 2002-2019, using the daily prices for all firms in the Saudi stock market and the Share Price Index TASI[1].

It is as important to understand the behavior of uncertainties and abnormal returns in the stock market as it is useful to assess regulatory proposals by policymakers and investors to implement hedging strategies. The purpose of the study is to examine the

[1] Tadawul is the sole entity authorized in the Kingdom of Saudi Arabia to act as the Securities Exchange (the Exchange). It mainly carries out listing and trading in securities, as well as the deposit, transfer, clearing, settlement, and registry of ownership of securities traded on the Exchange. (https://www.tadawul.com.sa/)

impact of major events on Saudi stock market returns. This study will make use of the explanatory approach so as to obtain deeper insights into phenomena, and to capture the stock market's abnormal returns.

The objective is to develop an understanding of the market's immediate reaction to various types of events in order to implement hedging strategies for portfolio managers and investors. This study will fulfill the quest to analyze the response of the Saudi stock market to changes to both internal and external events.

Conducting an event study requires an understanding of the efficient markets hypothesis (EMH), as well as the behavioral finance hypotheses. The EMH indicates that, regardless of the information that stock market participants may have, they should not be able to gain an abnormal profit because asset prices cannot be predicted. In other words, market prices fully reflect all the available information.

On the other hand, the main behaviorists' critique of the EMH--that all decisions by market participants are rational--is likely wrong. According to behavioral finance hypotheses, human decision-making under uncertainty can lead to several behavior biases, such as: overconfidence, overreaction, loss aversion, and herding. Therefore, market participants are often short-sighted with their decision-making strategy.

I chose the Saudi stock market because the Saudi Arabian economy is the largest economy in the Arab World with a GDP of USD 683.7 billion. Moreover, the Saudi stock market is the largest and most liquid in the Middle East and North African (MENA)

countries, accounting for 53% of the total of the Gulf Cooperation Council 's (GCC)[2] market capitalization. The next section provides an overview of the Saudi economy.

The Saudi Arabian Economy

Saudi Arabia is the largest country in the Gulf region with a population of 32 million, and the largest economy in the Arab World with a GDP of USD 683.7 billion. It is the only G-20-member country in the region. The Saudi Arabian Government (SAG) exercises control over the main economic activities of the country's oil-based economy. Saudi Arabia has almost 16% of the world's proven petroleum reserves, plays a principal role in OPEC, is one of the world's largest producers and exporters of crude oil, and is a large-scale oil refiner and producer of natural gas. According to *Forbes Magazine*, petroleum accounts for roughly 87% of budget revenues, 42% of GDP, and 90% of export earnings.

The Saudi Stock Market

The Saudi Stock Exchange, Tadawul, is considered the largest capital market in the Middle East and North Africa, and the Saudi economy is among the wealthiest economies in the Middle East. It has demonstrated sustainable high growth rates during recent decades. In 1980, the Saudi Stock Market was established by the Saudi Monterey Agency. In 1984, the government decided to create a committee that could develop and regulate the market efficiently. Capital Market Authority (CMA) was created by the government in the year 2003, and it became the market's sole regulator. Finally, four

[2] The GCC consists of six Arab states: Saudi Arabia, Kuwait, Bahrain, Qatar, the United Arab Emirates, and the Sultanate of Oman.

years later in 2007, the Tadawul All Shares Index (TASI) was established (*CMA Annual Report*, 2007).

Tadawul is the leading exchange market in the GCC countries, with a market capitalization that is three times greater than its closest peer. The Saudi stock market is the largest and most liquid in the Middle East and North African (MENA) countries, accounting for 53% of total GCC market capitalization. Tadawul's status as the leading regional exchange is demonstrated by the fact that 72% of the value traded across the region is carried out in Saudi Arabia (*Tadawul Annual Report*, 2017).

The Saudi stock market is the 23rd largest stock market among the 68 members of the World Federation of Exchanges and is the dominant market in the Gulf Cooperation Council (GCC), comprising 50.1% of total GCC market capitalization and 79% of value traded. The Exchange is the eighth largest stock market among its emerging market peers (Abokhodair, 2018). The offerings provided by Tadawul include mutual funds, exchange-traded funds, Islamic bonds, and equities. At present, around 187 companies are listed on the Tadawul for trading. The performance of companies that are listed on the Tadawul is tracked by TASI (*Tadawul Annual Report,* 2017).

Tadawul's sector classification adopts Global Industry Classification Standard (GICS) which was developed by Standard and Poor's (S&P) and Morgan Stanley Capital International (MSCI). Around 208 companies are listed on Tadawul and its market structure has 20 sectors; the first two largest sectors in terms of number of firms are the Materials and Insurance sectors (See table 1).

Table 1 – List of the Sectors

Sector	Number of Firms
Materials	44
Insurance	39
REITs	13
Banking	12
Capital Goods	12
Food & Beverages	15
Transportation	11
Consumer Services	10
Retailing	8
Health Care Equipment and Services	6
Real Estate Management and development	5
Consumer Durables and Apparel	6
Energy	7
Diversified Financials	5
Food & Staples Retailing	4
Telecommunication Services	4
Utilities	2
Media and Entertainment	2
Commercial and Professional Services	2
Pharma, Biotech and Life Science	1

LITERATURE REVIEW

Event studies originally developed as a statistical tool for empirical research in accounting and finance. Event studies have since migrated to other disciplines as well, including economics, history, law, management, marketing, and political science. Despite the elegant simplicity of a standard event study, variations in methodology and their relative merits continue to attract attention in the literature (Charles, 2011). Kothari & Warner (2006) stated:

> Even the most cursory perusal of event studies done over the past 30 years reveals a striking fact: the basic statistical format of event studies has not changed over time. It is still based on the table layout in the classic stock split event study of Fama, Fisher, Jensen, and Roll (1969).

The early literature on event studies includes a study of the impact of annual earnings announcements on stock prices and research of the announcement of stock splits on stock returns (Fama et al., 1969). Ball and Brown (1968) report that the difference between announced and expected accounting earnings has a positive impact on the abnormal performance index close to the annual report announcement date. Fama et al (1969) find that after a stock split announcement, stock prices tend to quickly reflect all the information and do not generate any abnormal returns. Their result demonstrates the efficiency of the capital market.

Efficient Market Hypothesis

It is important to understand the Efficient Market Hypothesis (EMH) when conducting an event study analysis. The reason for that is that the EMH indicates that stock markets are efficient and that prices reflect all publicly available information relevant to the prospects of the firm. Thus, the effect of an event will be reflected almost immediately in asset prices. This immediate reaction makes any link easier to establish than if I were examining, for example, profitability, which might require months or years of observation before the effects of the event were fully felt (Beverley, 2008).

The core idea of the EMH was first developed by Fama (1970). According to Fama, the efficient market hypothesis can be broken down into three different forms: weak form, semi-strong form and strong form market efficiency[3]. Essentially, the weak form hypothesis of the EMH states that the current market price for traded assets, such as

[3] Fama's (1970) review divides work on market efficiency into three categories: (1) weak-form tests (How well do past returns predict future returns?), (2) semi-strong-form tests (How quickly do security prices reflect public information announcements?), and (3) strong-form tests (Do any investors have private information that is not fully reflected in market prices?)

stocks, bonds and property, reflect all past publicly available information. The semi-strong hypothesis assumes that current market prices reflect all publicly available information and that prices will instantly change to reflect any new information that becomes available. The third strong hypothesis goes on to add that even hidden and insider information is instantly reflected in the market price.

Fama (1991) revised these three forms (1) tests for return predictability; 2) event studies; and 3) tests for private information) into the weak form, the semi-strong form, and the strong form, respectively. In conclusion, the EMH suggests that, regardless of the level of information that stock market participants may have, they should not be able to gain an abnormal profit because asset prices cannot be predicted.

Political and Economic Instability

A study conducted by Chan and Wei (1996) examined the impact of political news on the volatility of the Hong Kong stock market's returns. Their conclusion supported the fact that stock market returns are greatly influenced by the political news. If the political news is favorable, then it will generate positive returns, whereas if the political news is unfavorable, then it generates negative returns (Chan and Wei, 1996)**.** Perotti and Van Oijen (2001) conducted a study that included various emerging markets in which they examined the effects of political changes in local stock market returns. They concluded that excess returns were changed drastically when a political risk increases or decreases. Their results indicate that cross-sections of returns are majorly affected by political risk.

Most prior research that has studied the impact of events on stock market returns remains concerned with the political and economic changes that take place on a global level. There is a limited amount of research that has compared and examined the impact

of different events that have different characteristics on stock market returns. This research is even more significant given the important role that Middle Eastern countries like Saudi Arabia are playing in the world economy.

Aggarwal (1999) examines 10 of the largest emerging markets in Asia and Latin America, as well as in the U.S and some European countries. The study examines shifts in the volatility of emerging stock market returns and the events that are associated with the increased volatility. They found that the large abnormal returns seem to be related to important, country-specific political, social and economic events. Also, they found that the number of changes in variance differs from country to country and also the frequency of the date can cause more change points; daily returns have more change points than weekly or monthly returns.

This research will reflect on the behavior of the Saudi stock market in relation to economic and political events, both external and internal. Also, it is important to mention that since around 87% of the Saudi Arabian budget revenue comes from oil production, the dependency on oil makes it vulnerable to the shocks that disrupt the volatile oil market.

Since stock markets react to some new information and events, it is relevant to shed some light on behavioral finance. Market participants make decisions when events occur or new information comes to light. Thus, behavioral evaluation is essential. Behavioral finance theory goes against the EMH hypothesis that market participants react rationally and logically. According to Bird, Du and Willett (2017), behavioral approaches suggest that market movements can be generated by some forces, such as swinging between

optimism and pessimism, which could discount the impact of good news (positive events) during bad times and discount bad news (negative events) during good times.

Also, market participants do not always react to new information in proper proportion as the EMH implies. Lo (2007) notes that in some cases market participants may overreact to events by selling stocks that have experienced recent losses or by buying stocks that experienced recent gain. Therefore, "overreaction tends to push prices beyond their 'fair' or 'rational' market value, only to have investors take side of the trades and bring process back in line eventually" (Lo, 2007).

The Saudi Stock Market (Previous Research)

Most of the research that has been done on the Saudi stock market studied the relationship between oil prices and the stock market or between macroeconomic variables and the stock market index, TASI. For instance, Cheikh, N., Naceur, S, Kanaan, O and Rault (2018) examine the effect of oil price changes on GCC stock markets. The results recorded stock markets' heterogeneous reactions across GCC countries. They found a significant asymmetry in the relationships between oil prices and stock markets in some GCC nations (Kuwait, Oman, and Qatar), but not in others (Bahrain, Saudi Arabia, and the UAE). Furthermore, AlShogeathri (2011) investigates the long term and short run relationships between Saudi stock market returns and eight macroeconomic variables. He finds that, first, Saudi stock market returns behaved randomly, and the previous returns positively affected the current stock market returns in the Saudi economy. Second, the volatility of Saudi stock market returns was affected by past volatility[4] more than by

[4] "The prediction of stock market returns may become difficult as the volatility of macroeconomic variables increases in the short run. In other words, the more volatile the macroeconomic variables are, the more difficult it is to predict stock market returns in the Saudi economy" (AlShogeathri, 2011).

related news from the previous period. Third, there was a direct relationship between the volatility of the Saudi stock market returns and the short run deviations of the macroeconomic variables in the system.

Regional Events

The Arab Spring is a civil uprising movement that started in Tunisia in December of 2010 and quickly spread, causing political uncertainty in neighboring countries. This movement not only impacted the Arab World economically and politically, but also the whole world since many countries around the world have trade relations with countries in the Middle Eastern region. The main causes of the Arab Spring were economic conditions, high unemployment rates, high corruption rates and the lack of democracy and freedom of speech. All of the countries in the Arab World have been affected by the unrest in some direct or indirect ways. Some of the most dramatically affected countries are Tunisia, Egypt, Libya, Bahrain, Syria and Yemen. Although this movement has been going on for over seven years, the region is still under a political uncertainty that remains unpredictable.

There is limited research that studies the relationship between political uncertainty and stock market returns in the Arab World. Chau, F. D., Deesomsak, R. and Wang, J. (2014) have examined the impact of uncertainty caused by the Arab Spring on the major stock markets in the Middle East and North Africa (MENA). The findings indicate that the Arab Spring has contributed to the volatility of MENA stock market returns, especially for the Islamic indices; however, there is little or no significant impact on their interaction and integration with the World market.

Another study was conducted by Hammoudah and Li (2008) to examine sudden changes in volatility in the returns of five Gulf area and Arab stock markets. They concluded that most of the sudden changes for the GCC markets are due to global events, specifically the 1997 Asian crisis, the 1998 Russian crisis, the collapse of oil prices at the end of 1998, the 2000 adoption of a new oil pricing mechanism by OPEC and the September 11th attack. However, there are other studies that show a positive relationship between the Arab Spring and changes in stock market returns in the MENA countries. For instance, Mnif (2015) study the effect of political uncertainty (during and after the revolution of the Arab Spring) on stock market crises in MENA countries. Their results are consistent with previous studies showing that political uncertainty contributes to financial instability.

CHAPTER 2

METHODS

Data Description

The data used in this study is collected from the Wharton Research Data Services (WRDS) for all firms in the Saudi Stock Market from the period 2002 to 2019. Also, the daily Saudi Share Price Index TASI was obtained for the same time period. The daily observations were drawn from both the firms and index closing prices. The analyses are implemented on the pool of 208 companies from 20 different sectors for the period from 01 January 2002 to 04 March 2019.

Event Study Methods

Generally speaking, an event study analysis aims to determine if an event or announcement caused an abnormal movement in asset prices or a market. According to the literature, the majority of event studies use expected return models such as the Expected Return Model, the Market Adjusted Model, the Comparison Period Mean Adjusted Model, the Market Model with Scholes-Williams beta estimation, the Market Model with GARCH, Fama-French 3 Factor Model, and the Fama-French-Momentum 4 Factor Model.

In this study, I will be conducting an event study analysis in order to examine the impact of nine major events (see table 2 below) on each sector in the Saudi Stock Market (20 sectors). It is important to see whether the impact of these major events was positive or negative on each sector in order to understand the behavior of the market and perhaps forecast its reaction when the market faces similar events.

Table 2: List of the Examined Events

Event #	**Event Description**	**Event Date**
E1	The Capture of Saddam Hussein	13-Dec-03
E2	Lehman Brothers Files for Bankruptcy	15-Sep-08
E3	Muammar Gaddafi shot dead	20-Oct-11
E4	A Saudi Military Intervention in Yemen	25-Mar-15
E5	MBS Announced ARAMCO IPO	14-Jun-15
E6	Trump Wins the Presidential Election	8-Nov-16
E7	Restoring bounces and allowances for state employees announced	24-Apr-17
E8	Appointment of MBS as a crown prince	21-Jun-17
E9	Saudi Arabia Admitted Khashoggi Killing	20-Oct-18

The list of the events I considered include not only an important domestic occasion for Saudi Arabia, but also regional events, like the killing of the Libyan president Muammar Gaddafi, as well some global events, including the bankruptcy of Lehman

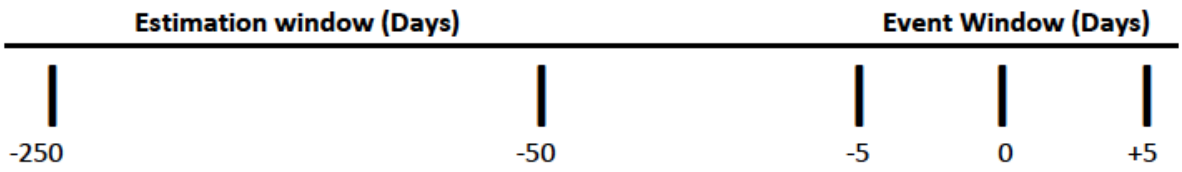
Brothers and Trump's victory in the US elections. In this way, I aim to check the market reaction in Saudi Arabia and its resilience towards both economic and political domestic and external shocks. This method will also enable me to implement comparisons of the responses to different important regional and global events for the expectations of market participants in Saudi Arabia, neighboring countries and global economies. Table 3 shows the importance of these events.

Table 3: Events Description

Event Number	The Importance of the Events	Type
E1	Saddam was the first Arabic leader who captured and put into custody by a foreign country.	Reginal/Political
E2	Lehman Brothers was the 4th largest investment bank in the U.S. and its collapse was the major results of the subprime mortgage market breakdown.	Global/Economic
E3	Saudi and Libya are neighbor oil producing countries. Gaddafi was the first Arabic leader who was captured and assassinated by his own people.	Reginal/Political
E4	The Saudi military intervention in Yemen was a surprise event for both the Saudi and Yemeni people.	Local/Political/Economic
E5	Aramco is one of the largest companies in the world by revenue. Aramco IPO is one of the biggest economic events in the history of the Saudi economy	Local/Economic
E6	Trump is a controversial leader who announced in his campaign some foreign policies that would affect middle eastern countries such as: withdrawal from Obama's nuclear agreement with Iran.	Global/Political
E7	Public sector workers represent a large percentage of employees in Saudi Arabia with higher rewards in comparison to private sector employees.	Local/Economic
E8	The appointment of such a young crown prince was unusual in Saudi history, and for a long time this event was in the headlines internationally.	Local/Political
E9	The assassination of Khashoggi captured international attention which had an impact on the Saudi relationships with other countries and its economy.	Local/Political

The events have been selected because they are major events for Saudi investors and I wanted to examine and see whether the market would react to these events and if so, what was the size of the reaction for each sector in the market by taking the AARs into account in our analysis. Further, in the empirical results section, I will talk more about the importance of these events for the region and the Saudi stock market.

In this study, the traditional event study methods of the market model will be used in order to conduct this event study analysis. The study uses daily returns from -250 to -50 relative to the event date as the estimation window. The assumption is that 50 days and more prior to the event day are not affected by the event because it is too far from it. The event window that the study uses is – 5 to 5, relative to the event date at day 0, as in the diagram below:



The study focuses on event effects for a short-horizon (five days) around an event to examine immediate reaction of the market or a security. According to Kothari and Warner, short-horizon methods are relatively straightforward and trouble-free in comparison with long-horizon methods which have some limitations such as lack of reliability. Also, short-horizon methods provide information about market efficiency and represent the "cleanest evidence we have on efficiency" (Fama, 1991, p. 1602).

I start our model with securities share prices and market daily prices converted to daily returns through the following formulas:

$$R_{it} = log\left(\frac{P_{it}}{P_{it-1}}\right) \qquad (1)$$

$$R_t^m = log\left(\frac{P_t^m}{P_{t-1}^m}\right) \quad (2)$$

Where P_{it} is the closing price of share i at day t, P_t^m is the market price at day t, R_{it} and R_t^m are the corresponding daily returns at day t for security i and the market returns correspondingly.

According to the market model the returns on a given security i are regressed against the market returns using ordinary least squares (OLS) estimator. Then the abnormal returns, AR_{it}, for an individual security at day t, is calculated as the difference between the observed returns, R_{it}, and the predicted returns using the OLS regression, $\hat{R}_{it}$:

$$R_{it} = \alpha_i + \beta_i R_t^m + \varepsilon_{it} \quad (3)$$

$$AR_{it} = R_{it} - \hat{R}_{it} \quad (4)$$

With this approach the effects of total economic factors are removed from the returns of the individual stocks, leaving only the portion of the return explained by the firm specific information.

After this step, the daily Average Abnormal Returns (AAR_{it}) will be calculated for each day in the event window (-5, +5). This gives us the total ARs for all N securities in a sector to find the daily AAR at each time *t,* as in equation (5):

$$AAR_{it} = \frac{1}{N}\sum AR_{it} \quad (5)$$

Next, the sum of the AAR_{it} over the t days in the event window will be calculated for each sector and based on each event in order to conduct the daily cumulative average abnormal return ($CAAR_i$):

$$CAAR_i = \sum AAR_{it} \quad (6)$$

AAR_{it} and $CAAR_i$ values are calculated for the defined event window around the event day, $t = 0$. The information of the pre-event days is also considered, as the price movements prior to the event may also be observed as a consequence of inside information or rumors. For this purpose, I consider a (-5,+5) event window for estimation of AARs and corresponding CAARS.

Finally, the hypotheses related to market reaction are tested based on the significance tests for AAR and CAAR values. The test under the null hypothesis of no significance in AAR and CAAE values is implemented, using t-test and assuming cross-sectional independence (Serra, 2004). The choice of the t-test for the baseline analyses is motivated mainly by the fact that alternative tests give similar conclusions for this type of event study.[5]

I use the corresponding AAR and the CAAR values to test the null hypothesis of no average and abnormal returns during the event window. The rejection of the null hypothesis is the sign that there was a significant reaction by the market participants to the event during the specified event window, which resulted in the significant deviation of the actual returns from the expected returns.

I am aware of the potential problems in the hypothesis testing I employed. In particular, in addition to potential endogeneity issues coming from the omitted variable bias, the abnormal return estimators may suffer from the autocorrelation or heteroskedasticity issues. The estimated residuals may vary over time due to the time dependency, or the error variance may be greater during the event period than in the

[5] (Brown & Warner, 1980) Crude dependence adjustment test and (Kolari & Pynnonen, 2010) test of standardized residuals corrected for event-induced changes in volatility and cross-correlation are also employed, but the general conclusions do not change much.

surrounding periods. The literature suggests various approaches to correct for these problems; nevertheless, as mentioned by Binder (1998), often many of these problems in event study literature can simply be ignored because, in practice, they are quite minor. Thus, I consider the results of my analysis robust and draw conclusions based on them.

The results of the significance tests enabled me to draw conclusions about the validity of the efficient market hypothesis in Saudi Arabia and discuss the expectations of investors in response to different important events.

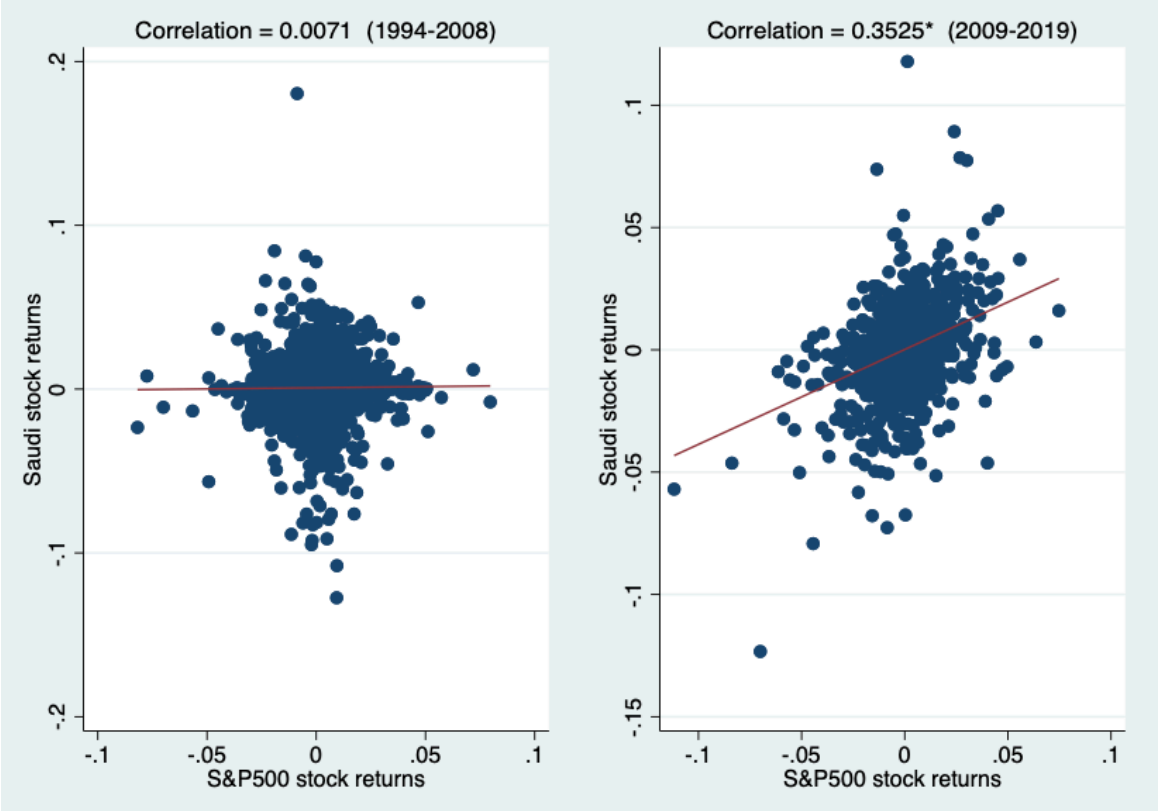
CHAPTER 3

Empirical Findings

Impact on the Overall Saudi Stock Market

This section summarizes the empirical findings and explores the reaction of the Saudi stock market to different economic and political events, originated both globally, as well as from the Saudi kingdom and the neighboring states (see the list in table 4). The motivation for using global events, particularly those originating in the U.S., stems from the association between the U.S. and Saudi stock markets. Figure 1 below illustrates the scatter plots and linear regression line between the U.S. and Saudi stock market index returns for pre- and post-2008 recession periods, as well as the pair-wise correlation coefficients.

Figure 1 – The association between the U.S. and Saudi stock markets



Note: (*) indicates $p \leq 0.05$.

As can be observed, for the pre-2008 recession period, the correlation was positive but very low and non-significant. However, for the post- 2008 recession period, the observed correlation coefficient is both statistically significant (according to the t-test, significant with 95% confidence level) and significantly higher at 0.35.

Rehman, Hazazi and Programe (2014) noted that the findings are consistent with the literature as they apply to the Pearson Correlation, Unit root, Johansen Co-integration, and Pairwise Causality tests for two periods between 2004 and 2013. They find that the Saudi Stock Market Index (TASI) increased the integration with the major stock markets, including the U.S. stock market. The existence of a long-running relationship between the Saudi and U.S. stock markets is also found by using the Johansen Co-integration approach

(Mohammed, Abdalhafid, & Ahmed, 2020). More details on the link between the two markets and the existence of a contagion effect on U.S. based stocks are discussed in future paragraphs on these particular events.

By the use of event study methods, I estimate and explore the response of the overall market participants and the abnormal returns' behavior during the (-5,+5) event window around the date of the examined events. For the given event window, I first estimate AAR and CAAR values for each event, using a market adjusted model, then a t-test is applied to check the statistical significance of the estimated AAR and CAAR values. This section outlines the general conclusions deduced by an investigation of the consequences of the nine examined political and economic events on the overall Saudi stock market.

The results of the estimated cumulative average abnormal returns for different tested events are summarized in table 3, as well as displayed in figures 2-10 for each day of the event window. The findings reveal that all together only two out of the 9 studied events have, according to a t-test, statistically significant estimates of the cumulative average abnormal returns at the end of the event window. In particular, significance is observed only for the "Lehman Brothers Files for Bankruptcy" and "Appointment of MBS as a Crown Prince" events.

Table 4 – CAAR values for the 9 events

Event #	Event description	CAAR
1	The Capture of Saddam Hussein	0.22%
2	Lehman Brothers Files for Bankruptcy	-2.00% (*)
3	Muammar Gaddafi Shot Dead	0.86%
4	A Saudi Military Intervention in Yemen	-0.45%
5	MBS Announced ARAMCO IPO	-0.70%
6	Trump Wins the Presidential Election	0.31%
7	Restoring Bounces and Allowances for State Employees Announced	0.54%
8	Appointment of MBS as a Crown Prince	-4.74% (*)
9	Saudi Arabia Admitted Khashoggi Killing	1.04%

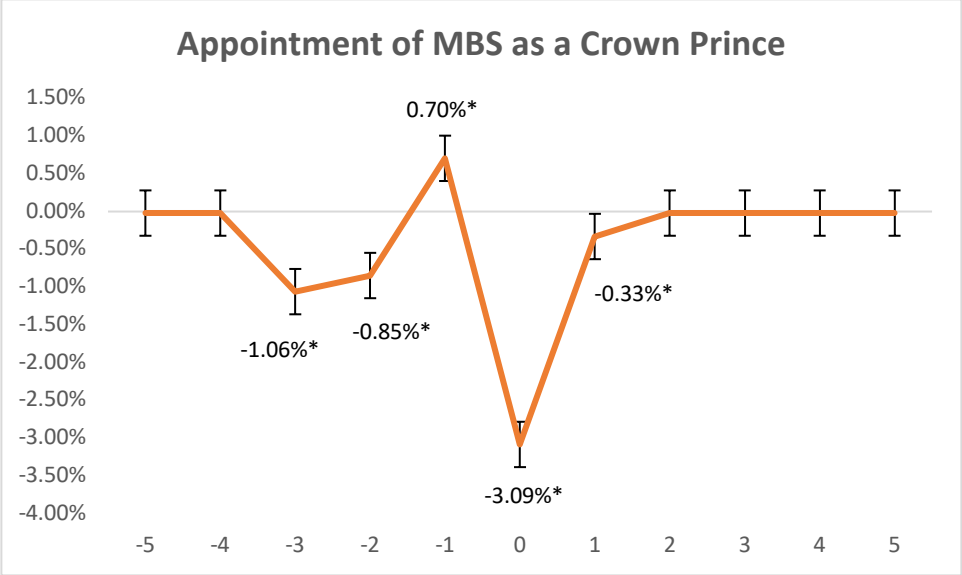
Note: (*) indicates $p \leq 0.05$.

For the "Appointment of MBS as a Crown Prince" event, the cumulative average of the abnormal returns is about -4.74 %, which means the actual market returns appeared to be substantially smaller than the expected ones. The abnormal returns displayed negative values for both pre- and post-event dates, except the day before the event happened (see figure 2). The highest negative AAR value was observed for the event day, -3.09 %. The AAR values appeared significant during the days close to the event day, at the window (-3,1).

The new Crown Prince was widely believed to be the main force behind the revolutionary reforms intended to liberalize conservative Saudi Arabia both socially and economically. These reforms were highly acclaimed by Western leaders. He initiated the ambitious Vision 2030 program and proposed to lead the oil dependent Saudi economy to diversification and sustainable development in the long horizon (Bouoiyou & Selmi, 2018). Still, under other conditions, the new Crown Prince was criticized for having his name connected to a number of events. Most importantly, as the minister of defense, he initiated the Saudi-led military intervention in neighboring Yemen in 2015, and was criticized for the overwhelming consequences of the war on the Saudi economy (Luay, 2015). Also, the

killing of journalist Jamal Khashoggi has led to massive withdrawals from the Saudi Future Investment Initiative (FII) summit called 'Davos of the Desert' (Bouoiyou & Selmi, 2018).

Figure 2 – AAR values for event 8



Note: (*) indicates $p \leq 0.05$.

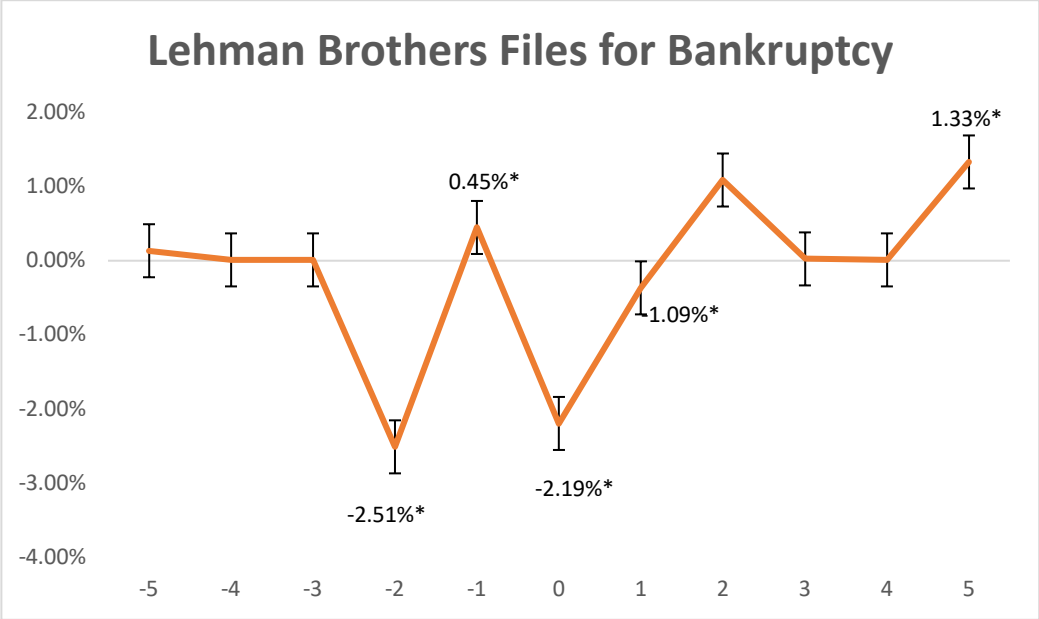
Negative and significant cumulative average abnormal returns are also found for the "Lehman Brothers Files for Bankruptcy" event. The estimates of CAAR values for this event is about -2.00 %. For the 2008 global financial crisis event, the estimates of abnormal returns display both negative and positive AAR values, but the magnitude is much higher for the negative values. The highest negative and significant value is seen at the second pre-event day, -2.51 %, which was followed by a small positive AAR value. Once again, a big negative AAR value emerged at the event day, -2.19 % (see figure 3).

The negative consequences for this event are expected and correspond with the general findings by many scholars. Despite the capital controls, the global financial crisis highlighted the substantial amount of risk that contagion from the collapse in the U.S. stock market posed to the Saudi stock market (Lagoarde-Segot & Lucey, 2009). Khallouli and Sandretto (2012) also observed significant evidence of negative risk contagion.

Nevertheless, the collapse in the Saudi market is believed to have an indirect effect on developments in the international oil markets, rather than the direct contagion of the global financial crisis from the U.S. to the Saudi economy (Moosa, 2010; Ghorbel and Boujelbene, 2013; Samarakoon, 2011).

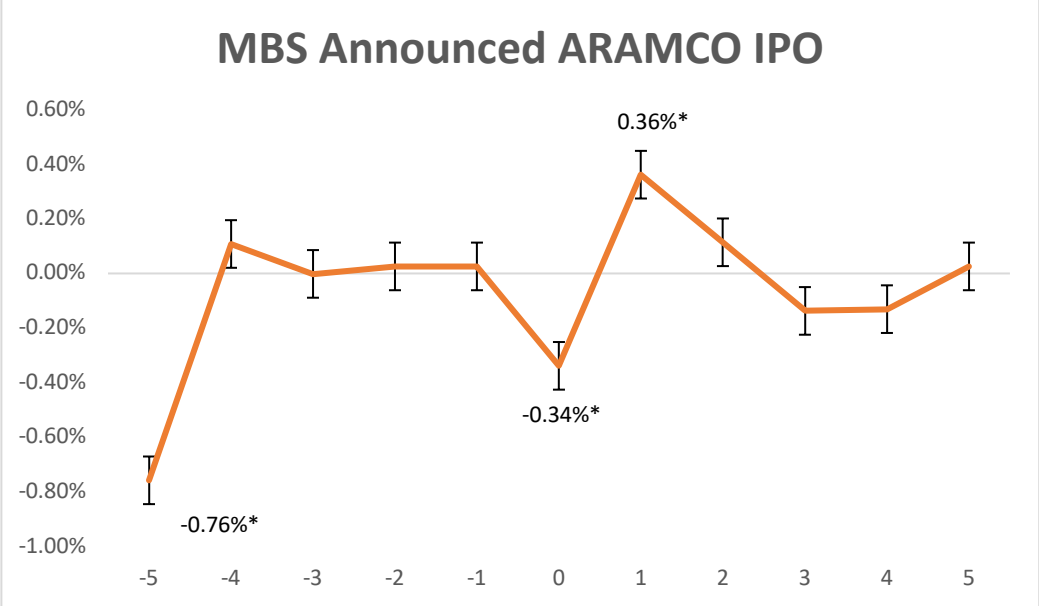
For the "MBS Announced ARAMCO IPO" event, the estimates of CAAR value are not significant, about -0.7 %. The significance of AAR values is only seen on the first day of the event window, during the event day and the next day of the event (see figure 4). For the first two cases the estimates are negative. The IPO of oil producing giant ARAMCO was believed to lead to Saudi Arabia's loss of its central role within OPEC, resulting in significantly less influence on world oil prices (Boslego, 2017; Praveen & Ruiz, 2017). There was also evidence of rising complaints, specifically the fear that the country's most important company was sold to foreigners cheaply (Shamseddine & Torchia, 2017). Finally, the successive achievements of the goals, the purpose of which the ARAMCO IPO was supposed to serve, were essentially depending on the effective transformations of the other sectors of the Saudi economy (Fattouh & Harris, 2017). Nevertheless, some other scholars were still optimistic about the privatization of the world's biggest oil producer and believed that the overall contribution in the long-term to the Saudi economy would be positive (Weijermars, 2020).

Figure 3 – AAR values for event 2



Note: (*) indicates $p \leq 0.05$.

Figure 4 – AAR values for event 5



Note: (*) indicates $p \leq 0.05$.

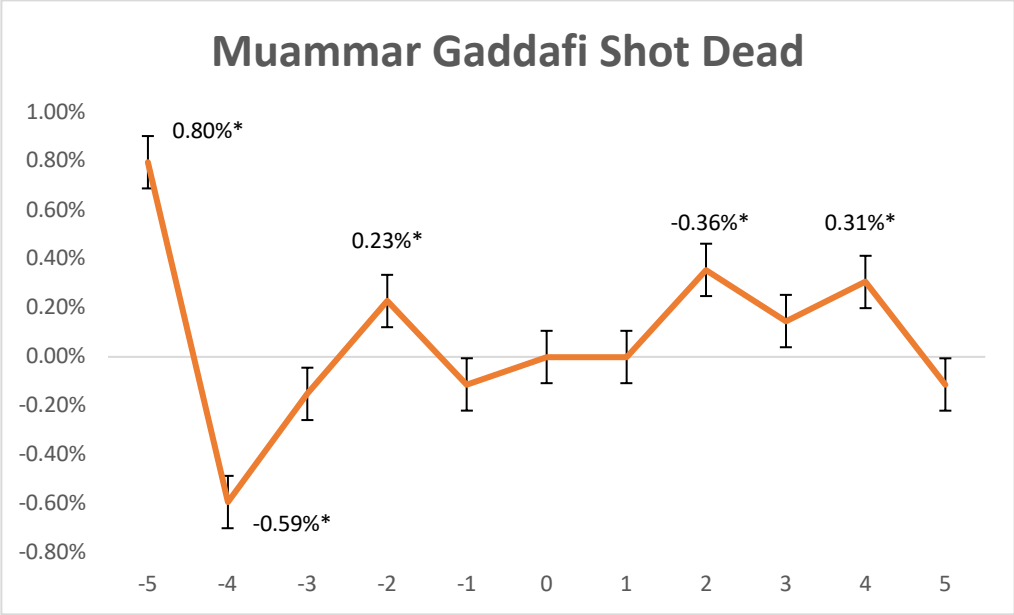
For the "Muammar Gaddafi Shot Dead" event, the estimates of CAAR value is about 0.86%, and for the "Saudi Arabia Admitted Khashoggi Killing" event, the estimate is

1.04%. Again, for both cases significance is not observed. For both events, the significance of AAR values is seen before and after the event day (see figure 5 and 6), signaling initial and delayed responses of the Saudi stock market to unexpected news. For the first event among the observed events, significant average abnormal returns occurred only for day -4. The AAR value is negative; for the rest, the values are positive, with the highest value observed for the first day of the window. For the second event, the highest positive AAR value was seen 3 days after the event, 2.73 %.

This result is explained by the positive expectations connected to these events. Despite the economic collapse in the neighboring country and negative spillovers from the revolution in Libya, Saudi Arabia was expected to be the first candidate taking Libya's lost share of the oil markets (Stankovska & Lavender, 2011). The gap in the global oil market that resulted from Libya's lost share significantly increased Saudi oil production levels (Energy Statistics of OECD Countries, 2011). Thus, overall it is believed that the overthrow of ex-dictator Muamar Gaddafi, and the consecutive events in Libya, had a positive impact on the Saudi Arabian economy (*Africa Economic Outlook*, 2012).

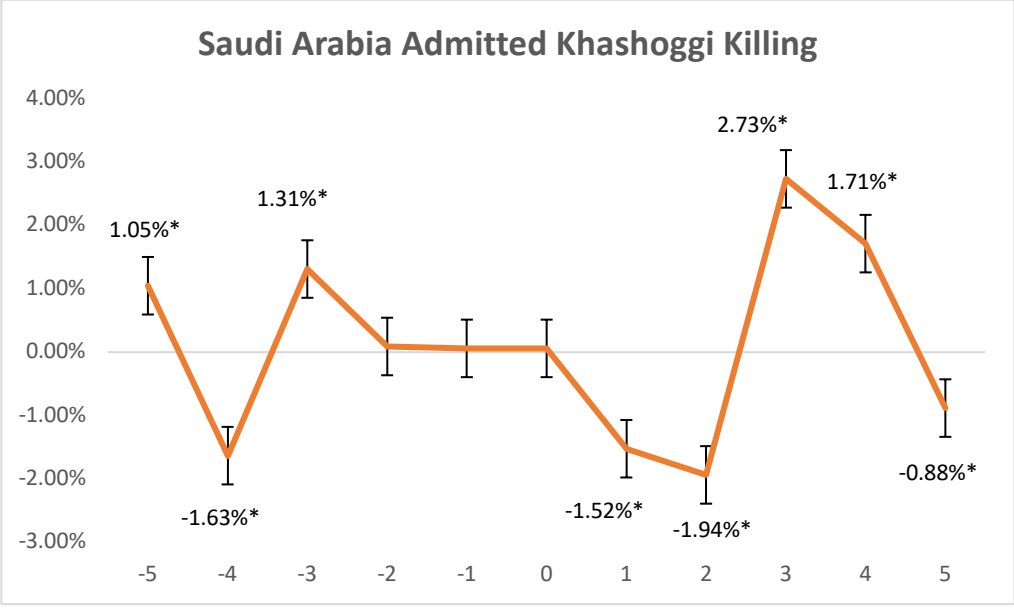
Furthermore, Khashoggi's tragic murder increased the possibility of distorting the strategic relationship of Saudi Arabia with the United States, and increased the further uncertainty around the future of the Saudi economy (Harrison, 2017). However, after the admission by the Saudi government of the tragic murder of the famous journalist, the feedback from the international community was mostly neutral, and did not seriously damage relationships with the U.S. government (Zahra & Ali, 2018). Accordingly, this event did not generate negative market consequences in the Saudi stock market.

Figure 5 – AAR values for event 3



Note: (*) indicates $p \leq 0.05$.

Figure 6 – AAR values for event 9

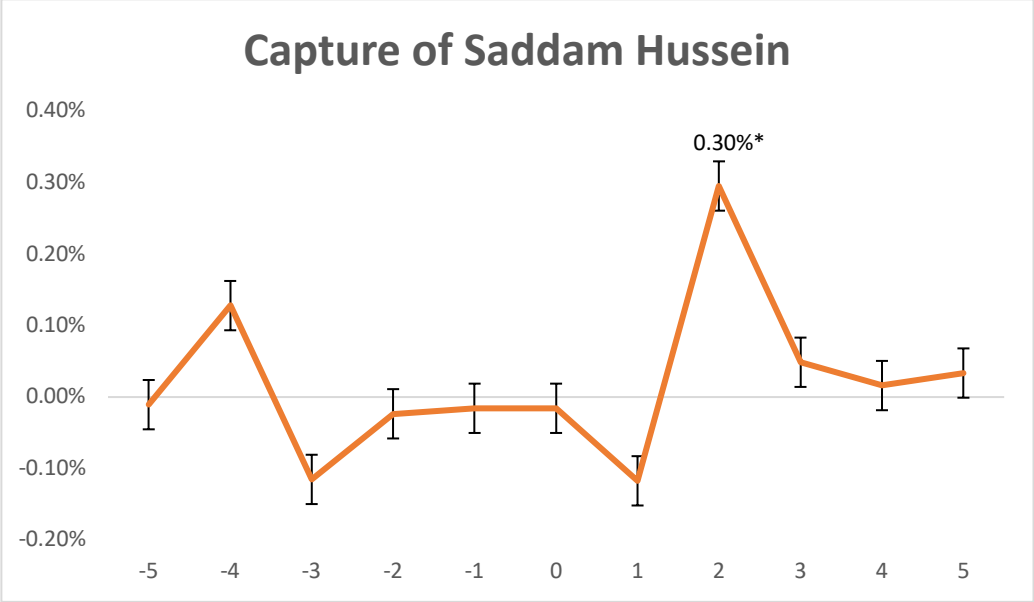


Note: (*) indicates $p \leq 0.05$.

For the rest of the examined events not only are the CAAR values insignificant, but also the significance of average abnormal returns was only seen during a few days of the examined event window (see figures 7, 8 and 9).

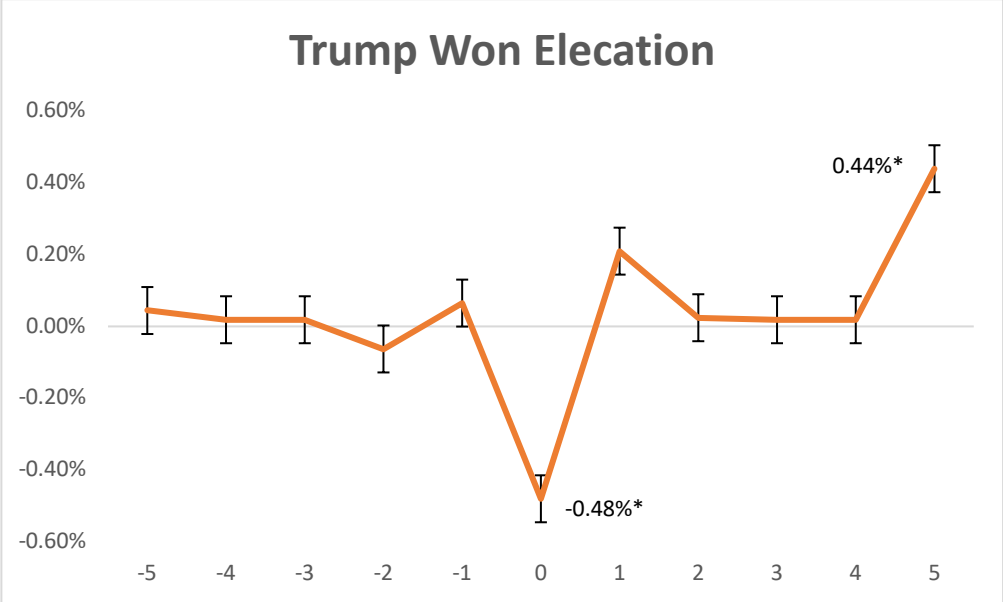
These results signal that the Saudi Stock market's results are uncorrelated with these international events, as well as the event of recovering the salary for state employees. Without a doubt, the capture of Saddam Hussain was expected and considered by the market participants, and the high possibility of the removal of the Iraqi dictator from power had been predicted since the summer of 2002 (Amihud & Wohl, 2004). Similarly, despite the huge uncertainty caused by the most unexpected election in U.S history, according to my results, there was no significant impact on the Saudi stock market. Finally, the recovery of the salary cuts for Saudi state employees was an indication of positive beliefs in the economy (Saudi Arabia's Economic Outlook, 2017). The positive CAAR values observed during the post-event period were mostly insignificant.

Figure 7 – AAR values for event 1



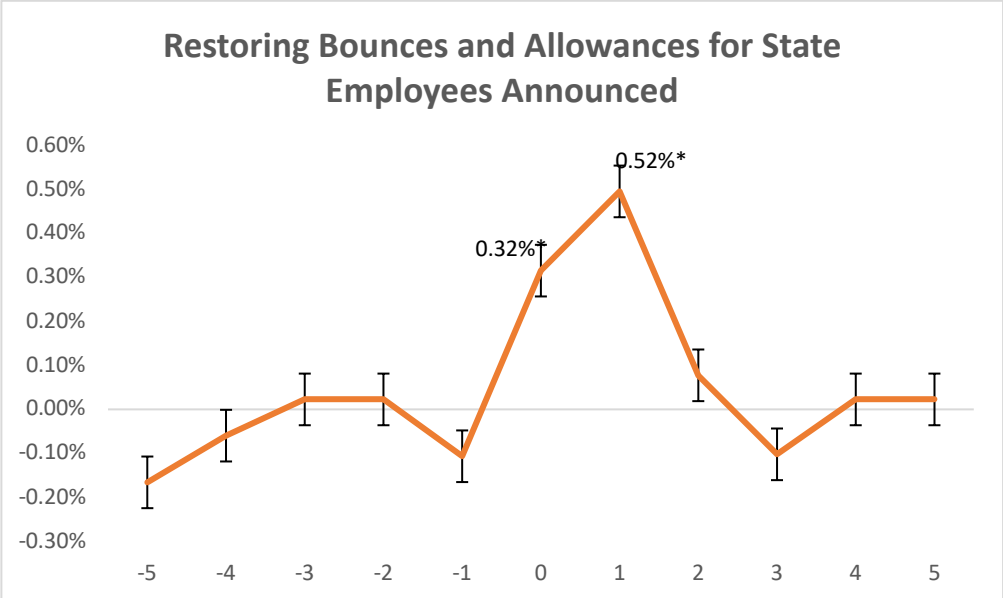
Note: (*) indicates $p \leq 0.05$.

Figure 8 – AAR values for event 6



Note: (*) indicates $p \leq 0.05$.

Figure 9 – AAR values for event 7

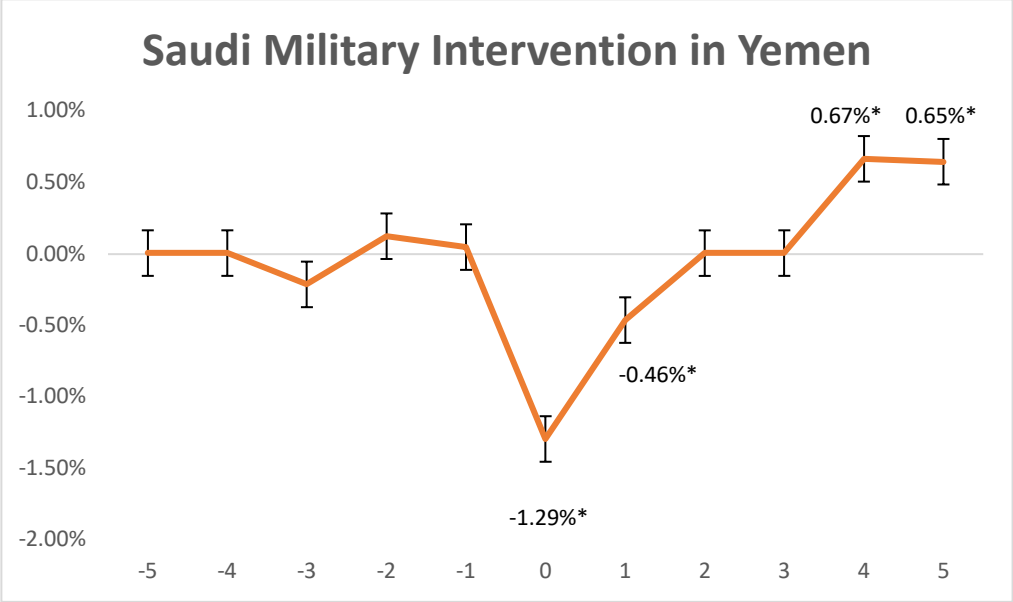


Note: (*) indicates $p \leq 0.05$.

Finally, for the "Saudi Military Intervention in Yemen" event, the CAAR value on the last day of the event window is not significant, but the estimates of AAR values illustrate significance for four days (see figure 10). The discrepancy and non-significance of the CAAR value comes from high negative AAR value for the event day (-1.29 %) and mostly positive AAR values for the rest of the examined event window.

These results are consistent with the observed enormous damage that was faced by the Saudi economy as a result of this conflict. The war resulted not only in a collapse in the Yemen economy, but also distorted the Saudi economy itself, putting a huge burden on the government's budget. In addition to the wasted government reserves, the fiscal policy was also supported by the increase in the oil and gas prices for domestic consumption and the decrease in the subsidies on public goods (Ali N. M., 2015).

Figure 10 – AAR values for event 4

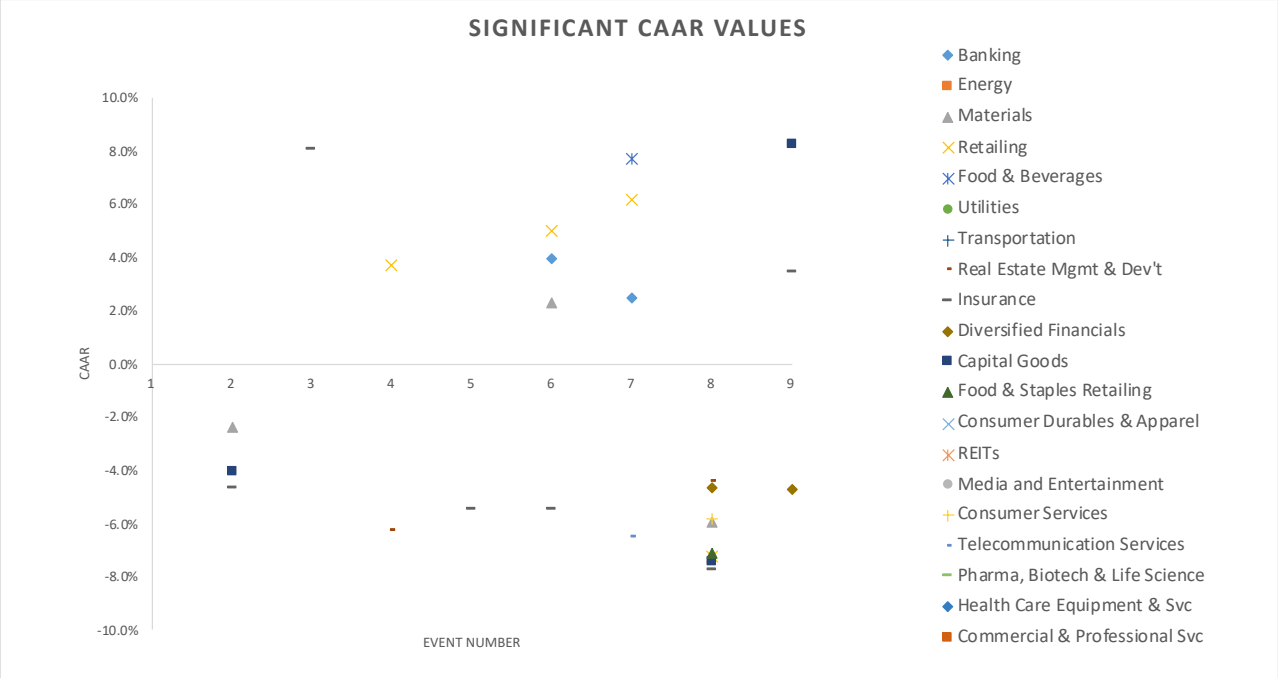


Note: (*) indicates $p \leq 0.05$.

Detailed Analyses of the Examined Events

The successive sub-sections give a description of the empirical evidence on each event separately and with more details. The impact of examined international events on the Saudi stock market, as well as local political and economic events, is investigated by testing the statistical significance of the estimated average abnormal returns and cumulative average abnormal for each of the examined sectors of the economy. Figure 11 displays the estimated, statistically significant CAAR values for each event and each sector. My results reveal that the examined events exhibit both negative and positive impacts on the Saudi stock returns. In some cases, the estimated CAAR values appeared to be statistically insignificant.

Figure 11 – Summary of the estimated CAAR values by sectors



Event 1: The Capture of Saddam Hussein (Dec 13, 2003)

On December 13, 2003, former Iraqi president Saddam Hussein was captured by U.S. soldiers after nine months on the run. The capture of one of the strongest dictators in the world was not only the start of a new developmental era for Iraq, but also had significant consequences on the geopolitical and economic developments of the Middle Eastern region as a whole. This event was supposed to be a positive influence for renewing engagement with neighboring Saudi Arabia since diplomatic relationships were cut after the regime of Saddam Hussein invaded Kuwait in 1990. Naturally, this important event was supposed to affect the market prices for the firms acting in Saudi Arabia, both directly due to the new opportunities for Saudi firms, and indirectly, through developments in oil prices. Consequently, investigations of market returns and the possibility of abnormal returns, enabled the extraction of large amounts of information from financial markets. The outcome of my analyses may serve to make policy decisions by market participants more resilient to similar shocks in the future.

Indeed, the capture of Saddam Hussain was an expected event, and the forthcoming outbreak of war and the overthrowing of the Iraqi leader had been predicted since the summer of 2002 (Amihud & Wohl, 2004). Even a specific financial instrument, referred to as "Saddam Security," was traded on an online betting exchange,[6] with the payoffs depending on a specific date when Saddam Hussein would be out of power. But the expectation on the potential effects of the news on stock prices was diverse. The U.S.

[6] Tradesports.com

government was optimistically predicting that the overthrow of the leading dictator in the world would decrease the risk of future terrorism and contribute to stability and economic benefits in the region. On the other hand, a negative impact on stock prices could be a natural consequence of uncertainty due to the expected war.

The empirical findings in the literature are also diverse and suggest different outcomes under different circumstances from Saddam Hussain's capture (Amihud & Wohl, 2004). Amihud and Wohl used "Saddam contracts" as a proxy to measure the market expectations of Saddam's ousting and found a significant positive link between the market's expectations of the event with the stock prices, and the fall in oil prices during the war period, but the adverse association was observed for the pre-war period.

The negative impact of the probability of Saddam's capture on the stock prices during the pre-war period was also observed in a similar ex-ante analysis of the economic consequences of the Iraqi war (Leigh, Wolfers, & Zitzewitz, 2003). The most severe negative consequences in this study were for the stock markets of Turkey, Finland, Sweden, Israel and Germany. In contrast, the positive effects of war are observed for some net oil importing countries. Later Wolfers and Zitzewitz (2009) implemented an ex-ante analysis to evaluate the expectations of financial market participants in response to the 2003 Iraq war and the overthrow of Saddam Hussein. Wolfers and Zitzewitz found a significant association between the stock prices and the probability of the Iraqi war. The analyses were further broken down by sector and country level, which suggested the biggest negative impact of the war was for the airlines and consumer discretionary sectors, as well as for sectors more sensitive to investments: that is, information technology, telecom, and finance sectors. For most of the examined countries the increase in the

probability of war is associated with the decline in the stock markets, especially in Finland, Sweden, and Germany. However, for some of the countries (for example, Austria and Indonesia) the impact is positive.

This section aims to conduct event study analyses around Saddam Hussein's capture and examines the AARs, tests the significance of CAARs, and implements evaluations of risk for firms acting in different sectors of the Saudi Arabian market. Analyses are implemented on different industry firms to capture the disproportional transmission of the market shocks, driven by the examined event. Finding significance in the AARs and CAARs will be a sign of the difficulties in building an appropriate framework for market predictions, decision-making and risk management.

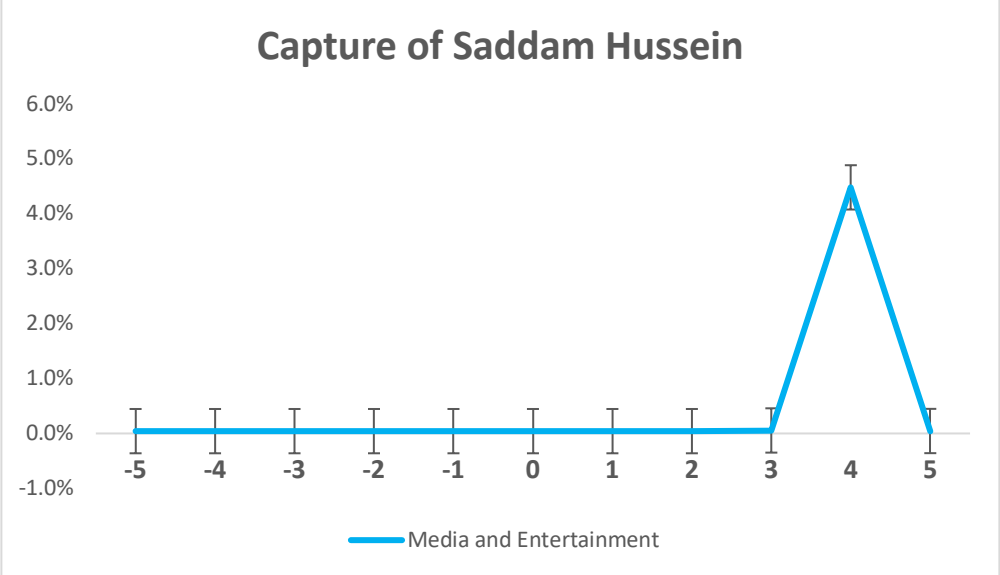
There is little exploration in the literature of this event and its consequences on Saudi financial markets. Among the related papers, Bradford and Robison (1997) investigate abnormal returns and changes in risk for transportation firms immediately around the Iraqi invasion of Kuwait. The paper finds that transportation firms suffered a -2.09% abnormal return and increases in unsystematic risk. In addition, the authors implement cross sectional regression and could explain 31% of the variation in the abnormal returns, with the examined variables controlled in the model. Considering the similarity of the two events, one might expect similar responses of market forces and developments in the abnormal returns after the Saddam Husain capture event.

My results indicate that none of the examined sectors appeared to generate statistically significant CAARs in response to the event around Saddam Hussein's capture in 2003. Furthermore, AARs for the firms acting in all the examined sectors illustrate similar development paths and mainly generate statistically significant AARs on

the fourth day following the event. The estimated AAR for the examined (-5,+5) event window is illustrated in figure 12, which illustrates a maximum 4.5% AARs on the fourth day following the event for the firms acting in the Media and Entertainment sector.

For the other sectors the AAR values are insignificant. Not observing significant AAR values for most of the pre and post event dates indicates that the asset prices for the examined firms were not affected by the new information related to the announcement of Saddam Hussein's capture. Finally, almost zero AARs for all the prior days indicate that investors from all the sectors were not aware of the event at all. I can say that there was no reaction for this event because the impact of the Second Gulf War had been going on for a few months before the date (Dec 13, 2003) when Saddam Hussein was captured. Thus, the capturing of Saddam did not affect the market in anyway because the market had been digesting this information before the event date.

Figure 12: Sectors with significant AAR values for Event 1.[7]



[7] For figure 12-20, I show only a maximum of two sectors with significant AAR values ($p \leq 0.05$) as data representation. The appendix has tables that show all the AAR and t-test values by sector for all days in the event window.

Event 2: Lehman Brothers Files for Bankruptcy (Sep 15, 2008)

The Fed and the US Treasury declined to offer Lehman Brothers a bailout because of its failure to find buyers for its distressed stock. This situation resulted in a filing for bankruptcy of the giant financial company on September 15, 2008. The bankruptcy, caused primarily by Lehman Brothers' investment in subprime mortgages, was the largest in the history of the US economy. The consequences of the Lehman Brothers' bankruptcy propagated throughout the US economy and caused the biggest economic decline since the Great Depression of the 1930s; furthermore, the effects quickly spread through the global financial markets, causing an economic crisis in almost all countries in the world.

The financial crisis in 2008 brought to the fore many concerns about existing problems in the policymaking process and catalyzed academic discussions about the sustainability of the global economy. The worldwide transmission of an unexpected shock originating in the US made both policymakers and the academic world reconsider the benefits of having financial markets play such a pivotal role in the overall economy. A few economists were predicting the pending credit and housing bubble crisis in the US and the consequent economic slowdown. Prior to the crisis, Roubini and Setser (2005) worried about the possible negative consequences of the huge current account deficit of the USA, which was supposed to lead to the dollar's depreciation and, as a result, distress the global financial markets. Nevertheless, for most of the academic world, policy makers and market participants, the global financial crisis in 2008 was an unanticipated event, and after the Lehman Brothers event, economists have been blamed for failing to foresee the crisis and failing to convince policymakers about the serious consequences.

The collapse in the U.S. stock market shortly afterwards spread to other economies with unprecedented speed, including the Saudi stock market. The Saudi economy, being directly and indirectly exposed to the U.S. housing market and financial institutions, also experienced a rapid decline in its stock market. Rehman, Hazarzi and Program (2014) observed that along with the decrease in the Saudi Stock Market Index (TASI) returns' volatility, the Saudi stock market became more integrated with the U.S. and other global stock markets, with increased correlations between the examined markets (2014). With a multivariate, dynamic conditional correlation GARCH model (DCC-GARCH), Arouri and Nguyen (2010) found time-varying nature, with structural breaks in the association between the global and GCC stock markets, but still the cross correlations between the Gulf stock markets and the world markets remain statistically insignificant. Although due to capital controls Saudi Arabia was still less integrated with the U.S. financial markets, the global financial crisis highlighted the shifts in risk contagion to the Saudi market (Lagoarde-Segot & Lucey, 2009).

By using a Markov-Switching EGARCH model, Khallouli and Sandretto (2012) observes significant evidence of U.S. stock market contagion, both in the level of stock market returns and the overall uncertainty of MENA stock markets. However, the collapse of the Gulf Cooperation Council (GCC) markets is believed to be greater. Moosa (2010) argues that the steep decline in oil prices during the crisis period, rather than the contagion from the U.S. markets, is the main driver for the collapse of the Saudi stock market. There is weak evidence of a pre-crisis period relationship between the U.S. and Saudi (as part of the Middle East and North Africa region) stock markets (Maghyereha, Awartani, & Al Hilu, 2015). Ghorbel and Boujelbene (2013) likewise observed a significant indirect

contagion of Lehman Brothers' bankruptcy on the Saudi stock markets. With different GARCH family models the authors found significant correlation and volatility spillovers between oil prices and the stock markets of the U.S. and GCC countries, including Saud Arabia. Some scholars found that the link between the U.S. and Saudi stock markets is more driven by the shocks originating in the U.S., while contagion is most probably sourced by emerging market shocks, including Saudi Arabia. Using a simple Vector Auto Regressive (VAR) model, Samarakoon (2011) proposes that during the global financial crisis there was no strong contagion from the U.S. to emerging markets, including Saudi markets.

This section aims to conduct an event study analysis around the Lehman Brothers' filing for bankruptcy in September 15, 2008 and examines the AARs, tests the significance of CAARs, and implements evaluation of risks for firms acting in different sectors of the Saudi Arabian market.

Saudi Arabia is one of the world's leading oil exporters and gains about 90% of its income from oil exports. After the financial crisis the price of barrel oil declined sharply more than three times and reached $38 a barrel in December 2008. Not surprisingly, the decrease in oil income dramatically affected the Saudi Arabian economy. Nevertheless, the Saudi economy managed to grow positively during this crisis period compared to a number of other countries. Al-Hamidy (2011) mentions that due to sound economic conditions, a prudent and conservative supervisory framework, countercyclical fiscal and banking system policies, and other macroeconomic reasons, Saudi Arabia was not materially affected by the global financial crisis and the Saudi domestic financial market continued to function effectively and efficiently without any hiccups.

After the global financial crisis, the interest in analyzing the sources and consequences of financial imbalances increased dramatically. Many scholars have investigated the effects of the crisis on developments in financial markets and real economies since then. Ball (2009) mentions that the collapse of Lehman Brothers and other large financial institutions reflects the failure of the efficient market hypothesis, which states that competitive financial markets exploit all available information when setting security prices. Novotná (2013) checks the impact of the financial crisis on the average financial performance of selected companies from the European Union. The results confirm that there is a large decline in the profitability and liquidity ratios of European industrial companies as a consequence of the financial and economic crisis, but the impact was heterogeneous among the examined countries.

Further, Miniaoui, Sayani and Chaibi (2015) studied the performance of market indices in the Gulf Cooperation Council (GCC) countries around the financial crisis period. They found that the impact of the crisis event on the mean value and the volatility of the market prices in Saudi Arabia was insignificant. Their results showed that the volatile nature was similar among the Islamic index and conventional index.

Nevertheless, not much work has been done analyzing the impact of the Lehman Brothers bankruptcy event on the financial markets of Saudi Arabia. In that context the analyses implemented in this section will be a valuable contribution to the literature. Following my general empirical strategy, I tested the significance of AARs and CAARs around a $(-5, +5)$ days horizon of the examined event. For the Lehman Brothers bankruptcy event I found significant CAAR for the firms acting in the materials production, insurance, and capital goods production sectors.

For all these sectors my analyses indicate the existence of significant negative CAAR of a magnitude of -2.3%, -4.6%, and -4.0%, respectively. The results show that the market expected returns in the estimation window were significantly higher than the actual returns for these sectors. Again, as I mentioned previously that the decline in oil prices during the crisis period is the main driver for the negative reaction of these sectors.

Unlike some studies, investigating the stock market response in the U.S and other developed markets found positive abnormal returns. Becchetti and Circiretti (2011) examine abnormal returns of about 2,700 stocks around the event date and observe on average positive abnormal returns (see table 5). Scholer, Skiera and Tellis (2014), who analyze the impact of the 2008 global financial crisis on 39 major banks in North America and Western Europe (see table 6), come to similar conclusions.

I did not observe similar paths of abnormal returns for firms acting in different sectors, indicating the heterogeneous impact of the examined crisis event. However, most of the significant AAR values were observed during the first two days around the event, and for some sectors on the last day of the examined event window. Observing significant AAR values for most of the close pre and post event dates indicates that the asset prices for the examined firms were affected by the new information related to the Lehman Brothers bankruptcy event.

In addition, I found significant AARs for some of the prior days to the event, indicating that the investors from some sectors were anticipating the upcoming financial crisis event. Finally, an interesting observation from my results is the failure to find significance of CAARs for the banking sector in response to the global financial crisis. This result suggests that the actual returns appeared to be consistent with the expected

returns before and after the crisis date. This finding can be connected to the fact that the Saudi economy stayed resilient in response to the global financial crisis. In particular, Al-Hamidy (2011) mentions that it remained resilient due to the structure of its economy, its sound economic conditions, prudent and conservative supervisory framework, countercyclical fiscal and banking system policies, and other macroeconomic reasons. Saudi Arabia was not materially affected by the global financial crisis, and the Saudi domestic financial market continued to function effectively without any hiccups.

Table 5 – Distribution of abnormal returns around the event date in (Becchetti & Ciciretti, 2011).

VARIABLES	(1) AR(-1)	(2) AR(0)	(3) AR(+1)	(4) AR(+2)	(5) AR(+3)	(6) AR(0)-AR(-1)	(7) CAR(0;+1)	(8) CAR(0;+2)
Mean	0.0000	0.0055	0.0011	0.0029	0.0159	0.0055	0.0066	0.0096
Median	-0.0014	0.0122	0.0026	0.0039	0.0074	0.0141	0.0126	0.0184
Sd	0.0362	0.0748	0.0496	0.0603	0.0716	0.0839	0.0907	0.1207
Skewness	-3.8142	-18.8776	-3.0647	-6.3612	0.6913	-11.3455	-9.3110	-8.4435
Kurtosis	73.6837	623.1067	42.1203	124.5743	39.1772	319.7233	199.4861	169.6568
Min	-0.7154	-2.6386	-0.8127	-1.2361	-1.0752	-2.5015	-2.3370	-2.9564
Max	0.2006	0.2473	0.3016	0.3971	0.8778	0.5710	0.3554	0.4000
P1	-0.0864	-0.1464	-0.1513	-0.1397	-0.1257	-0.1924	-0.2042	-0.2835
P5	-0.0439	-0.0798	-0.0642	-0.0666	-0.0667	-0.1186	-0.0955	-0.1357
P10	-0.0304	-0.0476	-0.0454	-0.0462	-0.0469	-0.0718	-0.0597	-0.0848
P25	-0.0159	-0.0109	-0.0187	-0.0197	-0.0207	-0.0154	-0.0208	-0.0307
P75	0.0143	0.0319	0.0264	0.0277	0.0432	0.0399	0.0446	0.0631
P90	0.0370	0.0539	0.0484	0.0579	0.0867	0.0695	0.0782	0.1117
P95	0.0549	0.0711	0.0652	0.0779	0.1266	0.0932	0.1008	0.1494
P99	0.0934	0.1145	0.1100	0.1286	0.2365	0.1469	0.1568	0.2198
Observations	2603	2603	2603	2603	2603	2603	2603	2603

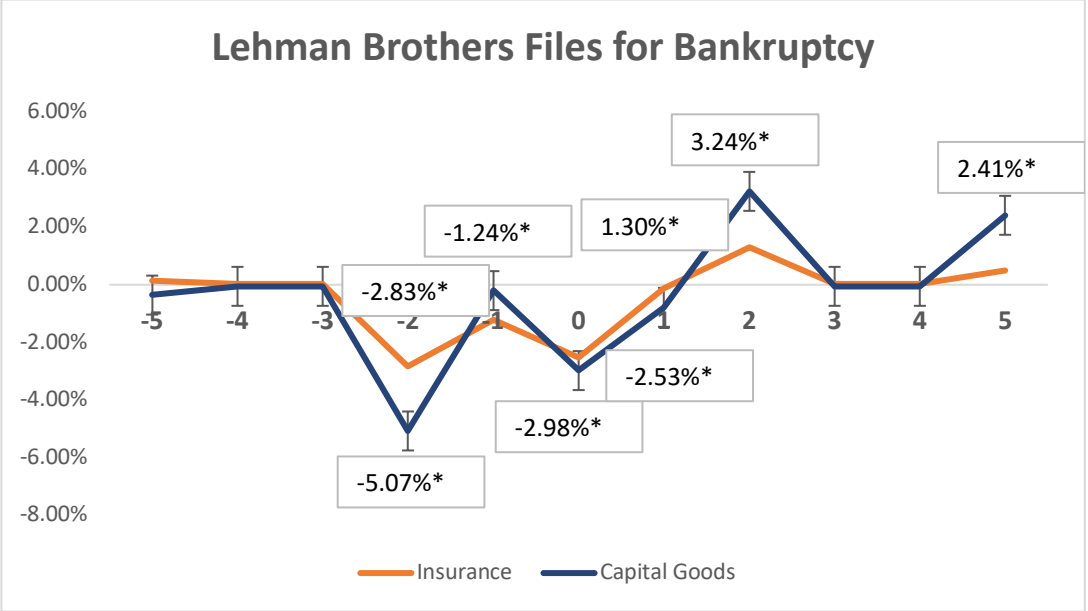
AR(-1): abnormal return in the day prior to the event date. **AR(0)**: abnormal return in the event date. **AR(+1)**: abnormal return in the day which follows the event date. **AR(+2)**: abnormal return two days after the event date. **AR(+3)**: abnormal return three days after the event date. **CAR(0;+1)**: cumulative abnormal return over the event date and the following day. **CAR(0;+2)**: cumulative abnormal return over the event date, the following day and two days after.

Table 6 – Cumulative abnormal stock market returns to different event windows (results for Europe) by (Scholer, Skiera, & Tellis, 2014).

Event Window	Returns	*p*-Value	Percentage of Positive
(0)	.16%	.017	53%
(−1, 0)	.21%	.007	52%
(−1,+1)	.13%	.271	51%
(−2,+2)	.09%	.571	48%

Notes: 0: announcement day. −1 (−2): one (two) day(s) prior the announcement.
+1 (+2): one (two) day(s) after the announcement.

Figure 13: Sectors with significant AAR values for Event 2.



Note: (*) indicates $p \leq 0.05$.

Event 3: Muammar Gaddafi shot dead (Oct 20, 2011)

In the early 2010s a series of anti-government protests arose in most Arab countries. Starting in Tunisia, massive protests quickly spread throughout almost all of the Arabic countries. These protests, later called the Arab Spring, came to Libya on the 15th of

February. The protests immediately spread across the whole country, soon resulting in anti-governmental forces taking the lead in the capital, Tripoli. After the fall of Tripoli, the former Libyan dictator, Muammar Gaddafi, moved to Sirte, the city of his birth, with a small number of his supporters. In October 20, 2011, the former dictator of Libya, who governed the country since 1969, was killed by protestors. Gaddafi's death spread enthusiasm throughout the country and was supposed to become the start of a new era of democratization and development in Libya.

The revolution of Libya was expected to bring democracy and prosperity for the Libyan population. The military intervention implemented by NATO in Libya was supposed to have a purely humanitarian nature. The democratization of post-Gaddafi Libya was expected among the experts and scholars, but considering Arab traditions and culture it could happen only in the form of hybrid democracies acceptable to Libyan society (Kirkova & Milosevska, 2014). However, after the horrible image of Gaddafi's death, NATO announced the end of the mission, and the Libyan nation was left alone with the approaching economic collapse. This situation gave rise to many doubts about the humanitarian motives of NATO's mission in Libya. Ifeonu (2012) notes that the manner of NATO's operation in Libya not only reinforced the skepticism and suspicion about the concept of humanitarian intervention, but also was more likely to reflect an unabashed desire to protect the economic interests of some hegemonic western powers.

The United States and NATO alliance did not put adequate efforts into restoring peace in Libya after the overthrow of the former dictator (Imam, Abba, & Wader, 2014). Post-Gaddafi era Libya appeared to be a failed and fragmented state, with two governments, two armies and an antagonistic society. The country was governed by two forces: Islamist-

allied militias who took control in the Western part of the country and the capital, Tripoli, and anti-Islamist politicians in the East of Libya. Iman, Abba and Wader (2014) implement an empirical comparison of socio-economic conditions in Libya for the pre- and post-Gaddafi periods, and conclude that in addition to the destroyed economy and the terrible war, the democratization of Libya was still not achieved after the Libyan revolution.

Before the revolution, the Libyan economy was mainly concentrated on oil production, with approximately 65 % contribution to GDP and 98 % of government revenues (Khan & Mezran, 2013). The revolution increased the excitement of the Libyan citizens about the possibility of building a democratic and steadily growing country. Considering the vital advantages of Libyan oil—a significant amount of proven reserves, high quality, and geographically close to Europe--the post-Gaddafi Libya was expected to be Europe's main partner, supplying crude oil and gas for the European countries and, as a consequence, experiencing long-term economic prosperity (Ali & Harvie, 2013).

Nevertheless, the Libyan economy collapsed immediately after the overthrow of the Muammar Gaddafi regime (Khan & Mezran, 2013). The post-Gaddafi era appeared to be a period of economic cataclysm, with inoperative infrastructures, and most importantly, a barely functioning oil production sector, which was the country's major source of revenues. For the Libyan economy the sharp collapse of oil production from 1.78 million to 98,000 barrels per day between December 2010 and July 2011 was destructive, and due to the revolution the Libyan economy experienced approximately a 64.2 % cumulative loss in the growth rate of per capita real GDP for the period between 2011 and 2014 (Echevarría & García-Enríquez, 2019).

The economic consequences of the Gaddafi regime overthrow, especially the sharp decline in oil production, significantly affected global oil markets, and the shock was propagated throughout other oil importing/exporting countries. Libya was soon replaced by other suppliers in the international oil markets, and Saudi Arabia was among the countries that significantly increased their oil production. The production of Saudi Arabian oil during the four months after February 2011 increased from 9.1 million to 9.8 million barrels per day (Stankovska & Lavender, 2011). The events in Libya had a positive impact on the Saudi Arabian economy (*Africa Economic Outlook*, 2012). In order to fill the gap in the oil market, the oil production in Saudi Arabia during 2011 increased by about 14% compared to 2010, resulting in about a 10% annual GDP growth rate (Energy Statistics of OECD Countries, 2011).

In this section I will investigate the impact of Muammar Gaddafi's execution and the crisis in Libya after the revolution, as well as the economic developments in Saudi Arabia. Again, through an event study analysis around the Gaddafi execution date, I will estimate the AARS, test the significance of CAARs, estimate the response of the market participants and evaluate the risks for the firms acting in different sectors. As before, the sample of the analysis includes firms from various sectors to capture the heterogeneity in the transmission of the shocks driven by the examined event.

Muammar Gaddafi's death was widely publicized in international media and got a great deal of political attention, and yet in economic literature there has been little examination of the economic response of oil markets and oil exporting countries, including Saudi Arabia, to this event. My analysis will be an attempt to fill in this gap and understand how market participants react to this event. Following our general

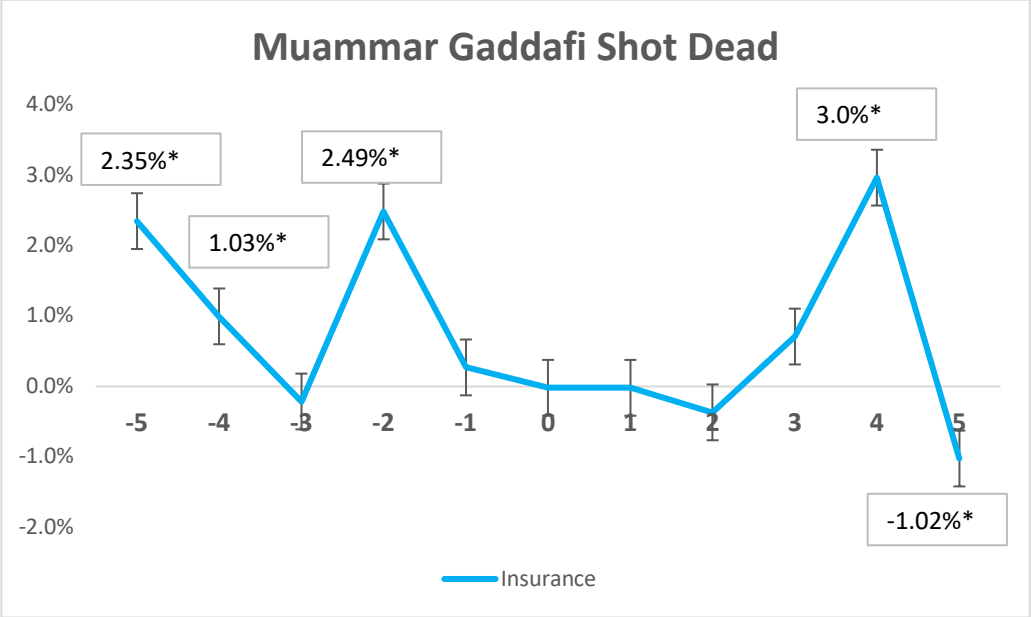
empirical strategy, I tested the significance of AARs and CAARs around a $(-5, +5)$ days horizon of Gaddafi's death. For this event the significance of CAARs was only found for the firms acting in the insurance sector. The results show that the CAAR value for a (-5,+5) days event window was 8.1%. These results are significant, indicating that the actual returns on average appeared to be significantly higher than the market index returns in the estimation window.

I found the significance of the positive CAAR in the insurance sector to be logical. As the oil production in Saudi Arabia increased due to this event, the Saudi GDP increased as a result. This increase in the GDP meant new firms, factories, and buildings were established in the economy and needed to be insured. Therefore, investors in the insurance sector would find this event an opportunity for insurance firms to have more work and income due to the increased demand for insurance services. In response to this event the market's actual prices exceeded the expected prices and generated positive, abnormal returns for the firms acting in the insurance sector.

Further, the estimation results indicate mostly heterogeneous AARs. Nevertheless, some common paths were observed for most of the examined sectors. In particular, more frequently I observed negative AARs prior to the event date, and positive abnormal returns after the event. The most significant exception to this pattern is the firms from the food and staples retailing sector and telecommunication services; post event AAR values in these firms are significantly negative, approaching about a 2 % level during the first few days after the event. Another exception are the firms acting in the insurance sector, the AAR values are mostly significant and positive.

In general, the event study analysis indicates that the asset prices for the firms from some of the examined sectors were mostly affected by the new information related to Gaddafi's execution. In addition, finding significant AARs for some of the prior days to the event indicated that the investors of some sectors were feeling the upcoming influence of this event because Gaddafi was on the run for a few months and his death was expected. Therefore, the market already digested the information before the date of the event.

Figure 14: Sectors with significant AAR values for Event 3



Note: (*) indicates $p \leq 0.05$.

Event 4: A Saudi Military Intervention in Yemen (March 25, 2015)

The next event I study is the Saudi military intervention in Yemen in March 25, 2015, which is the first event analyzed so far that is directly connected to Saudi Arabia. Saudi Arabia led coalition forces and initiated air strikes attack against Shia Houthi rebels backed by Iran in Yemen. According to the leaders of Saudi Arabia, the purpose of the military

intervention was to support the reestablishment of the legitimate government of ex-president Abdrabbuh Mansour Hadi, who resigned after the disordered situation began in the summer of 2014, when Shia Houthi rebels took power in most parts of Yemen's territory. Adel al-Jubeir, at that time the Saudi ambassador to the United States, mentioned in an interview with CNN that Saudi Arabia was concerned that after the illegal revolution. the radical militant group, Houthis, aligned with Iran and Hezbollah, would take control over the ballistic missiles of Yemen's armed forces and its air force and become a serious danger for Saudi Arabia.

The military intervention by Saudi Arabia was mainly supported by the international society, including the Arab League countries and the USA. The Saudi authorities had proposed the intervention, concerned about Yemen becoming a failed state and the need to protect the Yemeni people (Clausen, 2019). Darwich (2020) explains the conflict through the status dissatisfaction theory,[8] and proposes that the desire of Saudi leaders to achieve hegemony in the region was the main reason for the conflict's initiation. Khafagy (2017) argues that autocratic governments usually start a new initiation only in search of popularity, without considering the economic consequences.

Several years have passed since the start of the military intervention, but the conflict is not showing any sign of resolving, and with the abysmal amount of human deaths and social harms, destructive economic consequences have emerged. The conflict resulted in the de facto economic blockade of the Yemen economy. Yemen is a country that is heavily dependent on imports and foreign investments from Saudi Arabia and other GCC members

[8] Status dissatisfaction theory argues that states seeking to shift their status position will undertake "status-altering events" that are public and dramatic enough to capture the attention of the international community as well as shift its beliefs about where the state "stands" (Renshon, 2017).

(*Yemen Six Month Economic Analysis*, 2017). But the consequences were devastating not only for the Yemen economy, but also for the Saudi economy itself. Reuters estimated that the war cost Saudi Arabia about $675 million monthly. The government had to sell $1.2 billion of its holdings in European equities to cover those costs (Ali N. M., 2015). In addition, the budget deficit of Saudi Arabia sharply increased in 2015 and remained relatively high during the next few years. In particular, the budget deficit to GDP ratio in 2015 was -14.8 %, compared to -2.3% in 2014. During the war Saudi foreign reserves were declining sharply; in the twelve-month period after the war, foreign reserves declined about 15% (Luay, 2015). To support this fiscal policy, the Saudi government had to increase the oil and gas prices for domestic consumption and decrease considerably the subsidies on public goods (Yemen war cost Saudi $5.3 bn, 2015).

The political instability in these oil and gas exporting countries negatively affected oil and gas prices. Thus, the war was accompanied by a sharp decline in oil prices in the international markets. The two negative developments affected significantly the overall macroeconomic situation of the country. In summary, the war had severe economic consequences on the Saudi economy. The GDP was still growing, but at a lower rate, which eventually went negative in 2017. The year on year GDP growth rate in 2015 was about 4.3%, which decreased up to 2.1% in 2016, and was negative -1.18% in 2017 (Hussain, 2016).

As a number of scholars have noted[9], political instability negatively affected the economic growth of both Saudi Arabia and Yemen. Furthermore, the political turbulence propagated through the financial markets and the banking sectors of these economies. The

[9] (Alesina & Perotti, 1996), (Aisen & Veiga, 2013), among others.

Yemen war had negative consequences, both directly and indirectly, on the volume of loans and deposits in these markets, which were immediately transmitted throughout the whole region (Saif-Alyousfi, 2020).

This section investigates the Saudi military intervention in Yemen in March 25, 2015 and analyzes the market participants' responses to this event. An event study analysis was employed around the military intervention date to examine the developments of the AARs, to test the significance of CAARs, to estimate the response of the market participants and to evaluate the risks for the firms acting in different sectors.

The dramatic and unforeseen negative impacts of the Yemen conflict for the Saudi economy were analyzed by many political and economic experts, as well as academic scholars. Nevertheless, I could not find any appropriate analyses investigating this event's significance on the financial markets, the expectations of market participants and the possibility for abnormal returns. The analyses in this section are a valuable addition to the literature, investigating the significance in abnormal returns around the military conflict event between Yemen and Saudi Arabia in March 25, 2015.

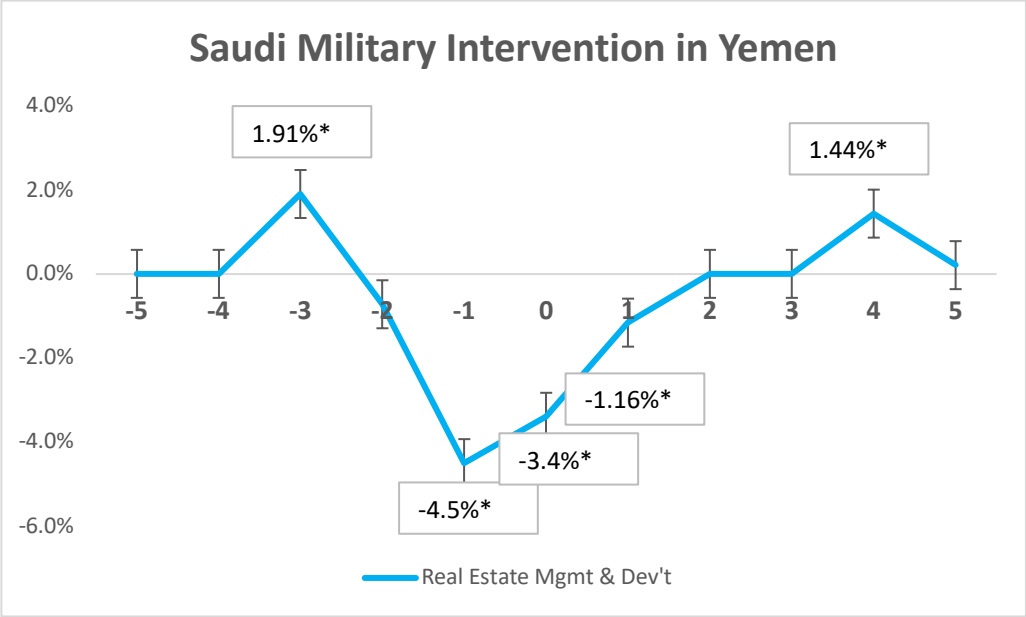
For this event the significance of CAAR was only found for the firms acting in the real estate management and development sectors. I found that the CAAR value for a (-5,+5) days event window in this sector was -6.2% with a high level of significance. These results indicate that the examined event generated significantly lower actual returns than the expected market index returns for the real estate management and development sector firms. This result highlights the fact that the war events generated an atmosphere of pessimism about the future course of home prices and affected negatively real estate prices and the incomes generated for the firms in this sector.

In addition, the war event is bad news for investors in the real estate market. Their willingness to invest decreases when uncertainty with war increases. Also, there are many investors in the real estate market in Saudi Arabia who are from Yemen. Therefore, many of them were likely to start to take their financial capital out of the Saudi market because they cannot speculate how the relationship between both countries might be in the future due to the war.

Finally, the other sectors did not react because most people probably were expecting this event to happen and therefore this information was already digested for many sectors in the market.

I also could identify some common paths for most of the examined sectors. In particular, I observed mostly high negative AAR values during the few days prior to the event, and high positive AAR values on the last day of the examined event window. This could be a sign that maybe some investors in the market had inside information about the specific day of the intervention, even though it was a surprise announcement for the whole world. Finally, none of the AAR values are significant on the -5^{th} day. In general, the event study analyses indicate that the asset prices for the firms from some of the examined sectors were mostly affected by the new information related to the Saudi Arabia and Yemen war event.

Figure 15: Sectors with significant AAR values for Event 4.



Note: (*) indicates $p \leq 0.05$.

Event 5: MBS Announced ARAMCO IPO (June 14, 2015)

In June 14, 2015, the government of Saudi Arabia launched for the first-time an initial public offering of shares of the world's biggest oil producer, the state-owned company Saudi Aramco. The decision followed the events described in the previous section, particularly the massive economic damage of the Yemen war and the collapse of oil-prices in the international markets. In addition, this was a first-time opportunity for foreign investors to gain access to one of the world's oil producing giants. This was an aspiring step to improve the economy's openness and attract more foreign capital, which could help not only overcome the severe economic issues, but also contribute to the sustainable development of the Saudi economy. The IPO was implemented gradually through listings on the Saudi Tadawul stock exchange and on a few leading global stock exchanges. Saudi Aramco was a state-owned petroleum and natural gas company, which was considered one

of the most profitable companies in the world (The Aramco Accounts: Inside the World's Most Profitable Company, 2018). In 2015, Saudi ARAMCO produced an average of 10.2 million bpd of crude oil, an all-time record, and processed an average of 11.6 billion scfd of raw gas, also an all-time record (Saudi Aramco News, 2016).

The ARAMCO IPO event was an expected and well-prepared for event. Saudi Arabian leaders saw it as a necessary step for the future development of the economy. During an interview with Al Arabiya TV, Crown Prince Mohammed bin Salma announced that it was impossible for the Saudi economy to diversify and develop other sectors without the IPO of ARAMCO. He mentioned that otherwise it would take about 40-50 years to develop the mining sector, domestic production or logistical services. After the IPO of ARAMCO, all the revenues were supposed to be put under the control of the Public Investment Fund, which has the mandate of supporting Saudi Arabian non-oil sector economic development. Nevertheless, the Saudi government was supposed to preserve sole control over ARAMCO's oil and gas reserves and would retain the right to determine the production level. Finally, the decision to privatize ARAMCO was not a political one, but rather had economic motives, driven by market forces. Therefore, it was not supposed to have a serious effect on the international oil markets (Ramady, 2018).

The privatization of Saudi ARAMCO was expected to impact fundamentally the structure of the global energy sector. Saudi Arabia was supposed to lose its central role within OPEC with the IPO of oil producing giant ARAMCO, as the latter would no longer influence world oil prices in cooperation with OPEC (Boslego, 2017). Even with a minority of private shareholders, the upcoming decisions made by ARAMCO might be challenged and opposed to the previous role played in OPEC (Praveen & Ruiz, 2017).

Meanwhile, there was an emerging complaint that the country's most important company potentially was being sold to foreigners cheaply. This complaint could have an effect on the process of the IPO, with the decision to give more priority to local investors (Shamseddine & Torchia, 2017). Nevertheless, the expectations among some scholars over the possible consequences of the privatization of the world's biggest oil producer were predominantly optimistic, predicting a prevailing role for the company in the global oil and gas market. Weijermars (2020) analyzed the financial performance of ARAMCO before and after the corporate restructuring over a few decades and predicted the potential success and possible future role of ARAMCO as a global oil supplier. The privatization of Saudi Aramco was predicted to have a central role in the development of global energy markets, as well as positively contribute to the Saudi economy.

The aim of this section is the investigation of the IPO event for the Saudi ARAMCO in June 14, 2015. In the previous section, I already outlined that the IPO of the state-owned giant was preceded by a challenging economic situation caused by the oil price collapse and the Yemen war. Meantime, the ARAMCO's IPO event was mainly anticipated by the market participants and was supposed to have a positive contribution on the Saudi economy and catalyze further contributions for economic diversification and openness.

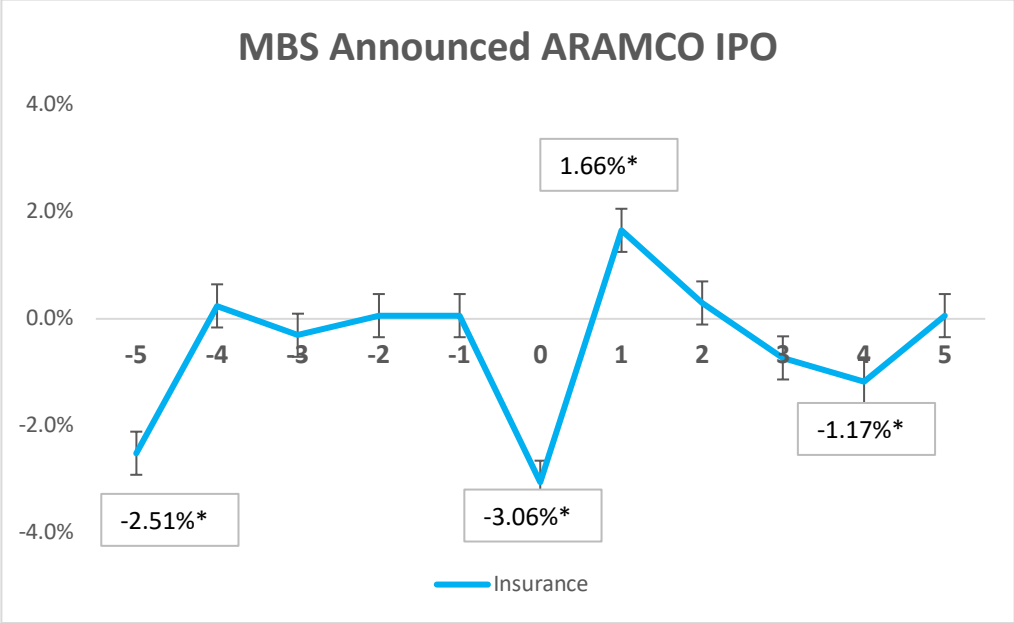
Considering the fact that the ARAMCO IPO event was public knowledge prior to the event date for most of the firms acting in the different sectors of the Saudi economy, I found it logical that the conducted event study analysis indicated no significant CAAR values for most of the examined sectors. The significance of CAARs was only observed for the firms acting in the insurance sector. The results show that the CAAR value for a

(-5,+5) days event window was negative -5.4%, which is significant and means that the expected market returns on average appeared to be significantly higher than the actual returns. I found the significance of negative CAAR value for insurance firms after the ARAMCO IPO event reasonable. This event was expected for a few months before the announcement and the market had already digested the information, which eventually resulted in the negative abnormal returns for the firms acting in the insurance sector.

For this event I again could observe some common paths of AAR values for most of the examined sectors. Obviously, the event was common knowledge two days prior to the event day, as most of the estimated AAR values appeared to be close to zero. The AARs for earlier days of the event window also illustrated a common tendency. The AAR values were mostly negative with only a few of them being significant during the prior three to five days and mainly insignificant after the event day. Some heterogeneity was observed exactly on the event date, when a few sectors, like the food and staples retailing, food and beverages, and utilities sectors, showed significant positive abnormal returns, and the insurance sector showed high negative AAR value.

To summarize, the results of the event study analyses came to confirm my belief that the markets were mostly aware of this event and managed to adjust their beliefs about the market returns. Except for a few cases during the event day, the AAR values were mostly insignificant and followed a common trend. The only sector where the significance of CAAR value was the insurance sector. I attribute the significance of CAAR value in this sector to the market beliefs exceeding significantly the actual returns, which was the result of excessive optimism for the economic development after the ARAMCO IPO event and negative demand shock for insurance companies.

Figure 16: Sectors with significant AAR values for Event 5.



Note: (*) indicates $p \leq 0.05$.

Event 6: Trump Wins the Presidential Election (November 8, 2016)

The victory of Republican Donald Trump in the US elections of November 8, 2018 surprised not only many American voters, but also the whole world. Trump is a businessman and a reality show star with no political experience, so for many, his running for president was a surprise, let alone his winning the election. Trump's campaign was based on populist pronouncements and many Americans voted for him with the belief that the country needed big changes. During his campaign, Trump promised to stop the wave of immigration and improve the economy. His ideas, including to build a wall along the border with Mexico and make Mexico pay for it, turn around the economy, increase employment, and stop the Syrian refugee immigration program were motivating for his supporters.

Soon many experts announced the start of an unknown political future for the world. Gregory Krieg, CNN, writes about the win of Donald Trump as "The day that changed everything" (2017). Indeed, Trump's victory increased the uncertainty among investors about the macroeconomic policy of the new government and its impact on the markets. Nevertheless, the market response to Trump's victory was positive.

Donald Trump as a presidential candidate was, for all intents and purposes, unique in U.S. history; thus, his election and all the preceding events associated with it created enormous uncertainty and a high level of volatility in the U.S. and global financial markets. Due to Trump's anti-free trade pronouncements prior to the election, the global stock market returns mainly went down, but just after election day, the global financial markets mainly observed positive abnormal returns (Bouoiyour & Selmi, 2017). Pham et.al (2018) employ an event study analysis on 47 events connected with Trump's election. They conclude that the 2016 presidential election had a significant impact on the U.S. stock market, which was highly responsive to these events. Sectorial analyses by the paper reveal that the life insurance sector had the most negative response to the event because of Trump's announcement to replace Obamacare. Sector-specific, heterogeneous effects were also observed in response to Trump's election. Healthcare, oil and gas, real estate, defense, financials, and consumer goods and services were sectors affected positively and utilities and technology were sectors affected negatively (Bouoiyour & Selmi, 2017). An event study analysis was also employed by Bouoiyour and Selmi, who investigated the reaction of BRICS markets to Trump's winning. They found altering results among the examined countries: the biggest negative impact was observed for the Chinese market, but Russian stock markets mainly responded positively. The negative response for India and South

Africa was negligible. Positive reaction to Trump's election event was also observed for the Indonesian stock market (Sagita, 2017).

Saudi Arabia traditionally had a close relationship with the US, especially during the presidencies of George W. Bush and Barack Obama. However, President Trump had unusual ideas about the US-Saudi relationship (Yglesias, 2019). In one of his tweets, Trump said that because of his efficient policy the United States had become a net energy exporter and the number one energy producer in the world. Therefore, the U.S. did not need Middle Eastern oil and gas anymore. This type of policy obviously should be a negative shock for market expectations in Saudi Arabia.

In this section, I investigate the response of the Saudi stock market to the event of Donald Trump's victory in the presidential election of November 8, 2016. The brief review in the above paragraphs highlights the increased uncertainty caused by this event for the global economy in Saudi markets in particular. However, we need to notice that this upcoming new environment of unforeseen external policy by the U.S. was mainly anticipated by the market participants in the Saudi economy. Almost all the examined sectors illustrated insignificant AARs for all the prior days to the event, indicating that the markets were efficient during these periods, and there was no evidence of existence for prior information not captured by market forces.

For the CAAR values estimated within the (-5,+5) days event window, I was able to identify significant findings for the firms acting in the banking sector, materials production sector, retailing sector, and insurance sector. For all the sectors, with the exception of the insurance sector, the CAAR values appeared to be positive, with a high level of significance only for the insurance sector. In particular, the CAAR value for the

banking sector was 4.0%, for the materials production sector about 2.3%, for the retailing sector about 5%, and for the insurance sector -5.4%. The positive reaction of these sectors to this event could be explained by what President Trump promised to promote: a 1trillion dollar infrastructure investment in the U.S. economy. Market participants in the Saudi market would view this as positive news because a 1trillion dollar infrastructure investment would lead to an increase in the demand for and the prices of oil in the world, which benefits the Saudi economy overall.

The negative CAAR value for the insurance sector conflicted with my prior beliefs, as I expected that Trump's victory significantly increased the uncertainty in the markets, consequently enlarging the demand for and prices of insurance services. Therefore, in response to this event, I was projecting that the market's actual prices would exceed the expected prices and generate positive abnormal returns for the firms acting in the insurance sector. Nevertheless, the event study results show that the market's expected returns on average appeared to be significantly higher than the actual returns, which indicates that investors in the Saudi market viewed this news as positive, just like the other sectors.

In addition, according to our prior beliefs, the CAAR values of many other sectors, especially the energy sector, should have also been significant, as this event was supposed to increase the global uncertainty in all the markets. We can connect this finding with the facts mentioned in the above paragraphs, in which I highlighted that the market response to Trump's victory was unexpectedly positive and was possibly due to Hillary Clinton's expected policy in the Middle East.

The S&P 500 index increased by 6 percent between Election Day and inauguration day (Trump's unexpected impact on markets in seven charts, 2019). Financial markets were also booming with an improved outlook for economic growth and inflation. This positive reaction in the U.S. economy could be due to some of Trump's campaign promises, including lowering the business tax rate, eliminating the federal debt in eight years, saving the coal industry, bringing back manufacturing to the U.S., promoting a 1trillion dollar infrastructure investment, and growing the economy by 4% a year.

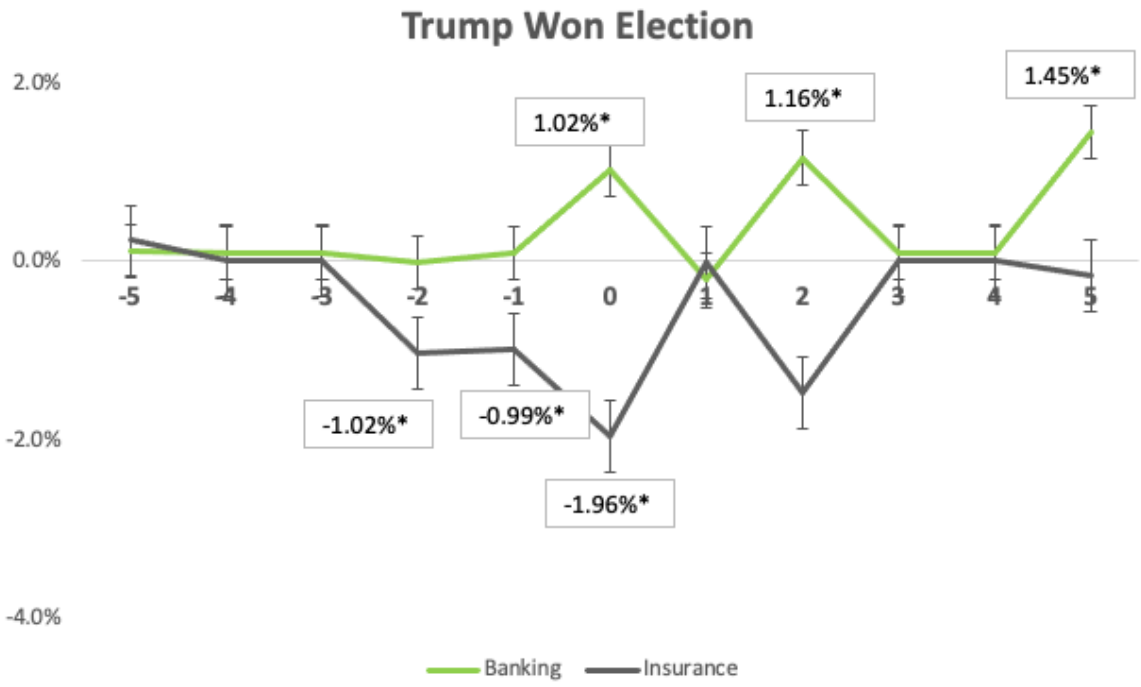
In her campaign, Hillary Clinton mentioned that she would intensify human rights and freedom of speech pressure on Saudi Arabia, keep President Obama's nuclear agreement with Iran and show support for Egypt's Muslim Brotherhood president, Morsi. Therefore, based on what Senator Clinton said, many investors in Saudi Arabia weren't optimistic about the Clinton administration's foreign policy in the Middle East, particularly as it pertained to Saudi Arabia. They found that Trump's victory was positive news. They anticipated that the Trump administration would support Saudi Arabia's government and markets more than Clinton's would.

As in most of the other examined events, the responses of different markets to the victory of Donald Trump were mostly homogeneous. In particular, most of the AAR values are not significant for the prior days. The vast majority of the significant AAR values appeared to be during the event day and one or two days after; no significance was observed during the third and fourth days after the event and small positive AAR values were observed on the last day of the examined window.

To summarize, the results of the event study analysis of Trump's victory conflicted somewhat with my prior belief that the increased global uncertainty would complicate

predicting market returns. In addition, I was expecting that the CAAR values in the insurance sector would be positive in response to the unexpected increased returns for this sector. Nevertheless, these results indicate that investors in the U.S. and Saudi Arabia found Trump wining to be positive news due to his economic campaign promises along with his good relationship with the Saudi government. Unlike Senator Clinton, President Trump did not mention anything negative regarding the U.S.- Saudi relationship during his campaign.

Figure 17: Sectors with significant AAR values for Event 6.



Note: (*) indicates $p \leq 0.05$.

Event 7: Restoring bonuses and allowances for state employees announced (April 24, 2017)

Unlike many other economies, traditional public sector workers in Saudi Arabia used to have financially higher rewards compared to private sector employees (Ramady, 2013). Higher oil prices generated sustainable public revenues for several decades, which allowed

the Saudi government to attract high quality human capital to create a public administration equivalent to those found in western economies. Yet, the comparison of the two reveals significant differences: well-paid jobs for state employees in Saudi Arabia are seen more as a means of generosity to citizens (Khodr & Reiche, 2012).

As was discussed in the earlier sections, starting from the 2015 Yemen war, there was a sharp decline in oil prices, which brought about serious negative consequences for the Saudi economy. To optimize government expenditures and support the budget deficit, the Saudi government had to make a decision to cut the salaries of public sector employees. This decision increased social tensions and complaints among public employees, who comprised the largest percentage of employees in the country.

The gradual recovery in oil prices, made the government reconsider its decision and respond to the public's complaints. In addition, the reforms in the labor market and the public sector salary cut, which were made in response to the crash in the global oil markets and the growing fiscal expenses due to the Yemen war, soon appeared to be unproductive, and came under reconsideration. Influential administrative, cultural, economic, and political barriers impeded the effectiveness of the implemented reforms, and more fundamental reforms to minimize the role and size of the state replaced salary cuts for public employees, which were no longer seen as the only solution to the problem (Biygautane, Gerber, & Hodge, 2017).

Approximately six months later, in April 24, 2017, the economy of the country was gradually recovering due to increased oil prices. The king issued a royal decree restoring "all allowances, financial benefits, and bonuses," also adding a two-month salary bonus for forces fighting in the kingdom's intervention in Yemen (Saudi Arabia restores perks to

state employees, 2017). This increase in the wages for public sector employees was in line with the traditional pro-cyclical fiscal policy behavior of Saudi Arabia and contributed to a positive economic expectation.

Furthermore, the episode of restoring bonuses and allowances for state employees coincided with the promotion of Prince Mohammed bin Salman bin Abdel-Aziz Al Saud in June 2017. The new young leader was ambitious and was putting efforts into projects that improved the economic diversification of the country and increased the role of the private sector. The restoration of bonuses and allowances for state employees, followed by the promotion of the young prince, was a positive impulse for the economy. In the new environment the market participants and investors were supposed to increase optimistic views toward the economy in the near-term horizon. The recovery of the economy and positive expectations were also delivered by different international organizations. For example, IMF experts were already speculating about the positive expectations in Saudi Arabia (Saudi Arabia's Economic Outlook, 2017). They highlighted the reverse of the salary cuts as a signal of improved economy.

This section investigates the market participants' response to the event of restoring the bonuses and allowances for Saudi state employees in April 24, 2017. According to my preliminary analysis, the market reaction was mainly optimistic in response to this event. The event study analyses for the (-5, +5) event window achieved a significance of CAARs in the firms acting in the banking sector, retailing sector, food and beverages production sector and telecommunication services. CAAR values for these sectors are mostly highly significant and are about 2.5%, 6.2%, 7.7%, and -6.5%, respectively. The positive CAAR values for the banking sector, retailing sector, and the food and beverages production sector

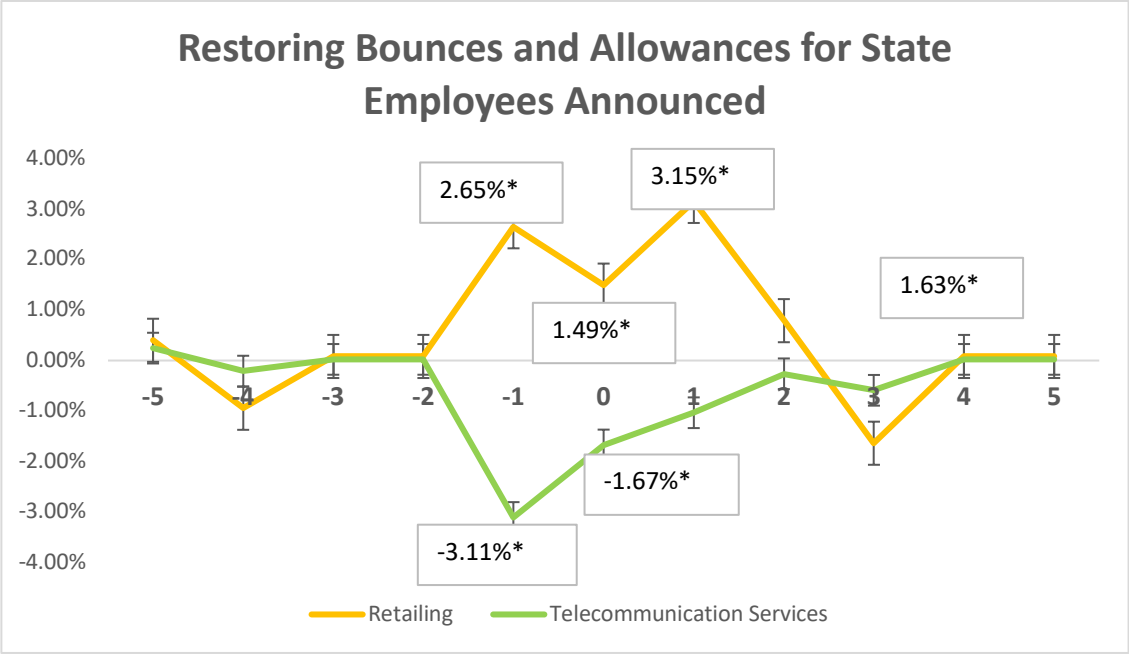
indicate that on average the market expected returns appeared to be significantly lower than the actual returns. Reverse reasoning can be applied for the telecommunication services, meaning that the market participants were expecting much higher returns for the firms in this sector, on average being more optimistic. The later results could be explained by the fact that unlike the other above-mentioned sectors, the firms in the telecommunication sector of Saudi Arabia have been private since 1998, but the improvement of the economic response was due to wage increases for public sector employees. In addition, increased incomes contributed to the demand for the retailing sector and food and beverages sector goods.

Furthermore, for some of the sectors, I could identify significant AAR values prior to the event date. A particularly significant AAR value was observed for the food and beverages sector on the fourth day prior to the event. That value indicates the failure of efficient market hypothesis about the existence of prior knowledge not captured by the market forces. Significant AAR values are also observed during the event date and within a (-1,+1) window. Finally, for all the sectors, the AAR value approached 0 on the two days after the event day.

To summarize, the results of the event study analyses for the event restoring the bonuses and allowances for Saudi state employees on April 24, 2017, were consistent with market expectations. I found significant negative CAAR values for the sector with mainly private firms, and positive CAAR values for those sectors with increased demand and a high share in the public sector. Again, I could not discover significant CAAR values in the energy sector, which was expected according to my reasoning. Finally, I also found mainly homogeneous developments in AAR values for the examined event window. The analyses

indicate the possibility of abnormal returns for some prior days and during the first days of the event, but the significance diminished after a few days. That is an indication that the market did not react efficiently during the event window of this event.

Figure 18: Sectors with significant AAR values for Event 7.



Note: (*) indicates $p \leq 0.05$.

Event 8: Appointment of MBS as a crown prince (June 21, 2017)

As we have seen with the previous event, the appointment of 33 year old Crown Prince Mohammed bin Salman (MBS) coincided with the restoration of salaries for state employees. The appointment of such a young crown prince was unusual in Saudi history, and for a long time this event was in the headlines. Unsurprisingly, I received a number of significant CAAR values for this event since it was a major event in the history of Saudi Arabia.

The new Crown Prince supported reforms in conservative Saudi Arabia and gained support from western leaders for his ideas about social reform, diversification of the economy, and desire to increase the role of the private sector. He was widely considered one of the initiators of the aspiring Vision 2030 program (Kinninmont, 2017). The appointment of the young price was believed to usher in an era of great change towards social and economic liberalization of the kingdom, economic diversification, and less dependence on the oil sector (Bouoiyou & Selmi, 2018). The ambitious plans of the prince included revolutionary diversification of the economy, with the increase in the non-oil sector revenue of the country by about 3.7 times by 2020, and by 6 times by 2030 (Saudi Crown Prince Mohammed bin Salman, power behind the throne, 2018). In addition to economic diversification, the prince was also planning to start a mega project of building a new $500billion dollar city (Robinson, S, Nakhoul, S & Kalin, S., 2017). This news, along with the possible privatization of oil giant Saudi Aramco, was supposed to make a large contribution towards the development of the non-oil sector, enliven the financial markets, and improve the investment environment of the country. He was especially popular among the young citizens; many of whom supported his vision for the future of the economy, with the belief that the new prince would lead the Saudi economy to prosper in the future with more democratic views and less dependence on oil income. However, since this situation was unusual in the history of Saudi Arabia, some investors were concerned whether the young prince would be successful in reforming the country.

Also, the Prince has been criticized by some international news outlets for initiating the war in neighboring Yemen in 2015 when he served as the minister of defense. Some authors predicted that the appointment of the young crown prince would bring “Saudi’s Arab

Spring" (Bouoiyou & Selmi, 2018), but that did not happen. No matter what, the appointment of MBS as a crown prince was a crucial event for the kingdom, predicting revolutionary modifications towards economic diversification (Lavergne, 2018).

In this section, I will investigate the market response to the appointment of the young crown prince of Saudi Arabia. Despite the controversy around the naming of the young Prince MBS, his appointment can be considered both as a positive and as a negative impulse for the market participants. Among the examined events so far, I received a number of significant CAAR values for the event of MBS's appointment. In particular, for a (-5, +5) event window, I achieved a significant value for firms acting in material production, retailing, real estate management and development, insurance, diversified financials, capital goods production, food and staples retailing, and consumer services. Interestingly, I received negative CAAR values in all the examined sectors and the actual returns appeared to be significantly lower than the expected returns. The observed significant CAAR values for these sectors were -5.9%, -7.2%, -4.4%, -7.7%, -4.6%, -7.4%, -7.1% and -5.8%, respectively.

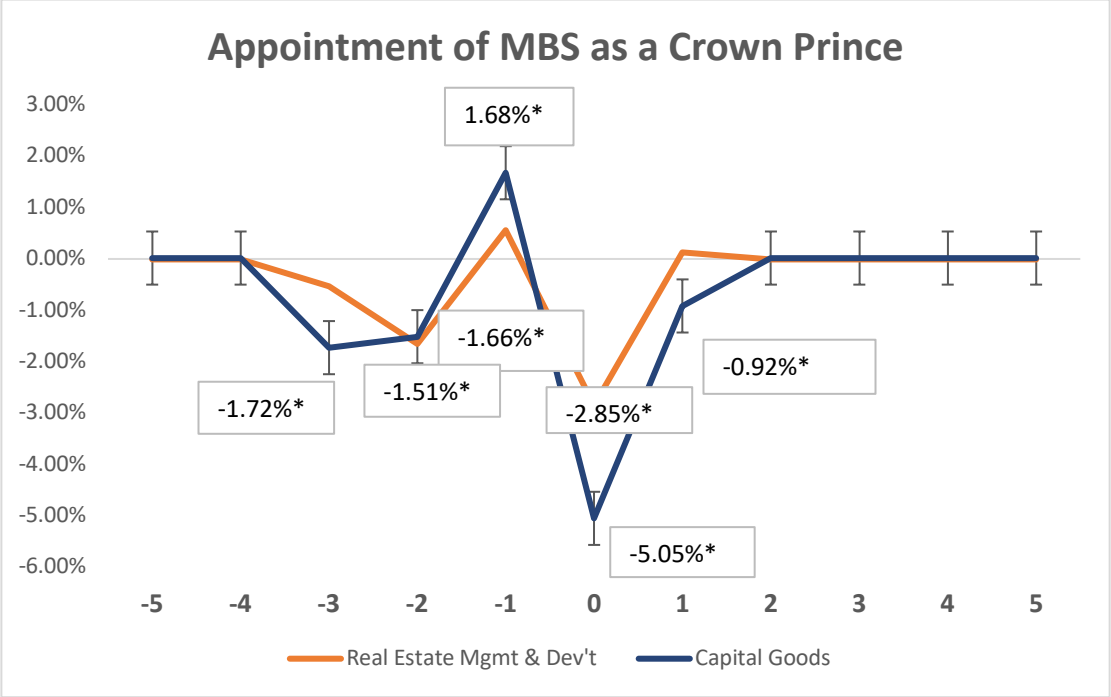
These results appeared to be consistent with the overall uncertainty connected with the young prince. Many young people see him as the strong leader who will direct the country towards a more democratic society and diversified economy, but others have some concerns regarding challenges he faces to reform the country and diversify the economy. Thus, market expected returns were significantly higher and over-optimistic than the actual returns appeared to be. This result shows that many investors were worried about the stability of the economy. Never before in the history of Saudi Arabia had such a young

crown prince passed the ranking system of the kingdom. Therefore, there was an understandable increase in economic and political uncertainty.

Additionally, I also observed mainly homogeneous paths in AAR values. In almost all the sectors the significance of AAR returns was observed two to three days prior to the event date, which was highly positive during the one day prior to the event, and mainly negative for earlier dates. This result indicates a possible existence of prior knowledge about this event. Further, in almost all the sectors I observed significant AAR values during the event date. Finally, for all the post event dates, the AAR values were insignificant, with almost zero values after the first post event day. Therefore, I can observe the possibility of abnormal returns during the event day and prior few days, but markets became efficient after the event day.

In summary the results of the event study analyses for the appointment of MBS as a crown prince in June 21, 2017 were consistent with the market reaction and uncertainty around this episode. In most of the examined sectors, I found significant negative CAAR values, indicating an exceeding of market expectations by the investors over the actual returns. Also, the AAR values were significant only during the event day and a few days prior to it, and efficient market hypothesis was recovered for all the post event days.

Figure 19: Sectors with significant AAR values for Event 8.



Note: (*) indicates $p \leq 0.05$.

Event 9: Saudi Arabia Admitted Khashoggi Killing (October 20, 2018)

Next I study the event connected with the death of Saudi journalist Jamal Khashoggi, who was killed in the Saudi consulate in Istanbul. Jamal Khashoggi used to be an adviser to the Saudi government and had close relationships with the royal family until 2017. However, since then, he moved to the U.S. and had started to heavily criticize the Saudi government's policies, and the crown prince MBS personally, in his publications in *The Washington Post*.

The international community was shocked by the death of the famous journalist, and many people around the world, including the Saudi people, found this event extremely troubling. After a few weeks of denying Khashoggi's death, the Saudi government officially admitted that the crime took place in the Saudi consulate in Istanbul and it was

done by some Saudi officials who abused their power. MBS stated he did not order the assassination of Khashoggi nor did he know anything about the planning of this crime. The government also announced that 18 people connected with this crime were arrested in Saudi Arabia and two senior officials connected to the crown prince were fired.

The U.S. president Donald Trump supported Saudi Arabia's official version of events and told journalists that the explanations seemed "credible" (Lynos, 2018). In response to the call of many lawmakers in the senate to conduct an independent investigation of the incident and apply sanctions against Saudi Arabia, President Trump said that he would consider it, but not at the moment (Saudi Arabia admits Jamal Khashoggi killed in Istanbul consulate, 2018). Immediate reactions arose from other leading countries. Many European countries stated that Saudi Arabia's acceptance of the incident was already some progress, but that a further, transparent investigation was essential as the explanations by the Saudi government were not fully convincing. In contrast, officials from neighboring Egypt and the UAE supported the Saudi government and announced that they believed the Saudi government's investigation of the incident was objective.

The Saudi Arabian reputation was seriously damaged after the death of the journalist Jamal Khashoggi, and negative economic consequences were expected immediately. Combined with the high possibility of sanctions by the U.S. and other western countries, many analysts predicted that many foreign companies would cancel investment plans in the country, especially in non-oil sectors (Heeb, 2018). Thus, the Crown Prince's effort to diversify the economy and build a smart mega-city were in serious doubt. According to *The Independent Journal*, there was more than $1bn in outflow of foreign investments as a result of this event (Chapman, 2018).

Khashoggi's tragic murder also raised concerns about the strategic relationship of Saudi Arabia with the United States and increased further uncertainty around the future of the Saudi economy (Harrison, 2017). Nevertheless, scholars were convinced that the event would not have any serious damage on the relationship between the two countries in the near future.

Despite the importance of this event, its implication on the Saudi stock market is not consistently investigated by scholars. Among the few papers, Bouoiyou and Semi (2018) implement an event study analysis on the dynamics of stock prices surrounding the killing of the Saudi journalist. They found that Khashoggi's killing event had the most negative impact on banks and financial services, materials, and technology. Oil and gas companies, however, were moderately or insignificantly affected. Overall, their results suggest that the crown prince's ambitious project for a Saudi Arabian economy that moved beyond oil wealth was threatened by this recent event, which dampened foreign interest in investing in the kingdom.

My result shows significant negative AAR values for the firms acting in the diversified financial sector. According to my findings, the firms acting in this sector were affected negatively with the CAAR value of about -4.7%. The negative response of the financial services was expected as some foreign investors lost their confidence in investing in the Saudi economy, while many local investors had hopes that the Saudi economy would greatly benefit from foreign investment. Furthermore, I also observed positive AAR values for the firms in the insurance sector, and capital goods production sector. The CAAR values are correspondingly 3.5% and 8.3%. The positive CAAR values are consistent with my beliefs that this shock had significantly increased the uncertainty in the markets,

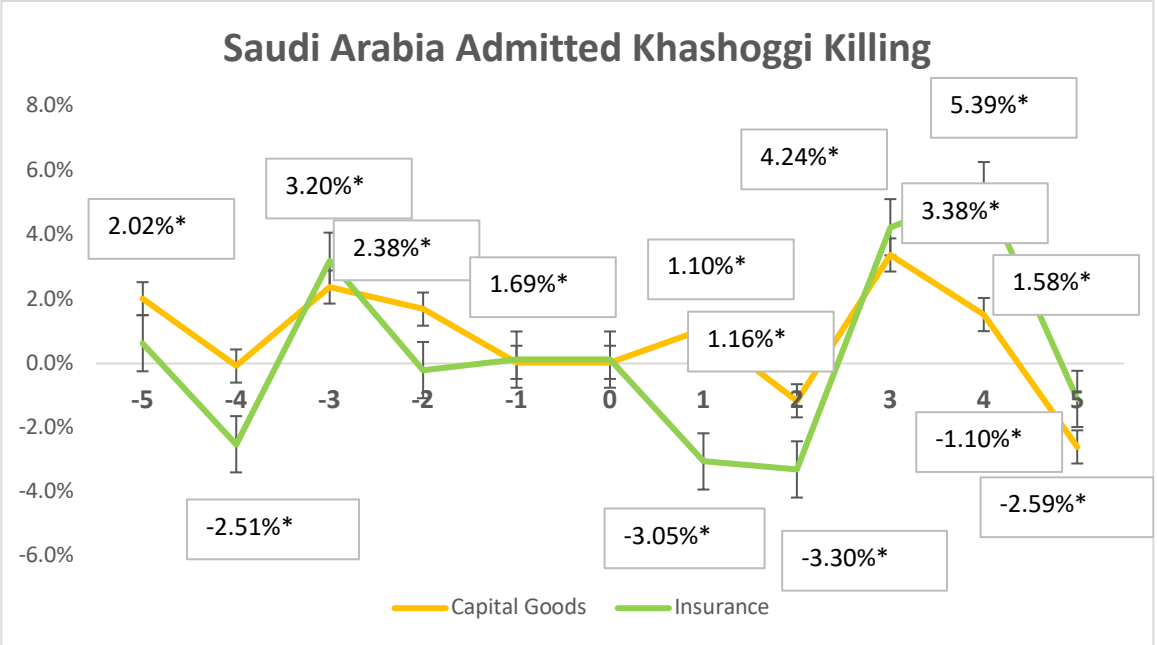
consequently enlarging the demand and the prices for insurance services. Furthermore, investors in the capital goods production sector probably found the announcement by the Saudi government a positive move and it was a relief for many of them that the government was not part of this crime. This will bring back confidence in the market again and will bring back foreign investment. For investors, bringing back foreign investment to Saudi Arabia economy means a positive expected return for firms acting in the capital goods sector. The Crown Prince's effort to diversify the economy and build a smart mega-city called NEOM (which is partially funded by foreign investors) and other local projects will continue and that increases the demand for capital goods.

Finally, for this event I also observed mainly homogeneous paths in AAR values. Almost in all the sectors the significance of AAR returns was observed in the three to four days before and after the event date. The highest values of positive AAR values were observed for the third and fourth days after the event day. Interestingly, I also observed significant negative AAR values prior to the event days, meaning that the markets were already aware of the event and were affected negatively by it prior to the official admission of Khashoggi's killing on October 20, 2018.

In summary, the results of the analysis for this event was consistent with the overall negative environment and market expectations. Furthermore, my results are also mostly in line with the ones found by the scholars investigating the dynamics of stock prices connected with this event. My results suggest that due to the lost reputation and decreased confidence of foreign investors, the expected returns were significantly higher than the actual returns for the firms acting in the diversified financials sector. Meanwhile, positive CAARs were observed for the firms acting in the insurance and capital goods production

sectors. Overall, I justify these results by the increased uncertainty in the markets, which caused an increase in demand and prices for the insurance services. On the other hand, this event was good news for some investors as it was a relief that this announcement would bring back confidence in the market, which would increase foreign investment.

Figure 20: Sectors with significant AAR values for Event 9.



Note: (*) indicates $p \leq 0.05$.

CONCLUSIONS

The purpose of this study is to implement event study analyses for the dynamics of stock prices in Saudi Arabian markets during the first five days, surrounding the event dates. The Saudi Stock Exchange, Tadawul, is considered the largest capital market in the Middle East and North Africa. The Saudi economy is among the wealthiest in the Middle East, demonstrating sustainable high growth rates during the recent decades and offers an advanced business ecosystem and investment environment. Thus, my study may be attractive for many acting and potential investors in the Saudi economy.

I tested the development of stock price returns for the firms acting in different sectors of the Saudi Arabian market in response to nine different events. The list of the events I considered include not only an important domestic occasion for Saudi Arabia, but also regional events, like the killing of the Libyan president Muammar Gaddafi, as well some global events, including the bankruptcy of Lehman Brothers and Trump's victory in the US elections. In this way, I aim to check the Saudi market reaction and its resilience towards both domestic and external shocks. This method will also enable us to implement comparisons of the responses to different important regional and global events for the expectations of market participants in Saudi Arabia, neighboring countries and global economies.

Following the research objectives, employed methods is an event study analysis, which investigates the market reaction in Saudi Arabia to different important events. Event studies have a long history, and were extensively used in accounting and finance literature, as well as in economics. After the first published paper (Dolley, 1933), many scholars employed this approach to investigate different firm specific or economy wide events on the expectations of market participants. This type of analysis starts with the definition of the events of interest. Then the period over which the related security prices will be examined (event window) and the model estimation period (estimation window) are determined. Finally, the selection criteria for inclusion of a given stock in the study are defined.

With the next step, the individual stock daily prices and market daily prices are converted to daily returns. Then, according to the market model, the returns on each security is regressed against the market returns using an ordinary least squares (OLS)

estimator. The market model assumes that the estimated intercept and the slope coefficients are constant during the estimation and event windows. In addition, the market model may be biased due to the omission of different important factors, but in practice, the results and conclusions of multifactor models for event studies does not gain much improvement. The parameters of the market model are estimated using an estimation window, which is set before the event window, and usually does not include the data for the event dates.

The abnormal returns for an individual security on each day is then calculated as the difference between the actual observed returns and the predicted returns, using the OLS regression of the market model. With this approach the effects of total economic factors are removed from the returns of the individual stocks, leaving only the portion of the return explained by the firm specific information.

In the next step, the estimated abnormal returns are used to calculate the daily AARs and CAARs for the specified event window. The CAARs are measured based on the cumulative summation of the estimated AAR values. The information from the pre-event days is also considered, as the price movements prior to the event day may also be observed as a consequence of inside information or rumors about the examined upcoming events. For the purpose of my research, I consider an event window with five days prior and five days post to the event day for the estimation of AARs and corresponding CAARs.

Finally, the hypothesis related to market reaction is tested based on the significance tests for AAR and CAAR values. Under the null hypothesis, I test the corresponding AAR and the CAARs values, which are no different from zero, meaning there is no

abnormal returns associated with the event during the event window. The rejection of the null hypothesis is the sign that there is a significant reaction (abnormal returns) by the market participants to the examined events during the specified event window, which resulted in a significant deviation of the actual returns from the expected returns by the market participants.

Summary of the Results

I found that the market participants react both positively and negatively to different events examined in the study, which was reflected in observing both positive and negative CAARs. The analyses revealed that the significant CAAR values were observed in response to the appointment of MBS as a crown prince in June 21, 2017 and in a number of sectors, the expected returns were significantly higher than the actual returns, such as material production, retailing, real estate management and development, insurance, diversified financials, capital goods production, food and staples retailing, and consumer services. All have significant CAAR values.

Negative and significant cumulative average abnormal returns are also found for the "Lehman Brothers Files for Bankruptcy" event. The estimates of CAAR values for this event is about -2.00 %. The collapse in the U.S. stock market a short time later spread to other economies with unprecedented speed, including the Saudi stock market. For the Lehman Brothers bankruptcy event, I found significant CAAR for the firms acting in materials production, insurance, and the capital goods production sectors.

Another interesting result, suggested by my analysis, is the fact that the insurance sector was the most responsive sector in the market and the one for which CAAR values were significantly more frequent among most of the examined sectors. The overall results

reveal that for the events worsening the market participants' expectations and increasing the overall market uncertainty, the demand and prices for insurance services increased. Subsequently, the market's actual prices in the insurance sector exceeded expected prices and generated positive abnormal returns for the firms acting in this sector in response to these events. The reverse situation was observed for the events, generating positive expectations. These types of events result in negative abnormal returns for the firms acting in the insurance sector since the demand for insurance services declined.

Also, one more crucial finding in our results is that the CAARs for the banking sector appeared to be insignificant for most of the studied events except for event 6 and 7. I attribute this result to the fact that the share of the foreign assets in the Saudi banking system is relatively small, which prevents the banking system from global imbalances and makes the system resilient to foreign shocks.

Furthermore, a prudent and conservative supervisory framework and countercyclical fiscal and banking system policies, prevents the Saudi Arabian financial system from domestic and global imbalances. Therefore, most of the examined events failed to have a significant impact on the CAAR values for the banking sector.

The most noteworthy event in the study was the appointment of MBS as the crown prince, for which the CAAR values were significant for a great majority of the examined sectors. This finding is also rational, with the reasoning as follows: the market participants were excited about this event, as the young prince was expected to bring revolutionary changes to the Saudi economy with his ambitious plans of diversification of the economy, privatization of the giant state owned oil producer, ARAMCO, and the promise of a dramatic increase in the non-oil sector revenue of the country. This explains

why, for instance, the CAARs of the materials production sector was the maximum observed among the others in response to this event; it was approximately -8.98%. Nevertheless, the observed returns in all the sectors appeared to be considerably lower than the expected ones, making the CAARs negative and highly significant. This situation could be attributable to some investors viewing this event as something that had never happened in the history of Saudi Arabia, which shocked the economy and contributed to increased economic and political uncertainty.

My results could be a crucial contribution to the literature, which lacks empirical analyses studying financial market's participants' responses to different important events in Saudi Arabia. The findings of this study are mainly consistent with the few papers available in the literature. In particular, similar to Miniaoui, Sayani and Chalibi (2015), I also received a limited response of market participants to the global financial crisis in 2008. In contrast to Bouoiyour and Selmi's (2018) conclusions, I also found Khashoggi's killing resulted in significant negative abnormal returns for the firms acting in the diversified financials sector. I also received positive abnormal returns for the firms in the insurance sector. Furthermore, My results also provided some insights about the market reaction in Saudi Arabia during different atypical situations and could be an important toolkit for investors in different sectors of the Saudi Arabian stock market and allow them to identify when to hedge risk.

Another important finding that provides information about the Saudi market efficiency. The Efficient Market Hypothesis indicates that stock markets are efficient and that prices reflect all publicly available information relevant to the prospects of the firm. Thus, the effect of an event will be reflected almost immediately in asset prices. That

means nonzero abnormal returns prior or following an event are inconsistent with market efficiency (Kothari and Warner, 2006). The results of the significance tests enabled me to draw conclusions about the validity of the efficient market hypothesis in Saudi Arabia and discuss the expectations of investors in response to different important events. My results show abnormal returns prior and following almost all the nine events that have been tested which is an indication of market inefficiency.

For Further Research

I accept that this study is just the beginning of a series of analyses to discover the market reaction in Saudi Arabia during different local and global atypical situations. For future research, I suggest that the Saudi stock market can be analyzed and compared based on these events to more efficient stock markets, like the US stock market, and also to the markets of neighboring GCC member countries and discuss their reactions. This will enable one to understand both the impact of local and global events on the regional markets, as well as discovering whether Saudi financial markets share common global trends.

Another important analysis could be testing the model for different sizes of event windows--both symmetric event windows with longer periods, and also asymmetric event windows--by testing the significance of CAARs for the pre and post event dates separately. This data would provide an important, robust check for the current results, as well as capturing important tendencies not captured by the short length of the examined event window. For example, changing the event window length for the local events that show abnormal returns before the event date which indicates an existence of prior

knowledge not captured by the market forces. Altering the event window to (-10, +5) instead of (-5, +5), would provide more important information about the market efficiency and whether some investors are able to gain abnormal profit because they can predict asset prices due to existence of prior knowledge about an event.

Furthermore, in terms of methods, future study may consider other model specifications, particularly the constant-mean-return model (COMEAN), Fama and French (1992, 1993) factor models, and buy-and-hold abnormal returns model (BHAR). These methods would serve as a robust check on my results and some of the issues not addressed in this study.

Appendix: Tables that show all AAR and t-test values for all sectors and by event

Table 7: Banking Sector

	t	-5	-4	-3	-2	-1	0	1	2	3	4	5	CAAR	t-test
E1	AAR	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.008	0.014	-0.001		
	t-test	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033	**-3.295 (*)**	**6.35 (*)**	-0.667		
E2	AAR	0.000	0.001	0.001	-0.027	0.022	0.002	-0.013	0.002	0.001	0.001	0.022		
	t-test	-0.017	0.155	0.155	**-3.18 (*)**	**2.587 (*)**	0.183	-1.506	0.283	0.155	0.155	**2.539 (*)**		
E3	AAR	0.010	-0.008	0.001	0.000	0.000	0.001	0.001	-0.003	-0.003	0.002	-0.003		
	t-test	**2.55 (*)**	**-1.84**	0.212	0.069	0.118	0.152	0.152	-0.631	-0.624	0.489	-0.773		
E4	AAR	0.000	0.000	-0.001	-0.003	0.004	0.007	-0.002	0.000	0.000	-0.002	-0.002		
	t-test	-0.058	-0.058	-0.114	-0.520	0.759	1.163	-0.435	-0.058	-0.058	-0.350	-0.421		
E5	AAR	-0.001	0.000	-0.003	0.000	0.000	-0.003	0.000	0.001	0.000	0.001	0.000		
	t-test	-0.182	0.061	-0.478	0.070	0.070	-0.474	-0.013	0.185	-0.027	0.188	0.070		
E6	AAR	0.001	0.001	0.001	0.000	0.001	0.010	-0.002	0.012	0.001	0.001	0.014		
	t-test	0.229	0.196	0.196	-0.025	0.173	**2.023 (*)**	-0.428	**2.289 (*)**	0.196	0.196	**2.871 (*)**	0.040	**2.233 (*)**
E7	AAR	0.006	0.005	0.000	0.000	-0.002	0.001	0.002	0.012	0.000	0.000	0.000		
	t-test	**2.182 (*)**	1.623	0.007	0.007	-0.524	0.274	0.618	4.143 (*)	0.145	0.007	0.007	0.025	**2.459 (*)**
E8	AAR	0.000	0.000	-0.003	0.007	-0.006	-0.006	0.004	0.000	0.000	0.000	0.000		
	t-test	0.077	0.077	-0.761	**2.136 (*)**	-1.619	**-1.72**	1.315	0.077	0.077	0.077	0.077		
E9	AAR	0.001	0.006	-0.013	0.005	0.000	0.000	0.004	0.014	-0.015	-0.001	0.003		
	t-test	0.339	1.570	**-3.79 (*)**	1.489	-0.033	-0.033	1.276	**3.913 (*)**	**-4.27 (*)**	-0.286	0.659		

Note: (*) indicates $p \leq 0.05$.

Table 8: Energy Sector

	t	-5	-4	-3	-2	-1	0	1	2	3	4	5	CAAR	t-test
E1	AAR	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.005	0.007	-0.002		
	t-test	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	-1.583	**2.302 (*)**	-0.664		
E2	AAR	0.010	-0.002	-0.002	-0.044	0.029	-0.043	0.023	0.001	-0.002	-0.002	0.026		
	t-test	0.010	-0.002	-0.002	-0.044	0.029	-0.043	0.023	0.001	-0.002	-0.002	0.026		
E3	AAR	0.009	-0.011	-0.009	-0.003	-0.022	0.000	0.000	0.015	-0.006	-0.011	0.005		
	t-test	0.908	-1.149	-0.914	-0.288	**-2.354 (*)**	0.027	0.027	1.544	-0.590	-1.161	0.496		
E4	AAR	0.000	0.000	-0.003	-0.003	-0.001	-0.012	0.007	0.000	0.000	0.007	0.016		
	t-test	0.009	0.009	-0.348	-0.433	-0.179	-1.396	0.848	0.009	0.009	0.816	**2.034 (*)**		
E5	AAR	-0.004	0.004	-0.002	0.000	0.000	0.000	0.005	-0.001	0.006	-0.005	0.000		
	t-test	-0.461	0.483	-0.266	-0.051	-0.051	0.045	0.588	-0.090	0.689	-0.525	-0.051		
E6	AAR	0.003	0.000	0.000	0.004	0.010	0.006	0.000	-0.002	0.000	0.000	-0.002		
	t-test	0.505	0.072	0.072	0.593	1.613	0.967	0.039	-0.404	0.072	0.072	-0.402		
E7	AAR	0.000	0.003	0.000	0.000	0.001	0.009	-0.002	0.000	0.005	0.000	0.000		
	t-test	0.022	0.338	0.014	0.014	0.111	1.186	-0.324	-0.036	0.693	0.014	0.014		
E8	AAR	0.000	0.000	-0.006	-0.017	0.012	-0.045	-0.007	0.000	0.000	0.000	0.000		
	t-test	0.039	0.039	-0.696	**-1.779**	1.285	**-4.450 (*)**	-0.726	0.039	0.039	0.039	0.039	-0.061	**-1.804**
E9	AAR	0.034	-0.041	0.009	0.002	-0.001	-0.001	-0.031	-0.033	0.063	0.014	-0.036		
	t-test	**4.169 (*)**	**-5.530 (*)**	1.247	0.285	-0.081	-0.081	**-4.181 (*)**	**-4.395 (*)**	**8.476 (*)**	**1.823**	**-4.417 (*)**		

Note: (*) indicates $p \leq 0.05$

Table 9: Materials Sector

	t	-5	-4	-3	-2	-1	0	1	2	3	4	5	CAAR	t-test
E1	AAR	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.004	0.005	-0.002		
	t-test	-0.110	-0.110	-0.110	-0.110	-0.110	-0.110	-0.110	-0.110	**-2.96 (*)**	**3.837 (*)**	-1.626		
E2	AAR	0.001	0.000	0.000	-0.031	0.018	-0.022	-0.012	0.006	0.001	0.000	0.017		
	t-test	0.241	0.021	0.021	**-10.53 (*)**	**5.874 (*)**	**-7.190 (*)**	**-4.130 (*)**	**2.157 (*)**	0.257	0.021	**5.637 (*)**	-0.023	**-2.332 (*)**
E3	AAR	0.008	-0.013	-0.001	-0.002	-0.006	0.000	0.000	0.004	0.001	0.000	0.001		
	t-test	**1.77**	**-2.979 (*)**	-0.230	-0.447	-1.333	-0.073	-0.073	0.963	0.193	0.083	0.239		
E4	AAR	0.000	0.000	-0.006	0.000	0.002	-0.006	0.004	0.000	0.000	-0.003	0.006		
	t-test	0.115	0.115	**-2.757 (*)**	-0.037	0.844	**-2.709 (*)**	**1.832**	0.107	0.115	-1.297	**3.131 (*)**		
E5	AAR	-0.003	0.001	0.003	0.000	0.000	0.003	0.001	0.000	0.000	0.000	0.000		
	t-test	-1.497	0.498	1.580	0.203	0.203	1.611	0.392	0.209	-0.091	0.189	0.203		
E6	AAR	0.000	0.000	0.000	0.003	0.007	0.002	0.003	0.006	0.000	0.000	0.003		
	t-test	-0.075	0.017	0.017	1.461	**3.281 (*)**	1.144	1.225	**2.667 (*)**	0.017	0.017	1.386	0.023	**3.213 (*)**
E7	AAR	-0.003	0.003	0.001	0.001	-0.005	0.000	0.006	-0.002	0.000	0.001	0.001		
	t-test	-1.519	1.381	0.293	0.293	**-2.497 (*)**	-0.169	**2.782 (*)**	-1.161	0.156	0.293	0.293		
E8	AAR	0.001	0.001	-0.010	-0.012	0.011	-0.039	-0.011	0.001	0.001	0.001	0.001		
	t-test	0.256	0.256	**-5.324 (*)**	**-6.119 (*)**	**5.337 (*)**	**-17.98 (*)**	**-5.365 (*)**	0.256	0.256	0.256	0.256	-0.059	**-8.979 (*)**
E9	AAR	0.015	-0.016	0.010	0.002	0.000	0.000	-0.018	-0.027	0.032	0.007	-0.013		
	t-test	**7.614 (*)**	**-9.179 (*)**	**5.436 (*)**	1.081	0.163	0.163	**-9.980 (*)**	**-15.220 (*)**	**18.050 (*)**	**4.070 (*)**	**-6.553 (*)**		

Note: (*) indicates $p \leq 0.05$

Table 10: Retailing Sectors

	t	-5	-4	-3	-2	-1	0	1	2	3	4	5	CAAR	t-test
E1	AAR	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.002	0.004	0.001		
	t-test	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022	-0.901	1.567	0.251		
E2	AAR	-0.001	0.000	0.000	0.001	-0.003	-0.009	-0.009	0.007	0.000	0.000	0.013		
	t-test	-0.278	0.042	0.042	0.110	-0.574	-1.558	**-1.739**	1.254	0.042	0.042	**2.432 (*)**		
E3	AAR	0.003	-0.002	-0.009	0.015	-0.005	-0.001	-0.001	0.018	-0.004	-0.003	-0.001		
	t-test	0.465	-0.409	**-1.695**	**2.632 (*)**	-0.826	-0.098	-0.098	**3.246 (*)**	-0.747	-0.548	-0.232		
E4	AAR	0.000	0.000	0.000	0.006	-0.003	0.000	0.004	0.000	0.000	0.006	0.025		
	t-test	0.013	0.013	-0.004	1.100	-0.631	-0.032	0.697	0.013	0.013	1.132	**4.534 (*)**	0.037	**1.919**
E5	AAR	-0.002	0.000	-0.002	0.000	0.000	0.006	-0.001	0.000	0.006	-0.004	0.000		
	t-test	-0.351	-0.039	-0.343	-0.028	-0.028	0.905	-0.156	0.021	0.919	-0.661	-0.028		
E6	AAR	0.000	0.001	0.001	0.008	0.009	-0.001	0.009	0.010	0.001	0.001	0.011		
	t-test	-0.041	0.168	0.168	1.441	1.545	-0.224	1.533	1.628	0.168	0.168	**1.92**	0.050	**2.294 (*)**
E7	AAR	0.004	-0.009	0.001	0.001	0.026	0.015	0.031	0.008	-0.016	0.001	0.001		
	t-test	0.631	-1.484	0.127	0.127	**4.156 (*)**	**2.349 (*)**	**4.944 (*)**	1.242	**-2.574 (*)**	0.127	0.127	0.062	**2.734 (*)**
E8	AAR	-0.001	-0.001	-0.022	-0.020	0.005	-0.037	0.009	-0.001	-0.001	-0.001	-0.001		
	t-test	-0.186	-0.186	**-3.276 (*)**	**-2.890 (*)**	0.798	**-4.926 (*)**	1.288	-0.186	-0.186	-0.186	-0.186	-0.072	**-3.005 (*)**
E9	AAR	0.007	-0.024	0.012	0.000	0.001	0.001	-0.020	-0.010	0.031	0.023	0.012		
	t-test	0.918	**-3.574 (*)**	**1.84**	-0.073	0.096	0.096	**-3.089 (*)**	-1.475837	**4.590 (*)**	**3.555 (*)**	1.599		

Note: (*) indicates $p \leq 0.05$

Table 11: Food & Beverages Sector

	t	-5	-4	-3	-2	-1	0	1	2	3	4	5	CAAR	t-test
E1	AAR	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.002	0.005	-0.001		
	t-test	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	-0.798	**1.822**	-0.217		
E2	AAR	-0.002	0.000	0.000	-0.029	0.009	-0.041	-0.001	0.017	0.000	0.000	0.029		
	t-test	-0.188	0.014	0.014	**-2.685 (*)**	0.798	**-3.714 (*)**	-0.055	1.594	0.014	0.014	**2.710 (*)**		
E3	AAR	0.003	-0.022	0.000	-0.012	0.008	0.000	0.000	0.028	-0.007	-0.011	0.002		
	t-test	0.473	**-3.403 (*)**	0.073	**-1.821**	1.318	0.019	0.019	**4.419 (*)**	-1.030	**-1.796**	0.394		
E4	AAR	0.000	0.000	-0.007	0.015	-0.001	-0.023	-0.011	0.000	0.000	0.013	-0.001		
	t-test	0.047	0.047	-1.432	**2.980 (*)**	-0.258	**-4.449 (*)**	**-2.242 (*)**	0.047	0.047	**2.537 (*)**	-0.202		
E5	AAR	-0.009	-0.001	0.000	0.001	0.001	0.015	0.000	-0.001	0.002	0.000	0.001		
	t-test	**-1.691**	-0.148	-0.082	0.094	0.094	**2.684 (*)**	-0.035	-0.166	0.449	-0.035	0.094		
E6	AAR	0.001	0.001	0.001	0.006	-0.003	-0.016	-0.001	0.005	0.001	0.001	0.010		
	t-test	0.296	0.135	0.135	1.359	-0.701	**-3.229 (*)**	-0.191	0.993	0.135	0.135	**2.001 (*)**		
E7	AAR	0.008	0.071	0.000	0.000	-0.001	-0.001	0.003	-0.001	-0.003	0.000	0.000		
	t-test	1.354	**12.46 (*)**	0.022	0.022	-0.090	-0.236	0.576	-0.147	-0.451	0.022	0.022	0.0770	**3.919 (*)**
E8	AAR	-0.001	-0.001	-0.008	-0.005	0.007	-0.027	0.003	-0.001	-0.001	-0.001	-0.001		
	t-test	-0.117	-0.117	-1.061	-0.688	0.886	**-3.056 (*)**	0.427	-0.117	-0.117	-0.117	-0.117		
E9	AAR	0.016	-0.021	0.017	-0.006	0.001	0.001	-0.011	-0.023	0.028	0.015	0.000		
	t-test	**3.940 (*)**	**-5.498 (*)**	**4.662 (*)**	-1.622	0.236	0.236	**-2.896 (*)**	**-6.134 (*)**	**7.362 (*)**	**4.087 (*)**	-0.069		

Note: (*) indicates $p \leq 0.05$

Table 12: Utilities Sector

	t	-5	-4	-3	-2	-1	0	1	2	3	4	5	CAAR	t-test
E1	AAR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
	t-test													
E2	AAR	0.015	0.001	0.001	-0.030	0.020	-0.013	-0.018	0.005	0.001	0.001	0.016		
	t-test	1.173	0.043	0.043	**-2.423 (*)**	1.564	-0.995	-1.418	0.392	0.043	0.043	1.283		
E3	AAR	0.005	0.000	-0.001	-0.012	-0.002	0.000	0.000	-0.001	0.003	-0.001	0.001		
	t-test	0.569	-0.051	-0.107	-1.272	-0.216	0.019	0.019	-0.133	0.308	-0.102	0.153		
E4	AAR	0.000	0.000	-0.001	-0.007	0.007	0.005	0.002	0.000	0.000	-0.011	0.004		
	t-test	-0.080	-0.080	-0.191	-1.156	1.146	0.860	0.387	-0.080	-0.080	-1.795	0.607		
E5	AAR	-0.019	-0.005	-0.008	0.000	0.000	0.016	-0.008	-0.005	0.000	0.003	0.000		
	t-test	**-2.339 (*)**	-0.632	-0.991	-0.054	-0.054	**1.871**	-0.945	-0.628	-0.034	0.319	-0.054		
E6	AAR	0.004	-0.001	-0.001	-0.002	-0.006	-0.008	0.002	0.009	-0.001	-0.001	0.000		
	t-test	0.442	-0.112	-0.112	-0.272	-0.683	-0.871	0.202	1.010	-0.112	-0.112	0.049		
E7	AAR	-0.006	-0.009	-0.001	-0.001	-0.007	0.002	0.007	-0.006	-0.002	-0.001	-0.001		
	t-test	-0.537	-0.807	-0.055	-0.055	-0.660	0.161	0.679	-0.570	-0.182	-0.055	-0.055		
E8	AAR	-0.001	-0.001	0.016	-0.015	0.011	-0.017	0.019	-0.001	-0.001	-0.001	-0.001		
	t-test	-0.079	-0.079	**1.687**	-1.523	1.179	-1.586	**1.922**	-0.079	-0.079	-0.079	-0.079		
E9	AAR	0.034	0.008	0.010	-0.001	0.001	0.001	-0.029	-0.025	0.022	-0.005	-0.020		
	t-test	**5.659 (*)**	1.475	**1.869**	-0.212	0.157	0.157	**-5.260 (*)**	**-4.619 (*)**	**3.913 (*)**	-0.976	**-3.219 (*)**		

Note: (*) indicates $p \leq 0.05$. And (N/A) indicates no data available or firms were not established during the time period.

Table 13: Transportation Sector

	t	-5	-4	-3	-2	-1	0	1	2	3	4	5	CAAR	t-test
E1	AAR	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.006	0.021	-0.003		
	t-test	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	-1.403	**5.454 (*)**	-0.648		
E2	AAR	0.016	0.001	0.001	-0.010	-0.006	-0.034	-0.009	0.007	0.001	0.001	0.018		
	t-test	**2.027 (*)**	0.104	0.104	-1.205	-0.746	**-4.081 (*)**	-1.126	0.924	0.104	0.104	**2.233 (*)**		
E3	AAR	-0.008	-0.011	-0.005	0.004	0.007	0.000	0.000	0.010	0.008	0.010	0.002		
	t-test	-1.195	-1.642	-0.703	0.549	1.052	0.035	0.035	1.427	1.132	1.384	0.329		
E4	AAR	0.000	0.000	0.002	0.015	-0.007	-0.024	-0.013	0.000	0.000	0.005	0.006		
	t-test	0.026	0.026	0.304	**2.129 (*)**	-1.053	**-3.387 (*)**	**-1.919**	0.026	0.026	0.781	0.917		
E5	AAR	-0.012	0.012	-0.006	0.000	0.000	-0.002	0.014	-0.004	-0.005	0.002	0.000		
	t-test	-1.569	1.636	-0.828	-0.030	-0.030	-0.253	**1.826**	-0.567	-0.720	0.267	-0.030		
E6	AAR	0.009	0.000	0.000	0.000	0.000	-0.012	0.006	0.018	0.000	0.000	0.020		
	t-test	1.353	-0.019	-0.019	-0.068	0.071	**-1.771**	0.918	**2.595 (*)**	-0.019	-0.019	**2.893 (*)**		
E7	AAR	0.003	-0.034	0.001	0.001	-0.003	-0.006	0.004	0.002	-0.004	0.001	0.001		
	t-test	0.321	**-4.345 (*)**	0.072	0.072	-0.366	-0.790	0.460	0.236	-0.479	0.072	0.072		
E8	AAR	0.001	0.001	-0.009	-0.012	0.011	-0.039	-0.012	0.001	0.001	0.001	0.001		
	t-test	0.093	0.093	-1.126	-1.484	1.327	**-4.334 (*)**	-1.481	0.093	0.093	0.093	0.093	-0.058	**-1.949**
E9	AAR	0.024	-0.037	0.024	0.002	0.001	0.001	-0.027	-0.037	0.041	0.003	0.005		
	t-test	**3.269 (*)**	**-5.523 (*)**	**3.713 (*)**	0.350	0.079	0.079	**-4.057 (*)**	**-5.658 (*)**	**6.108 (*)**	0.496	0.714		

Note: (*) indicates $p \leq 0.05$

Table 14: Real Estate Mgmt & Dev't Sector

	t	-5	-4	-3	-2	-1	0	1	2	3	4	5	CAAR	t-test
E1	AAR	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.006	0.011	-0.002		
	t-test	-0.037	-0.037	-0.037	-0.037	-0.037	-0.037	-0.037	-0.037	**-2.170 (*)**	**4.514 (*)**	-0.973		
E2	AAR	0.005	0.000	0.000	-0.040	0.014	-0.030	0.013	0.027	0.000	0.000	0.014		
	t-test	0.829	-0.023	-0.023	**-7.083 (*)**	**2.446 (*)**	**-5.028 (*)**	**2.377 (*)**	**4.797 (*)**	-0.023	-0.023	**2.515 (*)**		
E3	AAR	0.006	-0.009	-0.008	-0.001	-0.003	0.000	0.000	-0.001	0.015	-0.006	0.003		
	t-test	1.359	**-2.162 (*)**	**-1.914**	-0.232	-0.780	0.114	0.114	-0.144	**3.435 (*)**	-1.307	0.646		
E4	AAR	0.000	0.000	0.019	-0.007	-0.045	-0.034	-0.012	0.000	0.000	0.014	0.002		
	t-test	0.011	0.011	**4.799 (*)**	**-1.816**	**-11.367 (*)**	**-8.345 (*)**	**-2.921 (*)**	0.011	0.011	**3.6179 (*)**	0.534	-0.062	**-4.513 (*)**
E5	AAR	-0.008	-0.002	0.007	0.000	0.000	-0.003	0.001	0.000	-0.002	-0.001	0.000		
	t-test	-1.573	-0.341	1.503	-0.090	-0.090	-0.691	0.241	0.020	-0.382	-0.263	-0.090		
E6	AAR	0.004	-0.001	-0.001	-0.002	-0.001	-0.008	0.006	-0.003	-0.001	-0.001	0.019		
	t-test	0.856	-0.113	-0.113	-0.392	-0.224	**-1.798**	1.333	-0.609	-0.113	-0.113	**4.233 (*)**		
E7	AAR	-0.006	0.003	0.000	0.000	0.002	0.000	0.010	0.011	0.001	0.000	0.000		
	t-test	-1.331	0.613	0.036	0.036	0.400	-0.012	**2.324 (*)**	**2.551 (*)**	0.190	0.036	0.036		
E8	AAR	0.000	0.000	-0.005	-0.017	0.006	-0.029	0.001	0.000	0.000	0.000	0.000		
	t-test	-0.013	-0.013	-1.377	**-4.172 (*)**	1.426	**-6.570 (*)**	0.327	-0.013	-0.013	-0.013	-0.013	-0.044	**-3.247 (*)**
E9	AAR	0.019	-0.027	0.009	0.000	0.001	0.001	-0.017	-0.024	0.033	0.008	-0.011		
	t-test	**2.744 (*)**	**-4.309 (*)**	1.545	-0.034	0.188	0.188	**-2.785 (*)**	**-3.828 (*)**	**5.361 (*)**	1.344	**-1.659**		

Note: (*) indicates $p \leq 0.05$

Table 15: Insurance Sector

	t	-5	-4	-3	-2	-1	0	1	2	3	4	5	CAAR	t-test
E1	AAR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
	t-test													
E2	AAR	0.001	0.000	0.000	-0.028	-0.012	-0.025	-0.001	0.013	0.000	0.000	0.005		
	t-test	0.238	0.068	0.068	**-5.202 (*)**	**-2.193 (*)**	**-4.445 (*)**	-0.246	**2.369 (*)**	0.068	0.068	0.909	-0.046	**-2.540 (*)**
E3	AAR	0.024	0.010	-0.002	0.025	0.003	0.000	0.000	-0.004	0.007	0.030	-0.010		
	t-test	**5.371 (*)**	**2.276 (*)**	-0.488	**5.684 (*)**	0.619	-0.043	-0.043	-0.840	1.621	**6.783 (*)**	**-2.339 (*)**	0.081	**5.521 (*)**
E4	AAR	0.0001	0.0001	-0.0139	0.0011	0.0163	-0.0328	-0.0214	0.0001	0.0001	0.0258	0.0193		
	t-test	0.0194	0.0194	**-3.096 (*)**	0.2485	**3.627 (*)**	**-7.106 (*)**	**-4.759 (*)**	0.0194	0.0194	**5.737 (*)**	**4.287 (*)**		
E5	AAR	-0.025	0.002	-0.003	0.001	0.001	-0.031	0.017	0.003	-0.007	-0.012	0.001		
	t-test	**-5.020 (*)**	0.484	-0.612	0.121	0.121	**-6.094 (*)**	**3.306 (*)**	0.593	-1.459	**-2.341 (*)**	0.121	-0.054	**-3.206 (*)**
E6	AAR	0.002	0.000	0.000	-0.010	-0.010	-0.020	0.000	-0.015	0.000	0.000	-0.002		
	t-test	0.562	0.020	0.020	**-2.496 (*)**	**-2.403 (*)**	**-4.735 (*)**	-0.045	-3.527826	0.020	0.020	-0.388	-0.054	**-3.727 (*)**
E7	AAR	-0.006	-0.015	0.000	0.000	0.000	0.019	0.004	-0.003	-0.001	0.000	0.000		
	t-test	-1.238	**-3.314 (*)**	-0.058	-0.058	0.018	**4.334 (*)**	0.936	-0.619	-0.204	-0.058	-0.058		
E8	AAR	-0.001	-0.001	-0.020	-0.003	0.009	-0.047	-0.008	-0.001	-0.001	-0.001	-0.001		
	t-test	-0.233	-0.233	**-3.854 (*)**	-0.605	**1.778 (*)**	**-8.291 (*)**	-1.646	-0.233	-0.233	-0.233	-0.233	-0.077	**-4.453 (*)**
E9	AAR	0.006	-0.025	0.032	-0.002	0.001	0.001	-0.030	-0.033	0.042	0.054	-0.011		
	t-test	1.433	**-6.193 (*)**	**7.962 (*)**	-0.509	0.303	0.303	**-7.587 (*)**	**-8.207 (*)**	**10.437 (*)**	**13.410 (*)**	**-2.475 (*)**	0.035	**2.594 (*)**

Note: (*) indicates $p \leq 0.05$. And (N/A) indicates no data available or firms were not established during the time period.

Table 16: Diversified Financials Sector

	t	-5	-4	-3	-2	-1	0	1	2	3	4	5	CAAR	t-test
E1	AAR	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.001	0.023	0.003		
	t-test	-0.011	-0.011	-0.011	-0.011	-0.011	-0.011	-0.011	-0.011	-0.231	**4.479 (*)**	0.618		
E2	AAR	0.015	0.002	0.002	-0.036	-0.010	-0.063	-0.025	0.064	0.002	0.002	0.037		
	t-test	1.348	0.151	0.151	**-3.255 (*)**	-0.888	**-5.488 (*)**	**-2.231 (*)**	**5.718 (*)**	0.151	0.151	**3.374 (*)**		
E3	AAR	0.007	-0.016	-0.005	-0.021	0.006	0.000	0.000	0.035	-0.005	-0.009	0.022		
	t-test	0.754	-1.638	-0.515	**-2.153 (*)**	0.608	0.024	0.024	**3.503 (*)**	-0.496	-0.953	**2.248 (*)**		
E4	AAR	0.000	0.000	0.004	-0.002	-0.006	-0.007	-0.012	0.000	0.000	0.005	0.012		
	t-test	0.049	0.049	0.590	-0.218	-0.845	-0.896	**-1.658**	0.049	0.049	0.675	1.532		
E5	AAR	-0.004	-0.007	0.010	0.000	0.000	0.003	-0.002	0.001	0.001	0.002	0.000		
	t-test	-0.434	-0.843	1.103	0.052	0.052	0.331	-0.243	0.092	0.165	0.259	0.052		
E6	AAR	-0.010	0.000	0.000	-0.002	0.012	-0.006	-0.003	0.004	0.000	0.000	-0.003		
	t-test	**-1.877**	0.091	0.091	-0.464	**2.257 (*)**	-1.114	-0.549	0.802	0.091	0.091	-0.485		
E7	AAR	0.003	-0.004	0.000	0.000	-0.001	-0.007	0.005	0.002	0.002	0.000	0.000		
	t-test	0.541	-0.669	0.003	0.003	-0.231	-1.091	0.710	0.384	0.358	0.003	0.003		
E8	AAR	0.000	0.000	-0.018	0.004	0.011	-0.031	-0.012	0.000	0.000	0.000	0.000		
	t-test	-0.022	-0.022	**-2.943 (*)**	0.675	**1.826**	**-4.513 (*)**	**-1.891**	-0.022	-0.022	-0.022	-0.022	-0.046	**-2.021 (*)**
E9	AAR	0.007	-0.039	0.011	-0.009	0.001	0.001	-0.034	-0.022	0.035	0.014	-0.011		
	t-test	1.19	**-7.115 (*)**	**2.037 (*)**	**-1.68**	0.135	0.135	**-6.375 (*)**	**-4.122 (*)**	**6.412 (*)**	**2.623 (*)**	**-1.865**	-0.047	**-2.325 (*)**

Note: (*) indicates $p \leq 0.05$

Table 17: Capital Goods Sector

	t	-5	-4	-3	-2	-1	0	1	2	3	4	5	CAAR	t-test
E1	AAR	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.002	0.006	-0.004		
	t-test	-0.010	-0.010	-0.010	-0.010	-0.010	-0.010	-0.010	-0.010	-0.664	**2.098 (*)**	-1.216		
E2	AAR	-0.004	-0.001	-0.001	-0.051	-0.002	-0.030	-0.008	0.032	-0.001	-0.001	0.024		
	t-test	-0.668	-0.104	-0.104	**-9.443 (*)**	-0.372	**-5.298 (*)**	-1.459	**5.990 (*)**	-0.104	-0.104	**4.483 (*)**	-0.040	**-2.150 (*)**
E3	AAR	0.005	-0.012	-0.001	-0.008	-0.001	0.000	0.000	0.003	-0.001	-0.006	0.004		
	t-test	1.071	**-2.485 (*)**	-0.177	**-1.794**	-0.231	0.055	0.055	0.635	-0.176	-1.281	0.808		
E4	AAR	0.000	0.000	0.000	0.000	0.006	-0.023	-0.008	0.000	0.000	0.009	0.012		
	t-test	-0.028	-0.028	0.050	-0.041	0.843	**-3.004 (*)**	-1.011	-0.028	-0.028	1.182	1.563		
E5	AAR	-0.008	0.002	0.001	0.000	0.000	0.005	0.000	0.003	0.006	-0.001	0.000		
	t-test	-1.054	0.269	0.084	0.037	0.037	0.654	-0.048	0.370	0.768	-0.105	0.037		
E6	AAR	-0.001	0.001	0.001	0.003	0.011	-0.014	0.009	0.003	0.001	0.001	0.001		
	t-test	-0.299	0.143	0.143	0.776	**2.896 (*)**	**-3.588 (*)**	**2.353 (*)**	0.677	0.143	0.143	0.260		
E7	AAR	-0.006	-0.006	0.001	0.001	-0.007	-0.001	0.009	0.005	0.004	0.001	0.001		
	t-test	-1.320	-1.415	0.175	0.175	**-1.674**	-0.140	**1.922**	1.074	0.845	0.175	0.175		
E8	AAR	0.000	0.000	-0.017	-0.015	0.017	-0.051	-0.009	0.000	0.000	0.000	0.000		
	t-test	0.041	0.041	**-4.009 (*)**	**-3.446 (*)**	**3.874 (*)**	**-10.55 (*)**	**-2.118 (*)**	0.041	0.041	0.041	0.041	-0.074	**-5.012 (*)**
E9	AAR	0.020	-0.001	0.024	0.017	0.000	0.000	0.011	-0.012	0.034	0.015	-0.026		
	t-test	**3.398 (*)**	-0.144	**4.417 (*)**	**3.141 (*)**	0.068	0.068	**1.976 (*)**	**-2.152 (*)**	**6.196 (*)**	**2.822 (*)**	**-4.347 (*)**	0.083	**4.413 (*)**

Note: (*) indicates $p \leq 0.05$

Table 18: Food & Staples Retailing Sector

	t	-5	-4	-3	-2	-1	0	1	2	3	4	5	CAAR	t-test
E1	AAR	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.005	0.005	0.003		
	t-test	-0.011	-0.011	-0.011	-0.011	-0.011	-0.011	-0.011	-0.011	-0.899	1.033	0.565		
E2	AAR	0.017	-0.003	-0.003	-0.008	0.000	0.001	-0.020	-0.013	-0.003	-0.003	-0.003		
	t-test	0.346	-0.065	-0.065	-0.155	-0.001	0.020	-0.405	-0.264	-0.065	-0.065	-0.064		
E3	AAR	0.013	-0.016	-0.008	0.002	0.011	0.000	0.000	0.014	-0.021	-0.011	-0.006		
	t-test	1.316	-1.594	-0.796	0.204	1.162	0.005	0.005	1.465	**-2.134 (*)**	-1.169	-0.608		
E4	AAR	0.000	0.000	-0.001	0.009	0.005	-0.015	0.001	0.000	0.000	0.006	0.009		
	t-test	0.043	0.043	-0.063	0.974	0.506	-1.471	0.066	0.043	0.043	0.607	0.889		
E5	AAR	-0.014	0.004	0.004	0.001	0.001	0.028	-0.007	-0.006	-0.003	0.005	0.001		
	t-test	-1.361	0.398	0.417	0.075	0.075	**2.814 (*)**	-0.683	-0.553	-0.305	0.546	0.075		
E6	AAR	0.010	0.001	0.001	-0.002	0.005	-0.001	-0.016	0.010	0.001	0.001	0.012		
	t-test	1.230	0.143	0.143	-0.235	0.602	-0.151	**-2.039 (*)**	1.225	0.143	0.143	1.484		
E7	AAR	-0.006	-0.015	0.001	0.001	0.031	-0.005	0.009	0.000	-0.010	0.001	0.001		
	t-test	-0.797	**-1.893**	0.073	0.073	**3.878 (*)**	-0.599	1.192	-0.015	-1.284	0.073	0.073		
E8	AAR	-0.001	-0.001	-0.016	-0.008	0.005	-0.043	-0.005	-0.001	-0.001	-0.001	-0.001		
	t-test	-0.072	-0.072	**-2.164 (*)**	-1.053	0.688	**-5.133 (*)**	-0.662	-0.072	-0.072	-0.072	-0.072	-0.071	**-2.531 (*)**
E9	AAR	-0.002	-0.017	0.023	-0.002	0.001	0.001	-0.029	-0.023	0.043	0.013	0.001		
	t-test	-0.163	-1.281	**1.683**	-0.168	0.102	0.102	**-2.156 (*)**	**-1.706**	**3.178 (*)**	0.939	0.077		

Note: (*) indicates $p \leq 0.05$

Table 19: Consumer Durables & Apparel Sector

	t	-5	-4	-3	-2	-1	0	1	2	3	4	5	CAAR	t-test
E1	AAR	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.004	0.010	-0.003		
	t-test	-0.033	-0.033	-0.033	-0.033	-0.033	-0.033	-0.033	-0.033	-0.854	**2.427 (*)**	-0.741		
E2	AAR	-0.009	0.001	0.001	-0.016	-0.008	-0.017	0.008	0.020	0.001	0.001	0.014		
	t-test	-1.053	0.088	0.088	**-1.897**	-0.905	**-1.865**	0.944	**2.297 (*)**	0.088	0.088	**1.679**		
E3	AAR	0.009	-0.011	0.001	-0.006	0.003	0.000	0.000	0.014	0.002	0.000	-0.007		
	t-test	1.416	**-1.81**	0.191	-0.912	0.408	-0.006	-0.006	**2.276 (*)**	0.325	-0.080	-1.086		
E4	AAR	0.001	0.001	0.011	0.012	-0.001	-0.021	0.010	0.001	0.001	0.011	0.004		
	t-test	0.112	0.112	**2.141 (*)**	**2.381 (*)**	-0.279	**-4.141 (*)**	**2.079 (*)**	0.112	0.112	**2.137 (*)**	0.803		
E5	AAR	-0.008	-0.002	-0.002	0.000	0.000	0.006	0.002	0.002	-0.006	0.006	0.000		
	t-test	-1.500	-0.425	-0.314	0.001	0.001	0.992	0.387	0.278	-1.136	1.024	0.001		
E6	AAR	-0.008	0.000	0.000	-0.004	0.007	-0.015	0.013	-0.007	0.000	0.000	0.020		
	t-test	-0.625	-0.010	-0.010	-0.308	0.531	-1.099	0.998	-0.531	-0.010	-0.010	1.472		
E7	AAR	-0.005	-0.003	0.001	0.001	-0.017	0.006	0.013	0.009	-0.003	0.001	0.001		
	t-test	-0.606	-0.378	0.115	0.115	**-2.169 (*)**	0.770	1.610	1.148	-0.433	0.115	0.115		
E8	AAR	0.000	0.000	-0.006	-0.011	0.014	-0.040	-0.009	0.000	0.000	0.000	0.000		
	t-test	0.013	0.013	-0.766	-1.493	**1.92**	**-4.849 (*)**	-1.227	0.013	0.013	0.013	0.013	-0.051	**-1.908**
E9	AAR	0.022	-0.025	0.017	-0.001	0.000	0.000	-0.023	-0.023	0.028	0.012	-0.011		
	t-test	**3.335 (*)**	**-4.072 (*)**	**2.822 (*)**	-0.217	0.029	0.029	**-3.720 (*)**	**-3.760 (*)**	**4.475 (*)**	**1.996 (*)**	-1.617		

Note: (*) indicates $p \leq 0.05$

Table 20 : REITs Sector

	t	-5	-4	-3	-2	-1	0	1	2	3	4	5	CAAR	t-test
E1	AAR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
	t-test													
E2	AAR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
	t-test													
E3	AAR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
	t-test													
E4	AAR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
	t-test													
E5	AAR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
	t-test													
E6	AAR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
	t-test													
E7	AAR	0.001	-0.002	0.000	0.000	0.001	0.001	0.001	0.000	0.003	0.000	0.000		
	t-test	0.637	-1.020	0.010	0.010	0.547	0.719	0.481	0.162	**1.827**	0.010	0.010		
E8	AAR	0.000	0.000	0.000	0.002	-0.001	0.003	0.000	0.000	0.000	0.000	0.000		
	t-test	0.064	0.064	-0.017	0.496	-0.338	0.635	-0.014	0.064	0.064	0.064	0.064		
E9	AAR	0.000	-0.010	0.010	0.001	0.002	0.002	-0.007	-0.013	0.025	0.010	-0.014		
	t-test	0.016	-0.486	0.468	0.060	0.098	0.098	-0.321	-0.619	1.192	0.478	-0.608		

Note: (N/A) indicates no data available or firms were not established during the time period.

Table 21: Media and Entertainment Sector

	t	-5	-4	-3	-2	-1	0	1	2	3	4	5	CAAR	t-test
E1	AAR	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.045	0.000		
	t-test	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.068	**5.882 (*)**	0.059		
E2	AAR	0.017	0.001	0.001	-0.051	0.028	-0.038	-0.009	0.013	0.001	0.001	0.053		
	t-test	1.350	0.047	0.047	**-4.009 (*)**	**2.131 (*)**	**-2.859 (*)**	-0.709	1.036	0.047	0.047	**4.158 (*)**		
E3	AAR	0.030	-0.025	0.007	-0.018	0.006	-0.002	-0.002	-0.005	-0.002	-0.005	-0.006		
	t-test	**2.402 (*)**	**-2.023 (*)**	0.602	-1.459	0.492	-0.123	-0.123	-0.396	-0.187	-0.416	-0.524		
E4	AAR	0.000	0.000	0.009	-0.003	-0.003	-0.024	0.010	0.000	0.000	-0.002	0.003		
	t-test	0.014	0.014	0.830	-0.241	-0.304	**-2.158 (*)**	0.973	0.014	0.014	-0.166	0.244		
E5	AAR	-0.016	-0.006	-0.004	0.000	0.000	-0.004	0.000	0.006	-0.008	0.013	0.000		
	t-test	-1.485	-0.505	-0.333	0.019	0.019	-0.351	-0.040	0.537	-0.733	1.206	0.019		
E6	AAR	-0.006	0.002	0.002	-0.007	-0.008	0.016	-0.009	0.020	0.002	0.002	0.023		
	t-test	-0.376	0.122	0.122	-0.466	-0.558	1.081	-0.620	1.301	0.122	0.122	1.498		
E7	AAR	-0.011	-0.064	0.001	0.001	0.031	-0.002	0.020	-0.005	-0.004	0.001	0.001		
	t-test	-0.775	**-4.329 (*)**	0.099	0.099	**2.105 (*)**	-0.105	1.332	-0.333	-0.296	0.099	0.099		
E8	AAR	-0.001	-0.001	-0.021	-0.028	0.046	-0.036	-0.015	-0.001	-0.001	-0.001	-0.001		
	t-test	-0.042	-0.042	-0.673	-0.879	1.452	-1.018	-0.470	-0.042	-0.042	-0.042	-0.042		
E9	AAR	0.029	-0.048	0.001	-0.011	-0.001	-0.001	-0.037	-0.015	0.039	0.077	-0.038		
	t-test	**1.822**	**-3.200 (*)**	0.052	-0.737	-0.041	-0.041	**-2.503 (*)**	-1.023	**2.624 (*)**	**5.223 (*)**	**-2.355 (*)**		

Note: (*) indicates $p \leq 0.05$

Table 22: Consumer Services Sector

	t	-5	-4	-3	-2	-1	0	1	2	3	4	5	CAAR	t-test
E1	AAR	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.001	0.006	0.001		
	t-test	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-1.190	**5.984 (*)**	1.127		
E2	AAR	0.0013	0.0004	0.0004	-0.0144	0.0118	-0.0407	-0.0089	0.0121	0.0004	0.0004	0.0083		
	t-test	0.2748	0.0758	0.0758	**-2.978 (*)**	**2.382 (*)**	**-8.0618 (*)**	**-1.834**	**2.500 (*)**	0.0758	0.0758	**1.718**	-0.029	**-1.71**
E3	AAR	0.004	-0.004	0.003	-0.001	0.002	0.000	0.000	0.011	-0.002	0.001	0.009		
	t-test	0.747	-0.893	0.537	-0.220	0.493	0.034	0.034	**2.250 (*)**	-0.507	0.158	**1.924 (*)**		
E4	AAR	0.000	0.000	0.001	0.003	0.001	-0.010	0.006	0.000	0.000	0.001	0.005		
	t-test	-0.010	-0.010	0.193	0.589	0.125	**-1.959 (*)**	1.168	-0.010	-0.010	0.122	1.142		
E5	AAR	-0.003	0.009	-0.002	0.000	0.000	-0.001	0.009	-0.007	-0.007	0.000	0.000		
	t-test	-0.440	1.518	-0.297	0.004	0.004	-0.252	1.506	-1.209	-1.294	-0.031	0.004		
E6	AAR	-0.0008	0.0007	0.0007	-0.0032	-0.0035	-0.0078	0.0004	0.0009	0.0007	0.0007	0.0065		
	t-test	-0.2090	0.1894	0.1894	-0.8350	-0.9067	**-2.013 (*)**	0.0949	0.2373	0.1894	0.1894	**1.682**		
E7	AAR	-0.003	-0.001	0.001	0.001	0.010	0.010	0.007	-0.002	-0.001	0.001	0.001		
	t-test	-0.650	-0.139	0.152	0.152	**2.090 (*)**	**2.235 (*)**	1.517	-0.442	-0.161	0.152	0.152		
E8	AAR	0.000	0.000	-0.010	-0.016	0.007	-0.039	-0.002	0.000	0.000	0.000	0.000		
	t-test	0.060	0.060	**-2.322 (*)**	**-3.613 (*)**	**1.685**	**-8.021 (*)**	-0.398	0.060	0.060	0.060	0.060	-0.058	**-3.787 (*)**
E9	AAR	0.018	-0.022	0.023	0.004	0.000	0.000	-0.014	-0.019	0.032	0.013	-0.014		
	t-test	**4.750 (*)**	**-6.607 (*)**	**6.744 (*)**	1.155	0.122	0.122	**-4.299 (*)**	**-5.761 (*)**	**9.386 (*)**	**3.986 (*)**	**-3.768 (*)**	0.020	**1.674**

Note: (*) indicates $p \leq 0.05$

Table 23: Telecommunication Services Sector

	t	-5	-4	-3	-2	-1	0	1	2	3	4	5	CAAR	t-test
E1	AAR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
	t-test													
E2	AAR	-0.006	0.000	0.000	-0.026	-0.001	-0.039	0.023	0.008	0.000	0.000	0.034		
	t-test	-0.777	-0.036	-0.036	**-3.255 (*)**	-0.178	**-4.640 (*)**	**2.839 (*)**	1.023	-0.036	-0.036	**4.164 (*)**		
E3	AAR	0.005	-0.007	0.007	-0.002	-0.007	0.001	0.001	-0.017	-0.003	-0.003	-0.006		
	t-test	0.574	-0.780	0.761	-0.216	-0.808	0.114	0.114	**-1.903**	-0.317	-0.386	-0.640		
E4	AAR	0.002	0.002	0.027	-0.009	-0.003	-0.004	-0.008	0.002	0.002	0.027	-0.002		
	t-test	0.213	0.213	**3.350 (*)**	-1.076	-0.413	-0.427	-0.999	0.213	0.213	**3.284 (*)**	-0.269		
E5	AAR	0.003	0.002	-0.001	0.001	0.001	-0.005	0.003	0.001	-0.001	0.013	0.001		
	t-test	0.214	0.155	-0.075	0.067	0.067	-0.380	0.183	0.044	-0.045	0.934	0.067		
E6	AAR	0.002	0.001	0.001	0.011	0.003	-0.007	0.021	-0.005	0.001	0.001	0.014		
	t-test	0.348	0.084	0.084	1.560	0.397	-1.060	**2.984 (*)**	-0.753	0.084	0.084	**2.044 (*)**		
E7	AAR	0.002	-0.002	0.000	0.000	-0.031	-0.017	-0.010	-0.003	-0.006	0.000	0.000		
	t-test	0.325	-0.275	0.030	0.030	**-4.087 (*)**	**-2.204 (*)**	-1.360	-0.346	-0.777	0.030	0.030	-0.0653	**-2.325 (*)**
E8	AAR	-0.001	-0.001	-0.041	-0.007	0.006	-0.009	0.010	-0.001	-0.001	-0.001	-0.001		
	t-test	-0.072	-0.072	**-2.283 (*)**	-0.378	0.315	-0.465	0.540	-0.072	-0.072	-0.072	-0.072		
E9	AAR	-0.001	-0.003	0.003	0.008	0.000	0.000	0.001	-0.013	0.018	0.002	-0.014		
	t-test	-0.121	-0.403	0.324	1.044	0.034	0.034	0.150	**-1.723**	**2.321 (*)**	0.225	**-1.670 (*)**		

Note: (*) indicates $p \leq 0.05$. And (N/A) indicates no data available or firms were not established during the time period.

Table 24: Pharma, Biotech & Life Science Sector

	t	-5	-4	-3	-2	-1	0	1	2	3	4	5	CAAR	t-test
E1	AAR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
	t-test													
E2	AAR	-0.009	0.000	0.000	-0.049	0.011	-0.025	-0.016	0.005	0.000	0.000	0.010		
	t-test	-0.575	0.013	0.013	**-3.036 (*)**	0.684	-1.490	-1.002	0.303	0.013	0.013	0.639		
E3	AAR	0.005	0.003	-0.008	-0.004	0.001	0.000	0.000	0.000	-0.002	-0.002	0.001		
	t-test	0.373	0.196	-0.516	-0.283	0.080	0.009	0.009	0.009	-0.163	-0.151	0.059		
E4	AAR	0.000	0.000	0.008	0.008	0.003	-0.014	0.001	0.000	0.000	0.014	0.009		
	t-test	0.001	0.001	0.692	0.632	0.275	-1.109	0.050	0.001	0.001	1.144	0.718		
E5	AAR	-0.003	-0.003	0.005	0.000	0.000	-0.004	0.001	-0.002	0.007	-0.001	0.000		
	t-test	-0.261	-0.265	0.384	-0.007	-0.007	-0.347	0.111	-0.152	0.534	-0.060	-0.007		
E6	AAR	-0.007	-0.001	-0.001	0.004	0.021	0.010	0.017	0.012	-0.001	-0.001	-0.004		
	t-test	-0.617	-0.075	-0.075	0.376	**1.995 (*)**	0.981	1.594	1.087	-0.075	-0.075	-0.393		
E7	AAR	-0.009	-0.018	0.000	0.000	0.007	-0.012	0.015	-0.005	-0.008	0.000	0.000		
	t-test	-0.750	-1.409	0.022	0.022	0.591	-0.937	1.185	-0.386	-0.619	0.022	0.022		
E8	AAR	0.000	0.000	-0.019	-0.014	0.009	-0.053	-0.002	0.000	0.000	0.000	0.000		
	t-test	0.041	0.041	**-1.683**	-1.207	0.809	**-4.234 (*)**	-0.196	0.041	0.041	0.041	0.041		
E9	AAR	0.009	-0.038	0.001	-0.001	0.000	0.000	-0.015	-0.026	0.018	0.005	0.058		
	t-test	1.019	**-4.537 (*)**	0.071	-0.127	-0.013	-0.013	**-1.781**	**-3.070 (*)**	**2.173 (*)**	0.553	**6.222 (*)**		

Note: (*) indicates $p \leq 0.05$. And (N/A) indicates no data available or firms were not established during the time period.

Table 25: Health Care Equipment & Svc Sector

	t	-5	-4	-3	-2	-1	0	1	2	3	4	5	CAAR	t-test
E1	AAR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
	t-test													
E2	AAR	-0.004	0.000	0.000	-0.018	0.004	-0.008	0.002	0.003	0.000	0.000	0.000		
	t-test	-1.002	-0.100	-0.100	**-4.344 (*)**	0.834	-1.819	0.561	0.644	-0.100	-0.100	-0.100		
E3	AAR	0.001	-0.002	-0.001	0.000	0.000	0.000	0.000	0.000	-0.004	0.005	-0.001		
	t-test	0.435	-0.681	-0.355	0.102	0.131	-0.015	-0.015	0.085	-1.353	**1.655**	-0.428		
E4	AAR	-0.001	-0.001	-0.007	-0.005	-0.009	-0.005	-0.011	-0.001	-0.001	0.010	0.003		
	t-test	-0.163	-0.163	-0.908	-0.642	-1.191	-0.632	-1.533	-0.163	-0.163	1.327	0.425		
E5	AAR	-0.004	0.001	-0.002	0.000	0.000	-0.004	-0.001	0.006	0.000	-0.007	0.000		
	t-test	-0.528	0.119	-0.294	-0.006	-0.006	-0.494	-0.121	0.758	-0.010	-0.852	-0.006		
E6	AAR	-0.004	-0.001	-0.001	-0.005	-0.007	0.009	0.006	-0.010	-0.001	-0.001	-0.013		
	t-test	-0.196	-0.067	-0.067	-0.248	-0.388	0.471	0.313	-0.524	-0.067	-0.067	-0.664		
E7	AAR	-0.001	-0.002	0.001	0.001	-0.004	0.000	0.005	-0.005	0.000	0.001	0.001		
	t-test	-0.150	-0.259	0.126	0.126	-0.601	-0.020	0.766	-0.917	0.019	0.126	0.126		
E8	AAR	0.000	0.000	-0.006	-0.022	0.008	-0.016	0.008	0.000	0.000	0.000	0.000		
	t-test	0.024	0.024	-0.980	**-3.713 (*)**	1.433	**-2.491 (*)**	1.428	0.024	0.024	0.024	0.024		
E9	AAR	0.005	-0.021	0.012	-0.010	0.002	0.002	-0.016	-0.022	0.030	0.017	0.001		
	t-test	0.459	**-2.179 (*)**	1.211	-1.051	0.159	0.159	**-1.686**	**-2.225 (*)**	**3.055 (*)**	**1.723**	0.114		

Note: (*) indicates $p \leq 0.05$. And (N/A) indicates no data available or firms were not established during the time period.

Table 26: Commercial & Professional Svc Sector

	t	-5	-4	-3	-2	-1	0	1	2	3	4	5	CAAR	t-test
E1	AAR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
	t-test													
E2	AAR	0.0158943	0.0007989	0.0007989	-0.0220691	-0.009525	0.0116189	0.0072317	-0.002198	0.0007989	0.0007989	0.0071522		
	t-test	**2.091 (*)**	0.105279	0.105279	**-2.908 (*)**	-1.227999	1.462986	0.9528682	-0.2877596	0.105279	0.105279	0.9425493		
E3	AAR	0.005914	-0.0088944	-0.0037602	0.0033022	-0.008202	0.000066	0.000066	-0.0019461	0.008915	-0.0037443	-0.002802		
	t-test	0.6164009	-0.926602	-0.3919187	0.3441103	-0.854272	0.0068764	0.0068764	-0.2028372	0.9287595	-0.3902638	-0.291916		
E4	AAR	-0.0000413	-0.0000413	-0.0054455	-0.0022138	-0.001832	-0.0105745	-0.019331	-0.0000413	-0.0000413	0.0026478	0.0086452		
	t-test	-0.0036314	-0.0036314	-0.47761	-0.1946822	-0.161113	-0.9042614	**-1.7**	-0.0036314	-0.0036314	0.2319172	0.7589731		
E5	AAR	-0.0123604	-0.0055723	-0.0112843	0.0001106	0.000111	-0.0109371	0.0100098	0.0088777	0.0093941	-0.0024705	0.0001106		
	t-test	-1.019246	-0.4593996	-0.9306005	0.0091212	0.009121	-0.9003495	0.8250094	0.7321455	0.7747444	-0.2037217	0.0091212		
E6	AAR	0.0056586	0.0013744	0.0013744	-0.002058	-0.003654	0.0148767	-0.0092115	0.0385154	0.0013744	0.0013744	0.0261027		
	t-test	0.5389632	0.1316474	0.1316474	-0.1966672	-0.346853	1.40062	-0.8799067	**3.612 (*)**	0.1316474	0.1316474	**2.459 (*)**	0.0757278	**1.731**
E7	AAR	-0.0070788	0.0007577	0.0006503	0.0006503	-0.001844	0.0079503	0.0177489	0.0027391	-0.0011478	0.0006503	0.0006503		
	t-test	-0.6192497	0.0661797	0.0568884	0.0568884	-0.160922	0.6954773	1.548934	0.2396136	-0.1003761	0.0568884	0.0568884		
E8	AAR	0.0002495	0.0002495	-0.0140915	-0.0153025	0.026888	-0.0370337	-0.0076178	0.0002495	0.0002495	0.0002495	0.0002495		
	t-test	0.022352	0.022352	-1.259095	-1.340915	**2.387 (*)**	**-2.976 (*)**	-0.6786907	0.022352	0.022352	0.022352	0.022352		
E9	AAR	0.0211492	-0.0345588	0.0119902	-0.015648	3.77E-05	0.0000377	-0.0219615	-0.0195648	0.0320199	0.031564	-0.018829		
	t-test	**2.593 (*)**	**-4.615 (*)**	1.617516	**-2.111 (*)**	0.005084	0.0050839	**-2.963 (*)**	**-2.639 (*)**	**4.270 (*)**	**4.251 (*)**	**-2.293 (*)**		

Note: (*) indicates $p \leq 0.05$. And (N/A) indicates no data available or firms were not established during the time period.

REFERENCES

Abokhodair, M. (2018). The Saudi Stock Exchange (Tadawul) Launches Derivatives Market In The First Half Of 2019. Tadawul. Retrieved from https://www.prnewswire.com/news-releases/the-saudi-stock-exchange-tadawul-launches-derivatives-market-in-the-first-half-of-2019-300706226.html

Africa Economic Outlook. (2012). Retrieved from https://www.afdb.org/fileadmin/uploads/afdb/Documents/Generic-Documents/Libya%20Full%20PDF%20Country%20Note.pdf

Aggarwal, R. I. (1999). Volatility in Emerging Stock Markets. *Journal of Financial and Quantitative Analysis*, 34(1), 33-55. DOI:10.2307/2676245.

Aisen, A., & Veiga, F. (2013). How does political instability affect economic growth? *European Journal of Political Economy, 29*, 151--167.

Alesina, A., & Perotti, R. (1996). Income distribution, political instability, and investment. *European economic review, 40*(6), 1203--1228.

Al-Hamidy, A. (2011). The global financial crisis: impact on Saudi Arabia. *This volume BIS Papers, 54*, 347-357.

Ali, I., & Harvie, C. (2013). Oil and economic development: Libya in the post-Gaddafi era. *Economic Modelling, 32*, 273-285.

Ali, N. M. (2015). Yemen: Another Somalia in the Arabian Peninsula. *Asian Journal of Humanities and Social Studies*, 3 (4), 2321–2799.

AlShogeathri, M. (2011). Macroeconomic determinants of the stock market movements: empirical evidence from the Saudi Stock Marke. [Doctoral Dissertation, Kansas

State University]. K-State Research Exchange. Retrieved from http://hdl.handle.net/2097/11989

Amihud, Y., & Wohl, A. (2004). Political news and stock prices: The case of Saddam Hussein contracts. *Journal of Banking & Finance, 28(5)*, 1185-1200.

Arouri, M., & Nguyen, D. (2010). Time-varying characteristics of cross-market linkages with empirical application to Gulf stock markets. *Managerial Finance*, 36 (January), 57-70. doi 10.1108/03074351011006847

Ball, R. (2009). The global financial crisis and the efficient market hypothesis: what have we learned? *Journal of Applied Corporate Finance*, 21(4), 8-16.

Ball, R., & Brown, P. (1968). An Empirical Evaluation of Accounting Income Numbers. *Journal of Accounting Research*, 6(2), 159-178. doi:10.2307/2490232

Becchetti, L., & Ciciretti, R. (2011). Stock Market Reaction to the Global Financial Crisis: Testing for the Lehmann Brothers' Event. *Giornale degli Economisti e Annali di Economia*, 70 (Anno 124) (2), nuova serie, 3--58.

Beverley, L. (2008). Stock Market Event Studies and Competition Commission Inquiries Centre for Competition Policy. *CFP Working Paper*, No. 08-16. DOI:10.2139/ssrn.1114114. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1114114

Binder, J. (1998). The event study methodology since 1969. *Review of quantitative Finance and Accounting*, 11(2), pp.111-137.

Bird, G. Wenti Du & Thomas Willett. (2017). Behavioral Finance and Efficient Markets: What does the Euro Crisis Tell us? *Open Economies Review*, 28, 273-265. DOI: 10.1007/s11079-017-9436-1.

Biygautane, M., Gerber, P., & Hodge, G. (2017). The evolution of administrative systems in Kuwait, Saudi Arabia, and Qatar: The challenge of implementing market based reforms. *Digest of Middle East Studies, 26*(1), 97--126.

Boslego, R. (2017). Why the Aramco IPO Is Doubtful. *Seeking Alpha*. Retrieved from https://seekingalpha.com/article/4047600-why-aramco-ipo-is-doubtful

Bouoiyour, J & Selmi, R (2017). Political elections and uncertainty-Are BRICS markets equally exposed to Trump's agenda? arXiv preprint arXiv:1701.02182

Bouoiyour, J., & Selmi, R. (2018). The gruesome murder of Jamal Khashoggi: Saudi Arabia's new economy dream at risk ? arXiv: *General Finance*. Retrieved from https://arxiv.org/pdf/1812.11336.pdf

Bradford, B. & Robinson, H. (1997). Abnormal returns, risk, and financial statement data: The case of the Iraqi invasion of Kuwait. *Journal of Economics and Business*, 49(2), pp.193-204.

CAM. (2007). Annual Report. Retrieved from https://cma.org.sa/en/AboutCMA/AnnualReport/Documents/cma_2007_report.pdf

Chan, Y.C & Wei, K.C. (1996). Political Risk and Stock Price Volatility: The Case of Hong Kong. *Pacific-Basin Finance Journal*, 4 (2-3), 259-275.

Chapman, B. (22 October 2018). Investors pull $1bn out of Saudia Arabia's stock market as fallout from Jamal Khashoggi death deepens. *The Independent*. Retrieved from https://www.independent.co.uk/news/business/news/saudi-arabia-stock-market-jamal-khashoggi-death-murder-finance-economy-a8595781.html

Charles J. Corrado. (2011). Event studies: A methodology review. *Accounting and Finance*, *51*.

Chau, F. D., Deesomsak, R. & Wang, J. (2014). Political uncertainty and stock market volatility in the Middle East and North African (MENA) countries. *Journal of International Financial Markets, Institutions and Money*, 28. 1–19. DOI: 10.1016/j.intfin.2013.10.008. .

Cheikh, N., Naceur, S, Kanaan, O & Rault, C. (2018). Oil Prices and GCC Stock Markets: New Evidence from Smooth Transition Models. *IMF Working Paper.* Retrieved from https://www.imf.org/en/Publications/WP/Issues/2018/05/09/Oil-Prices-and-GCC-Stock-Markets-New-Evidence-from-Smooth-Transition-Models-45819

Cheng, A.-R., Jahan-Parvar, M., & Rothman, P. (2010). An empirical investigation of stock market behavior in the Middle East and North Africa. *Journal of Empirical Finance, 17*, 413–427.

Clausen, M. (2019). Justifying military intervention: Yemen as a failed state. *Third World Quarterly, 40(3)*, 488-502.

Darwich, M. (2020). Escalation in Failed Military Interventions: Saudi and Emirati Quagmires in Yemen. *Global Policy, 11(1)*, 103-112.

Dolley, J. (1933). Common Stock Split-Ups, Motives and Effects. *Harvard Business Review*, 12, 70-81.

Echevarría, C. & García-Enríquez, J. (2019). The economic consequences of the Libyan Spring: A synthetic control analysis. *Defence and Peace Economics, 30(5)*, 592-608.

Energy Statistics of OECD Countries. (2011). Retrieved from OESD database: https://www.oecd-ilibrary.org/energy/energy-statistics-of-oecd-countries-2011_energy_stats_oecd-2011-en

Fama, E., (1970). Efficient capital markets: A review of theory and empirical work. *Journal of Finance,* 25: 383-417.

Fama, E., (1991), Efficient capital markets: II, *Journal of Finance* 46: 1575-1617.

Fama, E., (1998). Market efficiency, long-term returns, and behavioral finance. *Journal of Financial Economics,* 49: 283-306.

Fama, E., L. Fisher, M. Jensen and R. Roll (1969). The adjustment of stock prices to new information. *International Economic Review*, 10: 1-21.

Fama, E., and K. French (1993). Common risk factors in the returns on stocks and bonds. Journal of Financial Economics, 33: 3-56.

Fattouh, B., & Harris, L. (2017). The IPO of Saudi Arabia: Some fundamental questions. *The Oxford Institute for Energy Studies*. Retrieved from https://www.oxfordenergy.org/publications/ipo-saudi-aramco-fundamental-questions/

Gardner, F. (2018). Mohammed bin Salman: How Saudi Arabia's crown prince rose to power. Retrieved from https://www.bbc.co.uk/news/extra/lLGBQVCUCZ/mohammed_bin_salman

Gause III, F. (2018). Fresh Prince: The Schemes and Dreams of Saudi Arabia's Next King. *Foreign Aff., 97*(75). Retrieved from https://www.foreignaffairs.com/articles/middle-east/2018-03-19/fresh-prince

Ghanem, D. &. (2014). *Major world events impact on stock market prices : -An event study* [Dissertation]. Uppsala University Publications. Retrieved from http://urn.kb.se/resolve?urn=urn:nbn:se:uu:diva-226793

Ghorbel, A., & Boujelbene, Y. (2013). Contagion effect of the oil shock and US financial crisis on the GCC and BRIC countries. *International Journal of Energy Sector Management*, 7 (4). Retrieved from https://www.researchgate.net/publication/263448182_Contagion_effect_of_the_oil_shock_and_US_financial_crisis_on_the_GCC_and_BRIC_countries

Graham, M., Kiviaho, J., Nikkinen, J., & Omran, M. (2013). Global and regional co-movement of the MENA stock markets. *Journal of Economics and Business, 65*, 86–100.

Lo, Andrew. (2008). Efficient Markets Hypothesis. 10.1057/978-1-349-95121-5_42-2. Retrieved from https://www.researchgate.net/publication/228319211_Efficient_Markets_Hypothesis

Krieg, G. (8 November 2017). The day that changed everything: Election 2016, as it happened. CNN News. Retrieved from https://www.cnn.com/2017/11/08/politics/inside-election-day-2016-as-it-happened/index.html

Hammoudeh, S. & Li, H. (2008). Sudden changes in volatility in emerging markets: The case of Gulf Arab stock markets. *International Review Of Financial Analysis*, 17 (1), 47-63.

Harrison, R. (2017). Saudi Arabia is Weakening itself and Strengthening. *Foreign Policy*. Retrieved from https://foreignpolicy.com/2017/07/06/saudi-arabia-is-weakening-itself-and-strengthening-iran/

Heeb, G. (20 October 2018). Saudi Arabia's reputation has taken another hit over the death of a journalist--and its economy may be next. Buisnessinsider.com. Retrieved from https://markets.businessinsider.com/news/stocks/saudi-arabia-jamal-khashoggi-death-hurt-economy-2018-10-1027635458

Hussain, M. (11 December 2016). Saudi Intervention in Yemen and its impact on Saudi's economy. *Foreign Policy* News. Retrieved from https://foreignpolicynews.org/2016/12/11/saudi-intervention-yemen-impact-saudis-economy/

Ifeonu, E. (2012). Dropped in Tripoli; Exploded in New York: Assessing the Collateral Consequences of NATO's [Mi] sleading Intervention in Libya. *ExpressO*. Retrieved from https://works.bepress.com/eberechi_ifeonu/1/

Imam, M., Abba, S., & Wader, M. (2014). Libya in the post Ghadaffi era. *The International Journal of Social Sciences and Humanities Invention, 2*(2), 1150--1167.

Khafagy, A. (2017). Political institutions and financial cooperative development. *Journal of Institutional Economic, 13* (2), 467--498.

Khallouli, W., & Sandretto, R. (2012). Testing for "contagion" of the subprime crisis on the Middle East and North African stock markets: A Markov Switching EGARCH approach. *Journal of Economic Integration*, 27 (1),134--166.

Khan, M., & Mezran, K. (2013). The Libyan economy after the revolution: still no clear vision. *Atlantic Council, Rafik Hariri Center for the Middle East*. Retrieved from https://www.atlanticcouncil.org/in-depth-research-reports/issue-brief/the-libyan-economy-after-the-revolution-still-no-clear-vision/

Khodr, H., & Reiche, D. (2012). The specialized cities of the Gulf Cooperation Council: A case study of a distinct type of policy innovation and diffusion. *Digest of Middle East Studies, 21* (1), 149-177.

Kinninmont, J. (2017). Vision 2030 and Saudi Arabia's Social Contract: Austerity and Transformation. Chatham House. Middle East and North Africa Programme. Retrieved from https://www.chathamhouse.org/sites/default/files/publications/research/2017-07-20-vision-2030-saudi-kinninmont.pdf

Kirkova, R., & Milosevska, T. (2014). The success of democratization in post Arab spring societies. *International Journal of Social Sciences,* 3 (1), 29-40.

Kothari, S.P. &. Warner, J. (2006). The Econometrics of Event Studies. *SSRN Electronic Journal*, 1, 3-32.

Lagoarde-Segot, T., & Lucey, B. (2009). Shift-contagion Vulnerability in the MENA Stock Markets. *World Economy,* 32 (10), 1478-1497.

Lavergne, M. (2018). Autour de la crise entre le Qatar et l'Arabie Saoudite, grandes manoeuvres sur la mer Rouge Diplomatie : Diplomatie: affaires stratégiques et relations internationales, Areion Group. *Les marchands d'armes. Commerce, trafics, réseaux, influences*, 40-44.

Leigh, A., Wolfers, J., & Zitzewitz, E. (2003). What do Financial Markets Think of War in Iraq? National Bureau of Economic Research. Working Paper 9587. Retrieved from https://www.nber.org/system/files/working_papers/w9587/w9587.pdf

Luay, A.-K. (30 December 2015). Saudi Arabia's economic time bomb. *Brookings Institute*. Retrieved from https://www.brookings.edu/opinions/saudi-arabias-economic-time-bomb/ If so, be sure to provide the address above.

Lyons, K. (2018). Jamal Khashoggi death: Trump says Saudi explanation is 'credible'--as it happened. *The Guardian.* Retrieved from https://www.theguardian.com/world/live/2018/oct/20/jamal-khashoggi-saudis-admit-journalist-killed-istanbul-consulate-updates

Maghyereha, A., Awartani, B., & Al Hilu, K. (2015). Dynamic transmissions between the US and equity markets in the MENA countries: New evidence from pre-and post-global financial crisis. *The Quarterly Review of Economics and Finance, 56*, 123-138.

Miniaoui, H., Sayani, H., & Chaibi, A. (2015). The impact of financial crisis on Islamic and conventional indices of the GCC countries. *Journal of Applied Business Research (JABR),* 31(2), 357-370.

Mnif, Afef. (2015). Arab spring and stock market crises: evidence from the countries in the MENA region. *Global Journal of Management and Business Research*, 2315-5086. 4. 267-278.

Mohammed, S., Abdalhafid, M., & Ahmed, B. (2020). Examining Causal Relationship between Saudi Stock Market (TASI) and US Stock Markets Indices. *Asian Journal of Economics, Finance and Management*, 1-9.

Moosa, I. (2010). Stock market contagion in the early stages of the global financial crisis: the experience of the GCC countries. *International Journal of Banking and Finance*, 7 (1), 19-34.

Novotná, M. (2013). An event study approach to assessing the effect of the financial crisis on European companies. *ECON–Journal of Economics, Management and Business*, (2), 91-106.

OECD database. (n.d.). Retrieved from OECD database: https://www.oecd-ilibrary.org/energy/energy-statistics-of-oecd-countries-2011_energy_stats_oecd-2011-en

Perotti, Enrico C. and van Oijen, Pieter. (2001). Privatization, political risk and stock market development in emerging economies. *Journal of International Money and Finance*, *20*, 43–69.

Pham, H., Ramiah, V., Moosa, N., Huynh, T., & Pham, N. (2018). The financial effects of Trumpism. *Economic Modelling*, 74, 264-274.

Phillips, N. (2018). How Trump Should Handle the Jamal Khashoggi Killing. *The Begin-Sadat Center for Strategic Studies*. Retrieved from https://besacenter.org/perspectives-papers/jamal-khashoggi-trump/

Praveen, P., & Ruiz, P., (2017). Saudi Aramco IPO Encounters Resistance from Domestic Critics. *The Fuse*. Retrieved from https://energyfuse.org/saudi-aramco-ipo-encounters-resistance-domestic-critics/

Ramady, M. (2013). *International Journal of Economics and Business Research,* 5(4), 476-498.

Ramady, M. (2018). Springer. Retrieved from https://www.springer.com/gp/book/9781441959867

Rehman, M., Hazazi, M., & Programe, M. (2014). Examining linkages between Saudi stock market (TASI) and selected stock markets indices. *International Journal of Financial Researc*h, 5(4), 196-209.

Renshon, J. (2017). *Fighting for Status: Hierarchy and Conflict in World Politics*. Princeton University Press. Retrieved from https://press.princeton.edu/books/hardcover/9780691174495/fighting-for-status

Robinson, S, Nakhoul, S & Kalin, S., (2017). Exclusive New Saudi mega-city will be listed publicly, crown prince saysR. *Reuters*. Retrieved from https://www.reuters.com/article/us-saudi-economy-mbs-interview-exclusive/exclusive-new-saudi-mega-city-will-be-listed-publicly-crownprince-says-idUSKBN1CV0ZM

Roubini, N., & Setser, B. (2005). Will the Bretton Woods 2 Regime Unravel Soon? The Risk of a Hard Landing in 2005–2006. *Federal Reserve Bank of San Francisco Proceedings, February.*

Sagita, V. D. (2017). Trump'e Elected Shock Effect in Indonesian Stock Market. *Journal of Indonesian Applied Economics,* 7(1), 71-83.

Saif-Alyousfi, A. Y. (2020). Political instability and services of GCC banks: how important is the Yemen War? *Journal of Economic and Administrative Sciences*. 36 (4), 339-365.

Samarakoon, L. (2011). Stock market interdependence, contagion, and the US financial crisis: The case of emerging and frontier markets. *Journal of International Financial Markets, Institutions and Money, 21*(5), 724--742.

Saudi Arabia admits Jamal Khashoggi killed in Istanbul consulate, (2018). *Aljazeera*. Retrieved from Aljazeera: https://www.aljazeera.com/news/2018/10/saudi-arabia-confirms-khashoggi-killed-istanbul-consulate-181019221512552.html.

Saudi Arabia's Economic Outlook, (2017).*WorldBank*. Retrieved from World Bank: https://www.worldbank.org/en/country/gcc/publication/saudi-arabia-economic-outlook-october-2017.

Saudi Arabia restores perks to state employees, boosting markets, (2017). *Reuters.* Retrieved from Reuters: https://www.reuters.com/article/us-saudi-economy/saudi-arabia-restores-perks-to-state-employees-boosting-markets-idUSKBN17O0NL

Saudi Aramco News. (2016). Facts and Figures 2015. *Saudi Aramco News*. Retrieved from https://www.aramcoexpats.com/articles/facts-figures-2015/

Saudi Crown Prince Mohammed bin Salman, power behind the throne. (6 October 2018). *BBC.* Retrieved from BBC: https://www.bbc.com/news/world-middle-east-40354415.

Scholer, L., Skiera, B., & Tellis, G. J. (2014). Stock market returns to financial innovations before and during the financial crisis in the United States and Europe. *Journal of Product Innovation Management*, 31 (5), 973-986.

Serra, A. P. (2004). Event study tests: a brief survey. *Gestao. Org-Revista Electronica de Gestao Organizacional, 2*(3), 248--255.

Shamseddine, R., & Torchia, A. (24 Febriaru 2017). As Saudis prepare to sell shares in oil giant, some have misgivings. *Reuters*.com. Retrieved from https://www.reuters.com/article/us-saudi-aramco-ipo-opinion/as-saudis-prepare-to-sell-shares-in-oil-giant-some-have-misgivings-idUSKBN16322Z

Smith, N. C., & Scholz, M. (2018). Finding Good News for Human Rights After Khashoggi. *MIT Sloan Management Review,* 60 (1), 1-4.

Stankovska, Lavender. (2011). Libyan Oil—Before and After Moammar Gaddafi. *Civil Military Fusin Center (CFC)*. Retrieved from https://www.scribd.com/document/72923072/Libyan-Oil-Before-and-After-Moammar-Gaddafi

Tadawul. (2017). Annual Report. Retrieved from https://www.tadawul.com.sa/wps/wcm/connect/7ea9ab40-5d5a-4f6c-a200c18f849e913f/Tadawul+AR2017EnglishNEW.pdf?MOD=AJPERES&CONVERT_TO=url&CACHEID=ROOTWORKSPACE-7ea9ab40-5d5a-4f6c-a200-c18f849e913f-mkIIPqb

The Aramco Accounts: Inside the World's Most Profitable Company. (2018). *Bloomberg News*. Retrieved from https://www.bloomberg.com/news/articles/2018-04-13/the-aramco-accounts-inside-the-world-s-most-profitable-company

Trump's unexpected impact on markets in seven charts. (2019). *Financial Times*. Retrieved from https://www.ft.com/content/401d0d88-de64-11e6-9d7c-be108f1c1dce

Weijermars, R. a. (2020). Saudi Aramco Privatization in Perspective: Financial Analysis and Future Implications. *Journal of Finance and Economics,* 8 (4), 161--170.

Wolfers, J., & Zitzewitz, E. (2009). Using markets to inform policy: The case of the Iraq war. *Economica*, 76 (302), 225-250.

Yemen Six Month Economic Analysis, Economic Warfare & the Humanitarian Context, (2017). Humanitarian Foresight Think Tank. Retrieved from https://www.iris-france.org/wp-content/uploads/2017/04/IARAN-YEMEN-6-month-analysis-REPORT-1.pdf

Yemen war cost Saudi $5.3 bn: Minister, (2015). Press TV.com. Retrieved from https://www.presstv.com/Detail/2015/12/29/443712/Saudi-Arabia-economy-minister-Yemen-war-budget/

Yglesias, M. (2019). "Trump's weird ideas on the US-Saudi relationship, sort of explained. Vox.com. Retrieved from https://www.vox.com/policy-and-politics/2019/9/17/20868358/donald-trump-saudi-money

Zahra, A., & Ali, O. (2018). The Prospect of the United States and Saudi Arabia Relations In light of Khashoggi Murder. *World Sociopolitical Studies,* 2(4), 605-632.