

**ISTANBUL TICARET UNIVERSITY
GRADUATE SCHOOL OF FINANCE
MASTER OF INTERNATIONAL FINANCE**

**THE IMPACT OF COVID-19 ON STOCK PRICES: EVIDENCE FROM
SAUDI ARABIA
MASTER THESIS**

Aya Bassam HUSAM EDDIN

ISTANBUL, 2024

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ISTANBUL, 2024

Dedication

I dedicate all the required information in this title '**The Impact of Covid-19 On Stock Prices: Evidence from Saudi Arabia**' has been written in accordance with the academic manners and ethical commitment. I would clarify that all the materials, sources, data and all extra inputs have been benefited well throughout the writing procedure of this thesis. All matters contained in this thesis are my personal opinion and do not reflect the official view of Istanbul Ticaret University.

Aya Bassam HUSAM EDDIN

ABSTRACT

The COVID-19 epidemic is significantly impacting the global economy, leading to problems with supply chain disruptions and influencing the stock market due to price volatility and instability. The study of the impact of the pandemic on stock markets is becoming main in both the areas of finance and business history. This study aims to determine the effect of the COVID-19 pandemic on King Saudi Arabian stock returns. It presents by employing an event study methodology to measure the response of stock prices and market volatility in Saudi Arabia. The Saudi stock market experienced significant changes before and after the COVID-19 crisis announcement, with abnormal returns on twenty different sector indices observed from -10 to 10. On event day (day 0), thirteen sectors had ordinary returns, three had positive average abnormal returns, and four had negative average abnormal returns. Consumer Services had a 0.61% positive average abnormal return, Pharma, Biotech, and Life Science had a 0.00017% positive average abnormal return, and REIT had a 0.29% positive average abnormal return. Food and Beverages had a 0.67% negative average abnormal return, Health Care Equipment & Services had a -1.08% negative average abnormal return, Materials had a -0.44% negative average abnormal return, and REIT had a -1.42% negative average abnormal return.

Keywords: *Saudi Exchange, COVID-19, Event study, Stock market return.*

ÖZET

COVID-19 salgını küresel ekonomiyi önemli ölçüde etkiliyor, tedarik zincirinde aksaklıklara yol açıyor ve fiyat oynaklığı ve istikrarsızlık nedeniyle borsayı etkiliyor. Pandeminin hisse senedi piyasaları üzerindeki etkisinin incelenmesi hem finans hem de iş tarihi alanında ana konu haline geliyor. Bu çalışma, COVID-19 salgınının Kral Suudi Arabistan hisse senedi getirileri üzerindeki etkisini belirlemeyi amaçlamaktadır. Suudi Arabistan'da hisse senedi fiyatlarının ve piyasa oynaklığının tepkisini ölçmek için bir olay çalışması metodolojisi kullanılarak sunulmaktadır. Suudi borsası, COVID-19 krizi duyurusunun öncesinde ve sonrasında önemli değişiklikler yaşadı; yirmi farklı sektör endeksinde -10 ila 10 arasında anormal getiriler gözlemlendi. Olay gününde (0. gün), on üç sektör normal getiri elde etti, üç sektör pozitif ortalamaya sahipti anormal getiriler ve dördünün negatif ortalama anormal getirileri vardı. Tüketici Hizmetleri %0,61 pozitif ortalama anormal getiri elde ederken, İlaç, Biyoteknoloji ve Yaşam Bilimleri %0,00017 pozitif ortalama anormal getiri elde etti ve GYO %0,29 pozitif ortalama anormal getiri elde etti. Yiyecek ve İçecek %0,67 negatif ortalama anormal getiri elde ederken, Sağlık Ekipmanları ve Hizmetleri %-1,08 negatif ortalama anormal getiri elde etti, Malzemeler %-0,44 negatif ortalama anormal getiri elde etti ve GYO %-1,42 negatif ortalama anormal getiri elde etti.

Anahtar Kelimeler: *Suudi Borsası, COVID-19, Olay çalışması, Borsa getirisi.*

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LIST OF ABBREVIATIONS

EMH	: Efficient Market Hypothesis.
TASI	: Tadawul All Shares Index.
CAR	: Cumulative Abnormal Return.
GCC	: Gulf Cooperation Council.
MENA	: Middle East and North Africa.
SAMA	: Saudi Arabian Monetary Authority
PIF	: Public Investment Fund
TBNI	: Banks Industry
TCGI	: Capital Goods Industry
TCPIC	: Commercial & Professional Services Industry
TDAI	: Consumer Durables & Apparel Industry
TCSI	: Consumer Services Industry
TDFI	: Diversified Financials Industry
TENI	: Energy Industry
TFSI	: Food & Staples Retailing Industry
TFBI	: Food and Beverages Industry
THEI	: Health Care Equipment & Services Industry
TISII	: Insurance Industry
TMTI	: Materials Industry
TMDI	: Media Industry
TPBI	: Pharma, Biotech & Life Science Industry
TRMI	: Real Estate Management and Development Industry
TRTI	: REIT Industry
TRLI	: Retailing Industry
TTSI	: Telecommunication services Industry
TTNI	: Transportation Industry
TUTI	: Utilities Industry

INTRODUCTION

The following section of the introduction provides background on COVID-19 and Saudi Arabian industries. This article examines the introduction separately. Consider the significance of the thesis to academic, industrial, and investor research before pursuing a study. This section defines the study's goal, scope, and structure. This also provide details about the research structure.

- **Background of the Study**

Many countries around the world experienced a crash in their stock markets because of COVID-19. However, since the start of this epidemic, a small amount of research completed to gain a better understanding of the effects that this crisis is had on the economy of Saudi Arabia. As shown in the studies by Liu, Manzoor, Wang, Zhang, and Manzoor 2020; Chaudhary, Bakhshi, and Gupta 2020; Topcu and Gulal 2020 there have been many investigations and studies made about China to determine the effects of COVID-19 on stock prices; however, there is also a lot of evidence concerning the consequences all over the world. The beginning of the COVID-19 pandemic in late 2019 resulted in significant impacts across businesses, such as healthcare, retail, transport, and manufacturing, among others. Countries have implemented harsh measures such as lockdowns, travel restrictions, and social distancing policies to prevent the expansion of the illness. The economy is suffered significant repercussions due to these activities, resulting in firm closings, disruptions in supply networks, and employment reductions. The pandemic exposed weaknesses in the healthcare system while highlighting the interconnectedness of the global economy. To effectively manage periods of uncertainty, firms adapt to new standards and approaches while governments persist in grappling with these challenges.

Saudi Arabia is seeing the effects of the COVID-19 pandemic, resulting in problems across several sectors. Countries implement strict regulations such as travel restrictions, lockdowns, and social distancing protocols. It led to business shutdowns, unemployment, and economic instability in different industries, as experienced globally.

The Saudi government is implemented proactive efforts to reduce the epidemic effects, such as dedicating resources to improving healthcare and providing financial assistance

to companies and individuals impacted by the crisis. The epidemic caused the implementation of digital technology in areas including education and healthcare. Saudi Arabia is addressing the problems presented by the COVID-19 epidemic by renewing and strengthening the country's economy while also focusing on the safety and well-being of people and communities.

The study identifies several challenges that necessitate management based on existing knowledge and problems identified for resolution. There are three main research questions that this study asks. First, does the COVID-19 pandemic have a positive or a negative effect on stock returns? Second, after one and two days of the COVID-19 pandemic announcement, does the abnormal return of the sector stock have any significance? And third, is there a statistically significant abnormal return of the sector stock within a particular period after the public declaration of the COVID-19 pandemic?

- **Purpose and Importance of the Research**

The objective of this thesis is to offer a better understanding of the short-term implications that COVID-19 would have on a variety of different sectors of the stock market. Vision 2030 seeks economic diversification, oil independence, and international investment in Saudi Arabia (Moshashai, Leber, & Savage, 2020; Vision 2030, 2016). The study examines the impact that the official disclosure of the COVID-19 outbreaks had on the Saudi Exchange. This thesis presents a study of the effect of COVID-19 on 165 equities listed on the Saudi Exchange. This study conducts a daily analysis of stock returns. For international investors, thorough research on the stock market helps them link their investment plans with the goals of Vision 2030 and the prospective development possibilities of the industries they invest in.

- **Scope of the Research**

This thesis primarily focuses on the Saudi market, a recognized global emerging market, to achieve its objective. Determine the selected study period for the event study in KSA. The duration of this event is going to be between September 2019 and March 2020.

- **The Hypothesis of the Research**

The thesis studies the effects on the market during the COVID-19 pandemic, as mentioned in the problem statement. The research uses 121 daily stock market indices from 2019 to 2020, with an estimated window of 120 days and an event window of 10 days. The pandemic is identified on 2nd March 2020, with a total event window of 21 days, with the first reported case occurring 60 days before, 60 days after, and the day of the first case. The thesis hypothesis is:

H0: After pandemic COVID-19 the stock prices does not affect on the Saudi Exchange in the short term.

H1: After pandemic COVID-19 the stock prices affects on the Saudi Exchange in the short term.

- **Research Method.**

The research methodology involved gathering data from 165 Saudi Arabian companies for the final study. The research paper includes an overview of event study methodology, a market model, and a descriptive analysis.

- **Significance of the Research**

This expects the findings of this research to aid investors, corporate management, capital market regulatory authorities, and the government in comprehending the short-term movements and performance of specific industrial sectors. Moreover, expect that these individuals can make better decisions considering future consequences and raise investor confidence, even during the COVID-19 pandemic.

- **Structure of the Research**

The thesis presents multiple sections. Each section provides distinct explanations that differ from each other. The following is a list of the five areas: The introduction area provides a summary of the topic of the thesis, the problems that are faced, and the underlying reason this study happened. In addition, it presents a brief overview of previous research efforts carried out in a similar academic field. This part also outlines the purpose of the research and its specific objectives. This part encompasses the study

background, objective, research questions, purpose, hypothesis, significance, scope, and structure.

The thesis begins with an overview of the Saudi exchange market. This section provides an overview of the entire Saudi Arabian market, including its history and structure.

The following section is Literature Review and Theory, which in this part presents a review of the studies based on previous research. This section encompasses a comprehensive review of pertinent literature and the fundamental principles of the theory guiding this study.

The following section is Data and Methodology, which contains information on the data and the process of calculation used for the research study. The procedure consists of several components, including a data description, an event day in Saudi Arabia, data sources, a data sample, a data variable, methodology description, market model description statistic, calculation of daily stock return, calculation of alpha and beta, calculation of daily abnormal return, calculation of daily average abnormal return, test statistic, and calculation of daily abnormal return. This part includes an explanation of the theory that is the basis for this study.

After that, the Result and Analysis section describes and explains the study results. Specifically, it presents a comprehensive overview of the empirical outcomes this study is discovered. Finally, a conclusion section provides an overview of the results. Also, constraints and suggestions for additional research that other researchers interested in this area of the overall study may undertake.

CHAPTER 1: OVERVIEW OF THE STOCK MARKET

This section presented an overview of the stock market and COVID-19. Besides, it provides a brief description of the stock market, and Saudi Exchange. Also, a historical crisis in the stock market, and external shocks. Finally, a brief background of COVID-19 pandemic, and KSA COVID-19.

1.1 Stock Market

The stock market is a controlled marketplace that gives traders the confidence they want to invest in publicly traded companies' shares. Thus, this reduces the amount of risk that is associated with daily company operations. The fact that the market is splitting into the primary and secondary markets. Stock market makes it easier for traders to sell or purchase stocks while consuming the least volume of risk possible in their operations (Giannakis, 2023).

In the business world, people frequently use shares to identify companies. Stock determines a company's classification. Later, the company can sell the stock to individual shareholders. After that, the company be able to initiate the process of attracting investors by making these shares available for purchase by everyone. It necessitates the establishment of a system like the stock market. Both supply and demand determine the price of stocks, which fluctuate for multiple reasons. Pricing can be affected by business performance, market movements, economic considerations, and laws. For earnings, traders seek these types of trends. (Campbell, Polk & Vuolteenaho, 2010)

The participation of financial intermediaries in the provision of indirect financing is of critical importance for the enhancement of economic growth, particularly in nations that are still in the process of developing their economies. Majority of the studies that focus on the subject have concentrated on how financial intermediaries contribute to the expansion of the American economy. Empirical research confirms that the financial sector's variables influence the growth and expansion of the economy. The majority of the evidence comes from measurements based on banks, such as the ratio of liquid liabilities to total liabilities and domestic credit extended to the private sector. Due to the growing significance of financial markets in economies, there is a shift in attention paid recently to stock market indicators. (Garcia & Liu, 1999).

1.2 Saudi Exchange

Share trading in Saudi Arabia started in 1935, founded by the first joint stock company, the Car Arabian Company. Between 1954 and 1975, joint stock companies grew to 14, with an overall invested capital of SR1,655 million. The stock market started in the late 1970s in response to the rapid expansion of public limited companies. Generally, share transactions are done immediately between sellers and buyers or via intermediaries. In the late 1980s, commercial banks started share trading, resulting in a rise in share prices and the founding of the Saudi Arabian Monetary Authority (SAMA) in 1985 (Saudi Gazette, 2017).

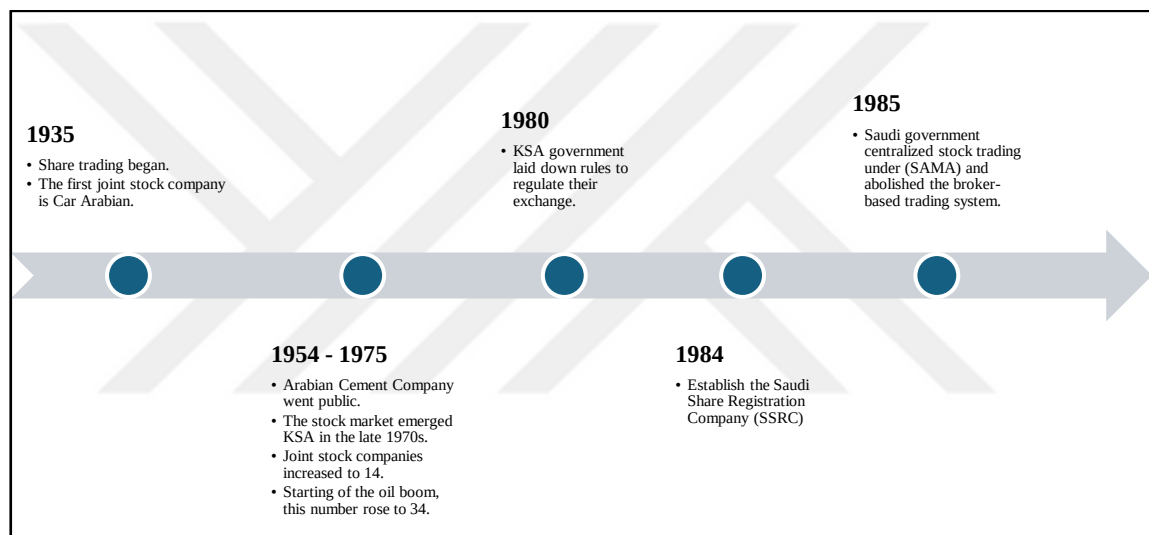


Figure 1. Timeline of Saudi stock market 1

Source: Saudigazette

In 2001, SAMA introduced the "Tadawul" system for share trading, clearing, and settlement, offering an efficient, accurate, and quick trading cycle. In 2007, the Council of Ministers approved the formation of the Saudi Stock Exchange (Tadawul), which is now the sole securities exchange in the Kingdom. As of August 2017, Tadawul listed 171 companies. Technological advancements have enabled shareowners to complete transactions from the comfort of their homes, eliminating the need for bank visits (Saudi Gazette, 2017).

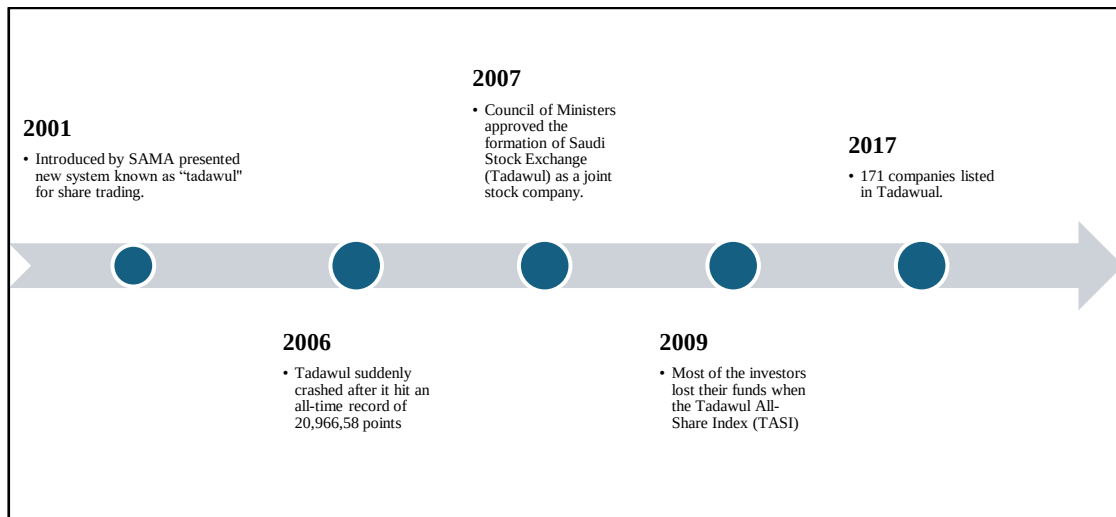


Figure 2. Timeline of Saudi stock market 2

Source: Saudigazette

Saudi Arabia is the biggest oil exporter. It leads to being the key source of economic income. Saudi Arabia is achieved the status of being the second-largest oil producer globally (Figure 3). It can generate over 9,000 barrels of oil daily at a low cost (WorldAtlas, 2023).

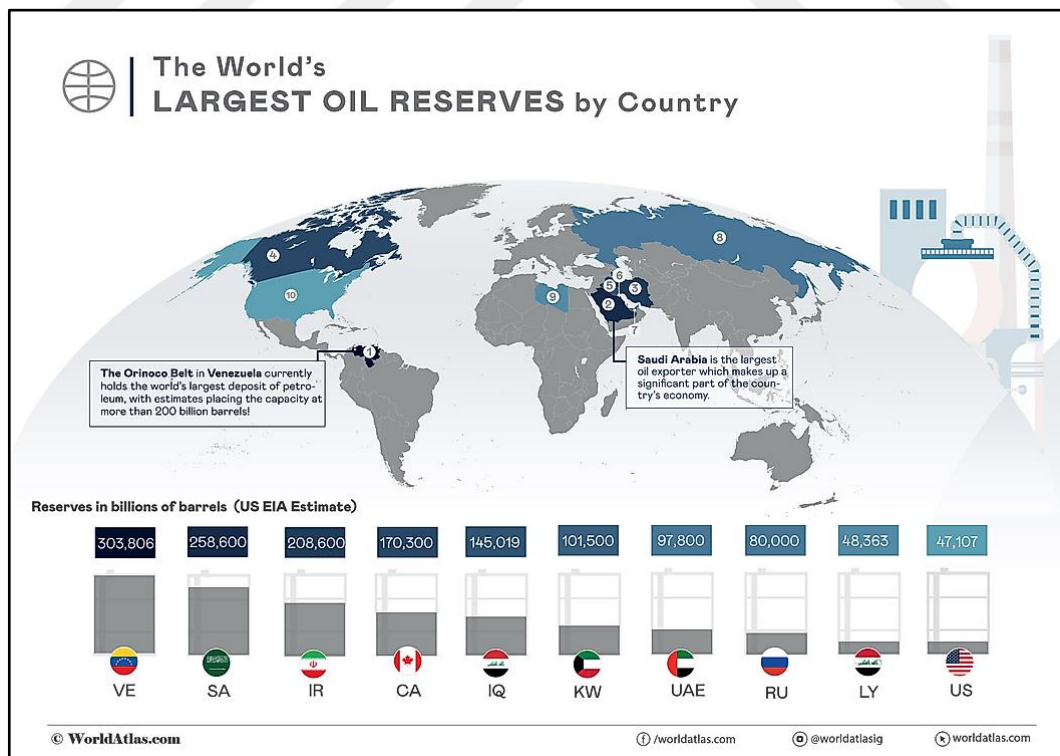


Figure 3: Largest Oil Reserves

Source: WorldAtlas.com

Oil is no longer the primary source of income for Saudi Arabia. Vision2030 is a plan approved by the Council of Ministers in April 2016. The Vision 2030 plan seeks to achieve holistic development built in religious principles. The plan is to capitalize on the country's capabilities and resources, positioning it as an exemplary model for the world (Saudi Gazette, 2016).

Crown Prince Mohammed bin Salman of Saudi Arabia is presenting "Vision 2030," a critical restructuring strategy that seeks to relieve the Kingdom of Saudi Arabia's dependence on oil exports. The Vision 2030 strategy focuses on generating income through oil and the growth of the Public Investment Fund (PIF), which become the largest in the world with a capital of around \$3 trillion. In addition, the strategy emphasizes the generation of revenue from alternative sources. The economic objectives and development plan of Saudi Arabia be significantly affected by the Saudi national wealth fund.

The Saudi Exchange is a popular stock exchange in the Gulf Cooperation Council (GCC) and Middle East and North Africa (MENA). It lists 345 stocks on all its exchange platforms as of November 2022. Among the 67 World Federation of Exchanges members, it is the third-largest developing country stock exchange and one of the world's largest. The exchange is a subsidiary of the Saudi Tadawul Group and offers diverse investment opportunities and top-rated goods and services. As of November 2022, its market capitalization reached \$2.72 trillion in the US dollar. Being a member of the Saudi Tadawul Group provides an opportunity to fulfil its objectives and leverage the support and expertise provided by its companies (Saudi Exchange).

Saudi Aramco sell 1.545 billion shares in its secondary public offering on June 2, generating \$13.1 billion. It is part of Saudi Arabia's economic plan to battle "oil addiction." The government of Saudi Arabia support big local projects using Aramco's funds since its IPO. The arrangement should help the kingdom invest in renewable energy, technology, tourism, organization, and manufacturing for long-term prosperity. Riyadh's sovereign wealth fund invested hundreds of billions in big projects like electric vehicles, sports, and a new airline to diversify the economy and generate employment. (AlJazeera, 2024)

1.3 Historical Crisis in The Stock Market

A well-developed stock market is essential for the industrial sector of an economy, particularly in economies that are currently in the process of transitioning. The long changes from fundamentals can result in distortions, as shown by the collapse of East Asian markets, which intensified the tendency toward recession (MacDonald, 2001).

Over many years of the history of the reality of financial markets, there have been cases of economic crisis that have taken place because of the beginnings of the financial market. However, the overall effect, which ripples through different industries, most severely impacts the financial business (Reisner, 2023).

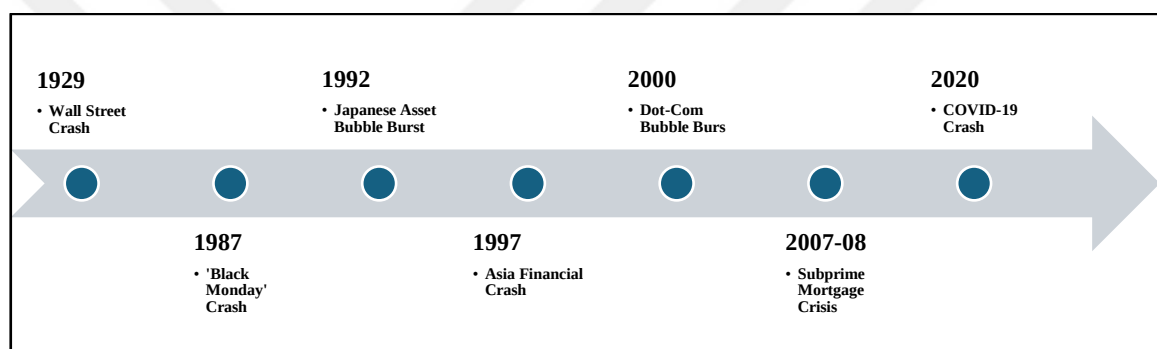


Figure 4 Biggest Stock Market Crashes.

Source: Business Insider

The financial crisis started in the subprime mortgage industry in the United States. These loans are problematic or fail to satisfy the standard requirements for acceptable quality, which are having a good credit history, having a guarantee, and a prudent loan-to-value ratio of other factors (Bui, 2011).

Tanaka (2022) examines the economic impacts of SARS, MERS, and COVID-19 on Asian economies over the past two decades. The study shows that nonpharmaceutical treatments and the fear of infection have a significant impact on the economies of Asian countries. The global financial crisis is causing a significant effect on the behaviour of volatile stocks, according to Shin (2005), who researched the relationship between expected stock returns and volatility in developing markets throughout the financial crash, which happened in Asia and Russia. Fang (2001) declares that Taiwan's stock return volatility increased because of the Asian crisis.

1.4 External Shocks

The global financial crisis caused commodities prices and foreign funds movements to shock India. Current account deficits raised vulnerability, while policy mistakes raised foreign capital reliance. The currency rate stabilized best by temporarily removing oil marketing organizations' demand. Regarding market restrictions and transaction types, carefully raising position limits and requirements for margin is suggested. With careful market constraints, controlled floating may goal inflation without going the policy rate to minimize depreciation (Goyal, 2014).

External shocks, such as U.S. monetary policy shocks, significantly impact macroeconomic fluctuations in emerging markets. These shocks experience a considerable influence on interest rates and exchange rates, with price levels and actual output responding more strongly than the U.S. economy (Maćkowiak, 2007)

The research described Pakistan's small open economy's response to external and internal sector shocks. The results show that external shocks and volatile stock markets are related to the nominal and real sectors over the long run. Oil price shocks affect REER and NEER the greatest, followed by world commodity price shocks. Pakistan is lacking in shock absorption capability. Therefore, decreasing external sector dependence, export diversification, and investor creditworthiness can assist in minimizing shocks (Rashid, Jehan, & Kanval, 2023).

1.5 Covid-19 Pandemic

COVID-19 is the result of the SARS-CoV-2 virus. Some people, especially older ones, and those with medical issues, may suffer severe sickness. Any person may get COVID-19 and get extremely sick or die at any stage of life. Healthcare systems affected by COVID-19. Due to the pandemic, authorities have had to stop nonurgent medical procedures and turn wards into ICUs or sub-ICUs (Ciotti, Ciccozzi, Terrinoni, Jiang, Wang & Bernardini (2020)

At the end of December 2019, Wuhan, China, found a new coronavirus. It caused a pandemic in various countries and spread throughout the world. In addition to being referred to as COVID-19, the medical disease classifies as a notifiable spreadable illness

that belongs to the fifth category. This illness can be transmitted by droplets or through direct contact, and the number of deaths related to it varies from low to moderate. Research is currently underway on several different drugs to address the lack of an existing treatment for COVID-19. Workers in the healthcare industry are requesting to be knowledgeable about the travel or contact history of patients to prevent the spread of the disease in the future and identify people who exhibit similar symptoms (Wu, Chen & Chan, 2020).

The study investigates COVID-19 epidemiology, molecular evolution, and diagnosis. The development of vaccines and antiviral therapies requires the identification of prevention and control measures. They can identify through phylogenetic analysis, homology modelling, epidemiological and diagnostic methods, and viral protein structure. For outbreak control, this information is crucial (Ciotti, Angeletti, Minieri, Giovannetti, Benvenuto, Pascarella, & Ciccozzi, 2020).

Ciotti, Angeletti, Minieri, Giovannetti, Benvenuto, Pascarella, & Ciccozzi (2020) found in December 2019, Chinese health officials informed the public about an epidemic of the disease in Wuhan, Hubei Province. This disease is the initial reference to as 2019-nCoV. The SARS-CoV-2 virus, which is a new kind of Coronavirus, is quickly spread around the world. It is resulting in many losses of life and an impact on the healthcare sector and economy. This study provides a comprehensive overview of the current understanding of the epidemiology, phylogenesis, homology modelling, and molecular diagnostics of SARS-CoV-2. Phylogenetic analysis is essential to know about viral evolution, while homology modelling is essential for developing vaccination methods and treatment. Effective test results are the basis for identifying cases, tracking contacts, determining the source of the disease in animals, and starting control measures (Public Investment Fund, 2016).

From March 1 to May 10, 2020, Elsayed (2020) conducted a study on the impact of COVID-19 on 17 diverse sectors of the Egyptian stock market. After analysing daily sectoral measurements, researchers discovered that new cases are more responsive to cumulative death indicators compared to cumulative cases. Furthermore, they observed that cumulative death indicators had a higher influence on stock market outcomes than daily COVID-19 deaths.

1.6 KSA Covid-19

The Saudi Ministry of Health is officially verified the first report of coronavirus infection in a Saudi citizen who had returned from Iran through Bahrain (Ministry of Health, 2020). Early in the epidemic, Saudi Arabia advised avoiding visiting high-COVID-19 countries. Although there are daily new cases of COVID-19 in Saudi Arabia due to the government control of the country, there is an increase and decrease in the daily cases (Figure 5).

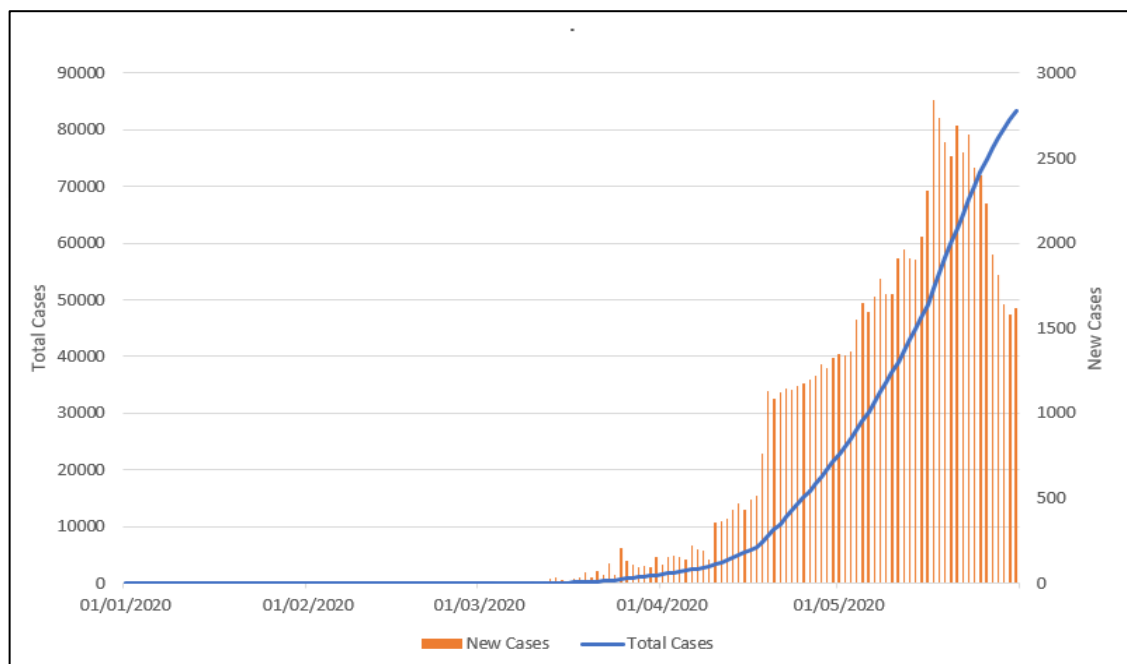


Figure 5. Daily new cases and total cases of COVID-19 in Saudi Arabia.

Data Source: ourworldindata.org

Saudi Arabia is constantly adjusting their COVID-19 strategy. Virus experiences and developments at national and worldwide levels educate each of us. Early collaboration across organizations with defined roles and duties is essential for controlling the COVID-19 pandemic. KSA imposes regulations and policies to manage and stop the spread of COVID-19 cases. One of the regulations is Saudi Arabia cancelled all International and domestic flights on March 15 and 21, 2020, as the pandemic expanded (Khan, Alsofayan, Alahmari, Alowais, Algwizani, Alserehi, & Jokhdar, 2021).

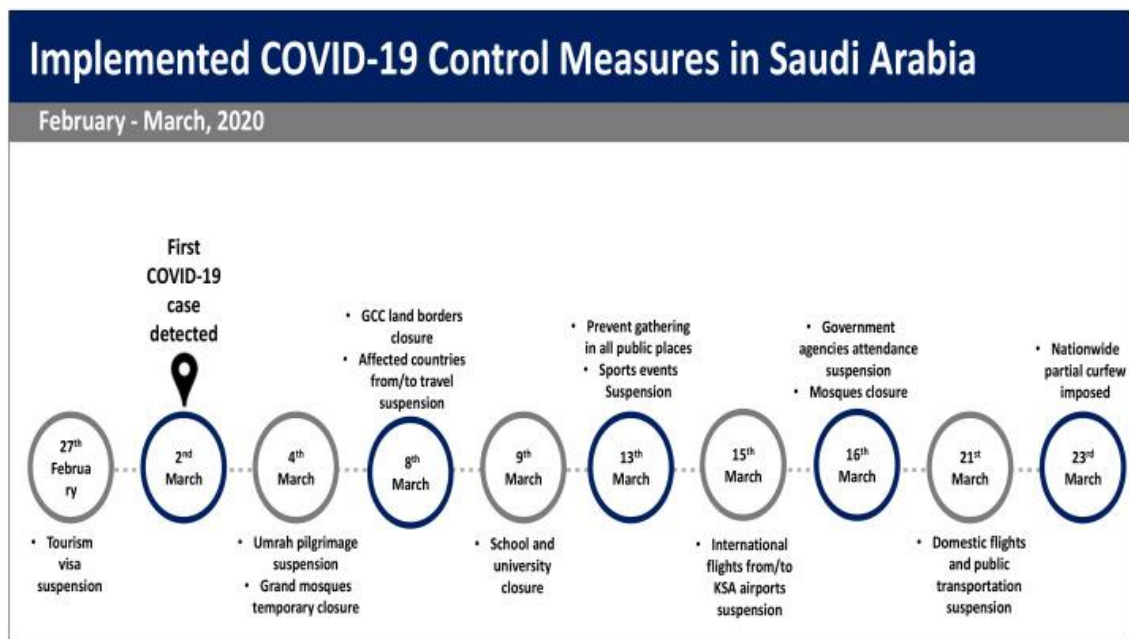


Figure 6 Timeline of Saudi Arabia response to compact COVID-19 spread in the first 4 weeks.

Source: Alqahtani, Alrasheed, & Alqunaibet, (2021).

Chaouachi & Slim (2020) examine the influence of the Coronavirus on the Saudi Stock Market from March 2nd to May 20th, 2020, using an ARDL estimate technique. The research used the daily confirmed cases of COVID-19 and the natural logarithm of the trading volume of the KSA Stock Exchange (TASI) to assess the prevalence of the Coronavirus. The Findings show a consistent negative relationship between the logarithms of the number of COVID-19 occurrences and the stock market index (TASI). Furthermore, the evidence shows a unidirectional causal connection between these factors. To avoid a significant stock market disaster in the Kingdom of Saudi Arabia in the future, the findings of the robustness study support the notion that a strong and resilient national reaction is necessary.

CHAPTER 2: THEORETICAL BACKGROUND AND LITERATURE REVIEW

This chapter examines the theoretical framework that guide the research process. Additionally, this chapter presents the findings from previous studies. Our study can support the researcher by mentioning and discussing several different points of view.

2.1 Literature Review

This chapter contains the findings obtained by other researchers who have implemented, researched, and submitted their findings and discoveries. This research investigates and studies a variety of concerns, such as COVID-19, event studies, and returns on the stock market, amongst several other studies.

2.1.1 The Impact of COVID-19 on Emerging Countries.

Singh & Shaik (2021) found the COVID-19 pandemic is impacting global financial stock market indices, with six WHO announcements impacting five sectors and nine global stock market indices. The study found that the pandemic affected global financial stock markets, but the effect varies for developed and emerging economies. Harjoto, Rossi, Lee, & Sergi (2021) found that the COVID-19 outbreak negatively influenced stock prices. It is leading to an impact on economic growth and market responses in both emerging and developed nations. COVID-19 is negatively impacted stock returns, increased volatility, and trading volume in 53 emerging and 23 developed countries from January 14 to August 20, 2020. Developed markets experienced these effects, while the cases and deaths affected stock returns and volatility in the emerging markets. There seems to be a difference in how traders in emerging markets respond to COVID-19 cases and deaths.

Brown & Warner (1985) studies the effect of the daily stock return using event study methodology. There is no indication that nonnormality in income or biases in OLS predictions impact abnormal performance tests. Autocorrelation in greater profits and variations in variance can affect evaluation. Study results find that considering dependency in daily earnings can result in reduced power. The results obtained from forecasting with actual daily data usually support the conclusions drawn in previous studies that utilized monthly data.

Singh, Dhall, Narang & Rawat (2020) use event methodology and panel data regression

to evaluate the effect of COVID-19 on the stock markets of the G-20 nations. The significant negative abnormal returns in the last 58 days are influencing the economies of both developed and developing countries. Increasing fear associated with the cumulative average abnormal return (CAAR) from day 0 to day 43, while recovery is showing by the CAAR from day 43 to day 57. The panel data analysis verified the recovery.

Liu, Manzoor, Wang, Zhang & Manzoor (2020) study founds the short-term impacts of the coronavirus outbreak on 21 leading indexes of the stock market in the essential nations impacted like Japan, Korea, Singapore, the USA, Germany, Italy, and the UK. The event study method displays quick falls in the stock market, with Asia facing greater negative returns than usual. The negative impact of verified cases on abnormal returns in indexes of stocks is assigned to investors' negative expectations and worry over uncertainty.

Alam, Wei & Wahid (2021) found the COVID-19 pandemic affecting Australia's economy and capital market. As a result, some industries have become high-risk while others have performed well. The research analyzed data from eight sectors in Australia, including transportation, pharmaceuticals, healthcare, energy, food, real estate, telecommunications, and technology. It discovered that the food, pharmaceutical, and healthcare industries experienced significant positive profits on the same day as it announced an outbreak. Companies in the transportation sector are performing poorly compared to the telecommunications, pharmaceutical, and healthcare sectors, which all did well. The findings are necessary for investors, market players, corporations, and governments to make strategies for recovery.

SHAIK (2021) examines how COVID-19 affects the stock market performance in Saudi Arabia by analysing daily price data obtained from the Tadawul All Share Index (TASI). The findings display a negative Abnormal Return (AR) of -0.003 on the announcement day, followed by a positive return the next day. The Cumulative Abnormal Return (CAR) is statistically significant and negative across all six event windows at a 1% significance level. The impact of an epidemic declines after 30 days but rises in the last 10 days. After the event, there is an increase in the volatility of the stock market. That represents a negative mean return of -0.326 and a higher standard deviation. The study concluded that the COVID-19 pandemic affected stock market returns of TASI.

Sayed & Eledum (2023) analyses the Saudi stock market's short-term COVID-19

reaction. It calculates abnormal earnings for 21 industries using event methods for research. The findings indicate that there is no effect on the market, which results from the predicted using CARs for the various industrial categories. The first verified case in Saudi Arabia negatively impacted banks, consumer services, capital goods, transportation, and commercial services the most.

2.1.2 The Impact of COVID-19 on Sectors

According to the findings of Shaikh, I. (2022), the COVID-19 pandemic is effect on the energy markets, which includes stock indexes, futures, exchange-traded funds, and implied volatility indexes. Historical volatility affected by instability indicators such as the increase in infections, uncertainty about economic policy, and the unpredictability of infectious illness markets. Energy exchange-traded funds (ETFs) display greater stability, but the market for WTI crude oil is significantly volatility. The result of the reaction to these tail events increases in the opinion of investors within the energy sector, suggesting that worried investors quickly bought put options and paid high premiums to protect themselves against unusual risks. Su, Khan, Tao, and Nicoleta-Claudia (2019) employed wavelet analysis to evaluate Saudi Arabia's geopolitical risk, oil prices, and liquidity in finance. The study shown that increased GPR correlates oil prices (OP) and financial liquidity in the time domain and short- and medium-term correlations in the frequency domain. Without GPR, a midterm correlation exists. The results support the monetary equilibrium concept and underline the importance of varying income sources to deal with domestic market shocks. Algamdi, A., Brika, S. K. M., Musa, A., & Chergui, K. (2021) explored the effects of the COVID-19 dying cases on crude oil prices throughout the world, with a focus on the raised volatility and investor worries caused by the virus. In this research, daily data from January 22nd to June 14th, 2020, analyzed with the application of an econometric model defined as the ARDL. According to the results, Saudi Arabia is the country that negatively affected by the dying ratio, which is a large and negative impact on the dynamics of oil prices. The summary of the study emphasizes the inflation of risk connected with dying in both the real economy and the financial market.

Coluccia, B., Agnusdei, G. P., Miglietta, P. P., & De Leo, F. (2021) found the COVID-19 pandemic is caused a global social and economic downturn, leading to a significant

impact on the agri-food sector. A study assessing the sector's resilience to the pandemic, focusing on supply and value chain, found that fresh and perishable products experienced price level effects during the first wave, while storable products did not. This is due to the vulnerability of harvest and production phases, which affected fresh and perishable product supply, and the resilience of transport and organization, which ensured the supply of storable products to consumers. The analysis could help researchers, policymakers, and managers build suitable strategies for the entire agri-food supply chain, ensuring sector resilience during unprecedented times. Höhler, J., & Lansink, A. O. (2021) The COVID-19 pandemic is significantly impacted financial and commodity markets worldwide. A study analysing stock prices and financial reports from 71 major food supply chain companies in the US, Japan, and Europe found increased price volatility. Manufacturers of fertilizers, agrochemicals, and food distributors showed high volatility in their stock prices. Low price volatility observed in food retailers' stocks. This pattern also reflected in the profits of companies published in financial reports. The study found that more profitable companies exhibited higher cumulative returns during the outbreak, while riskier stocks received higher discounts on returns in subsequent phases. The pandemic is impacted the food supply chain's profitability and stock price volatility.

Donadelli, M., Kizys, R., & Riedel, M. (2017) investigate the impact of WHO alerts and media news on pharmaceutical companies' stocks in the US. It argues that disease-related news (DRNs) should not trigger rational trading. The research reveals that DRNs have a positive sentiment effect among investors, especially for small companies, who are less likely to develop new vaccines.

Balemi, N., Füss, R., & Weigand, A. (2021) found that the COVID-19 epidemic own significant effects on the real estate sector, as seen by the number of empty apartments, retail malls, and office towers in metropolitan areas. This paper reviews academic insights on the housing, commercial real estate, and mortgage markets, analyzing their performance during the crisis. It also provides an outlook and discusses probable future developments in each real estate segment. Milcheva, S. (2022) study examines the risk-return relationship between real estate equities in the US and Asian nations during the Covid-19 pandemic. The study finds significant variations between Asian equities and US stocks, with Asian businesses experiencing a negative market response, while the US showed few category differences. The findings suggest a significant gap in predictions

between US and Asian real estate firms, due to past global crises. Chong & Phillips (2022) estimate the dollar impact of COVID-19 on the aggregate value of US commercial real estate, highlighting the severe impact of factors such as telecommuting, social distancing, commerce restrictions, and business closures. It uses MacroRisk.com's commercial stock valuation models to evaluate the impact of economic changes on real estate values. The study finds that real estate markets would have experienced greater declines if extreme monetary and fiscal policies implemented during the pandemic's early months.

Jauzaa & Hirawati (2021) analyzed the financial performance of telecommunications firms by calculating earnings indices like ROA, ROE, and NPM both earlier and following the Covid-19 crisis. The study showed that the telecommunications industry had improved in performance while other sectors noticed a decline, which primarily depends on internet access for social media engagement. The research applied financial information from telecommunication businesses traded on the Indonesia Stock Exchange between the second quarter of 2019 and the first quarter of 2021 by using descriptive methods. Throughout the epidemic, the average earnings ratios of telecommunications industry businesses grew. Even so, Hotteling's T2 test showed that there no statistically significant differential in earnings ratio between each of the periods.

The research by Hassounah, Raheel & Alhefzi (2020) delves into Saudi Arabia's digital response to the COVID-19 pandemic, scrutinizing the country's use of digital technology across various sectors. Their analysis encompasses the implementation of lockdown measures, population movement restrictions, and the integration of technology to ensure uninterrupted delivery of essential services. Through a comprehensive literature review and examination of publicly available sources, the paper highlights Saudi Arabia's multifaceted efforts in navigating the pandemic through digital solutions. It underscores the development and deployment of various apps and platforms by both governmental and private entities for public health functions and healthcare services. Additionally, the study emphasizes the smooth transition to electronic education platforms, collaborative initiatives among telecommunication companies, and effective risk communication activities via social media, websites, and SMS text messaging, emphasizing the significance of digital solutions in tackling the challenges posed by the pandemic in Saudi Arabia.

Shortall, Mouter, and Van Wee (2022) investigate the effects of COVID-19 containment measures on passenger transport systems. Through an extensive review of existing literature, the study examines the diverse strategies implemented worldwide in response to the pandemic and their consequences on passenger travel behavior, accessibility, and equity. The findings illustrate that while measures such as lockdowns and travel restrictions effectively reduced transmission rates, they also resulted in significant disruptions to passenger transport networks, leading to changes in travel patterns and modal preferences. Additionally, the study highlights concern about the unequal distribution of impacts, with marginalized groups disproportionately affected by reduced access to essential services and employment opportunities. Farooq, Nasir, and Bashir (2022) explore the impact of the COVID-19 pandemic on the stock market performance of transportation and travel services firms through a cross-country study. Their research investigates the financial repercussions experienced by these sectors, considering factors such as lockdown measures, travel restrictions, and changes in consumer behavior. The study finds a notable negative influence of the pandemic on the financial performance of transportation and travel services firms, underscoring the significant challenges faced by these industries during the crisis. This underscores the importance of understanding the global economic implications of such pandemics on specific sectors, providing insights into the vulnerabilities and resilience of these industries.

2.2 Theoretical Background

This section presents an overview of the theoretical framework, which serve as the foundation for the subsequent research. To assist the researcher, this engages in theoretical discussions and present relevant findings from previous studies.

2.2.1 Theoretical Framework

The event research method analyses how an event affects stock prices. It allows researchers to explore non-numerical variables like environmental disasters. The event research technique uses ordinary returns to compare the stock's pre-event performance to the market index. After the event, the factual returns may compare to the standard returns to calculate their impact. The sources include Wells (2004) and MacKinlay (1997). This study examines how health emergencies affect stock markets using event study

methodology. The selected strategy suits this goal. Similar methods have shown acceptable results (He et al. 2020; Shen & Zhang 2020).

As a result of the fact that the primary objective of this research is to determine the implications that health difficulties might have on Saudi Arabia's stock markets, the event study technique (Wells 2004; MacKinlay 1997) is existence used because the method is a good fit for this prerequisite. By the theoretical framework proposed by Fagerholm, H. (2021), the efficient market hypothesis contributes to the demonstration of the element of evidence presented in Figure 1. The COVID-19 virus is the subject of the first component of the theoretical framework because it is a predicted factor that influences stock markets. The event research approach is used to investigate the impacts of COVID-19 and is the subject of the second component. Because the stock market is the focus of the research, the final component of the theoretical framework is related to the stock market. There is a connection between these factors and the notion that COVID-19 is an effect that contributes to the stock market, and the effects are studied using the approach of event research.

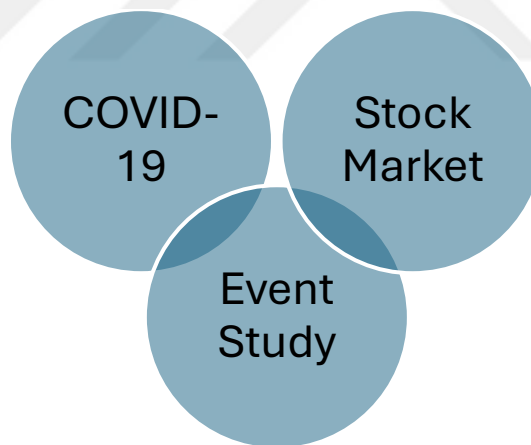


Figure 7. Theoretical Framework

Source: (Fagerholm, 2021:8)

2.2.2 Efficient Market Hypothesis

Event studies expect efficient markets (Wells, 2004). Several years ago, economists approved Eugene Fama's efficient market hypothesis. Many believe that security markets accurately represent stock market information. Malkiel (2003) and Fama (1960) propose

that securities buyers feel the price is higher than the present purchasing price, while sellers believe the selling price is higher than the actual price.

The efficient market hypothesis assumes markets are always efficient. Therefore, market prices represent all available information. New knowledge spreads quickly throughout the market, changing stock values promptly. The reason is that public information analysis does not help investors locate inexpensive stocks and make more funds than randomly selected stocks. Thus, inexperienced investors who buy a random portfolio earn the same as professionals. In efficient markets, individual investors cannot consistently outperform the market. It is impossible to benefit from expertise. (Fama, 1960; Malkiel, 2003).

The efficient market hypothesis assumes a random walk. Thus, prices are changes in random anomalies of past values. It means free information flow in efficient markets, where stock prices reflect allowed news immediately. Tomorrow's price adjustments are in prospect with the result of new information different from today's. Stock price swings must be random since news is unexpected. Therefore, stock prices represent all current facts. Malkiel (2003)

CHAPTER 3: DATA AND RESEARCH METHODOLOGY

This chapter provides a detailed description of the techniques used to obtain the data description. In addition, the model and method employed in this study rely on Alam, Wei, and Wahid (2021). The data description section contains several elements, including, event day in Saudi Arabia, data source, data sample, and data variables. the model and method section consists of market model, description statistic, calculation of daily stock returns, calculation of alpha and beta, calculation of daily abnormal returns, calculation of daily average abnormal return (AAR), test statistical significance, calculation of daily cumulative average abnormal return (CAAR).

3.1 Data Description

The present research employs an event study method and quantitative strategy to complete the investigation. Event study method used in this research to help reach concrete, verifiable evidence of the impact of COVID-19 on the Saudi stock market. The collected information is using a suitable statistical approach. In addition, tests use various formulas. Secondary data on the return on the market and the return on the company's shares are the sources of information used in the base article on which this research relies. For this investigation, the writing technique employed for the thesis is the Microsoft Excel program for data processing to acquire the data gathering method. Using Microsoft Excel in this study provides the advantages of enhancing the understanding of the concepts and visualizing the results.

3.1.1 Event Day in Saudi Arabia

On Monday, 2nd March 2020, the Ministry of Health (MOH) reported the first coronavirus case. Unlike the global rate, in which there is a rise in daily COVID-19 cases, the Saudi Arabian government's efforts to control the COVID-19 virus spread by putting regulations and policies led to increases and decreases in cases. The Ministry of Health (MOH) uses a great protocol during COVID-19; it is swift and effective. The Saudi government developed applications to monitor COVID-19 cases and their exposure. The applications helped contain the spread by having options to book a test if the individuals had symptoms or had contact with some that had signs, which helped manage the health resources.

3.1.2 Data Source

To determine the level to which COVID-19 is an impact on the performance of stocks on the Saudi exchange market. The primary focus of this research is to examine secondary data gathered from investing.com. The use of secondary data assisted in the process of establishing the foundational knowledge for the investigation. This research focuses on the years 2019 and 2020. This research is based on empirical data, meaning the type of secondary data used in this study is quantitative data. Using secondary main advantage is economic because there is no need to collect the data from scratch. The secondary data sources used in this study are used in the base article on which this research is based.

3.1.3 Data Sample

The data set for Saudi Arabia comprised of a representation of stock market indices as a sample. Composed of 121 daily observations, the complete stock indexes from 01/09/2019 to 14/09/2020. The estimated window for this research is 120 days, while the event window is 10 days. On 2nd March 2020, the identification of the pandemic caused by the coronavirus in Saudi Arabia. Day 0 is the symbolic representation of COVID-19 as shown in Figure 3 timeline for an event study. The event window shown in the research studies in total is 21 days, which h is 10 days before the first case, 10 days after the first case, and the day of the first reported COVID-19 case. {As for the estimated window it is the 121, 60 days before the first case, 60 days after the first case, and the day of the first reported COVID-19 case.}

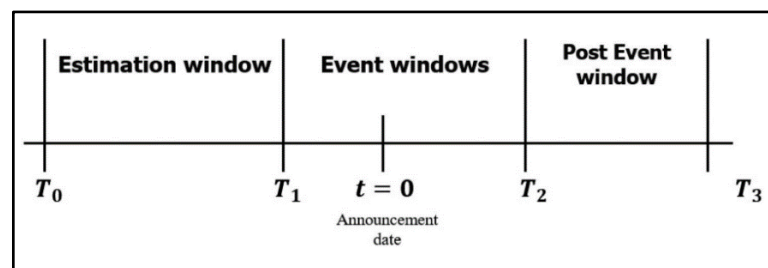


Figure 8. Timeline for An Event Study

Source: (Sayed & Eledum, 2023:4)

3.1.4 Data Variables

In this study, unusual returns are used as the dependent variable to look at how well these stocks did and how negative and trend ways changed returns. The expected returns and the actual returns used as separate factors in this investigation (Table 1). To reach this goal, the unusual return needs to be found. The purpose of this research is to determine how COVID-19 affects profitability and losses. The expected returns and the actual returns are the independent variables while the unusual returns are the dependent variables. Expected returns and actual returns do not depend on the event happening or not, but the unusual returns are caused by the event. Studying the event window and the numbers of the daily stock returns results can give concrete evidence to prove or disapprove of the hypothesis.

Table 1. List of Variables

Variables	Description	Type of Variable	Expected Return
Abnormal returns	Daily Stock Return	Dependent	Negative
Expected returns	Daily Stock Return	Independent	Negative

Source: Created by the author for specified citations

In the scope of this investigation, all the Saudi market industry investigated. The Saudi market is twenty different industries as shown in Table 2. Out of the 171 cases for which information about the firm accessible in the market, 165 chosen for further consideration.

Table 2. Sample of Sector Index.

No.	Industry Group	Symbol	Companies Included
1	Banks	TBNI	10
2	Capital Goods	TCGI	10
3	Commercial & Professional Services	TCPIC	2
4	Consumer Durables & Apparel	TDAI	5
5	Consumer Services	TCSI	6
6	Diversified Financials	TDFI	4
7	Energy	TENI	1
8	Food & Staples Retailing	TFSI	3
9	Food and Beverages	TFBI	12
10	Health Care Equipment & Services	THEI	6
11	Insurance	TISII	25
12	Materials	TMTI	39
13	Media	TMDI	2
14	Pharma, Biotech & Life Science	TPBI	1
15	Real Estate Management and Development	TRMI	11

16	REIT	TRTI	12
17	Retailing	TRLI	6
18	Telecommunication services	TTSI	3
19	Transportation	TTNI	5
20	Utilities	TUTI	2

Source: Investing.com

3.2 Methodology Description

This section presents an explanation of the variables that selected, as well as an explanation of the model and the techniques of calculation that are going to be used in the process of investigating and studying the performance of the industries. Event research is a common method used for looking into reacting to public announcements and their impact on stock prices. Because this research is quite like that of Alam, M. M., Wei, H., & Wahid, A. N. (2021), Sayed, O. A., & Eledum, H. (2023), and Dyckman, T., Philbrick, D., & Stephan, J. (1984) this thesis adopts the event study approach from their ideas. Considering the variations that have occurred in the stock market in Saudi Arabia. The investing.com, which includes 165 companies, is used to collect the daily closing prices of the stocks. This research studies three periods: 120 days before the pandemic announced from 1 September 2019 to 16 February 2020, 120 days following from 17 March 2020 to 14 September 2020, and 17 February 2020 to 16 March 2020. Following that, the t-test calculation makes use of the significance testing value for each trading day.

3.2.1 Market Model

The market model is a statistical model that provides a connection between the earnings of a stock and the return of the market portfolio. It depends on the assumption that asset returns follow a joint normal distribution and are expressed in a linear format. Building our study on previous studies that have shown in Haihua, Z. (2020), Fagerholm, H. (2021), and Alam, M. M., Wei, H., & Wahid, A. N. (2021) employing the market model, which is defined in the following parts:

$$E(R)_t = \alpha + \beta R_S$$

Where: $E(R)_t$ = expected returns on stock daily for the day, α = intercept, β = stock's Beta value, R_{TASI} = return on the stock index for the day.

3.2.2 Description Statistic

A descriptive statistic provides a description or profile of sample data collected throughout the study methods of data collecting. This method describes the sample data. A minimum, a maximum, a mean, and a standard deviation are the components that make up this. The elements evaluated in this study are the data collected.

3.2.3 Calculation of Daily Stock Returns

After gathering the necessary information to calculate the stock's return. Like earlier research like Alam, M. M., Wei, H., & Wahid, A. N. (2021), in this study, calculate the daily stock return by using the estimating window and the event window, the following formula is used for calculating the daily return of every stock price:

$$R_t = \frac{P_t - P_{t-1}}{P_{t-1}}$$

Where: R_t = stock daily returns on t day, P_t = stock closing price on t day, P_{t-1} = stock closing price on t-1 day.

3.2.4 Calculation of Alpha and Beta

Based on the previous studies Haihua, Z. (2020), and Fagerholm, H. (2021) are using regressing the market model, the alpha coefficient is used in the CAPM analysis to figure out the expected profit. The beta coefficient shows systemic risk, while the CAPM predicts good, unusual events. Since the average goes above zero, bad things are likely to happen if the stock is held for a long time.

$$E(R)_t = \alpha + \beta R_t$$

Where; $E(R)_t$ = estimated earnings on stock for time, α = intercept of the regression equation, β = Beta value, R_t = earnings on the index for time.

The Capital Asset Pricing Model's importance is measured by the alpha value, which is found through regression analysis of a market model. Calculating abnormal returns requires the alpha value because it helps figure out cumulative abnormal returns. Within

the Capital Asset Price Model (CAPM), price is only impacted by the market. This leads to the calculations of CAPM alpha and beta.

The beta coefficient (β) shows how risky it is for buyers to put funds into an industry or business. It shows how much of the variation in the dependent variable can be described by the variation in the independent variable. Because it correlates with previous market data, this can use the coefficient to examine how events like the COVID-19 outbreak affected predicted earnings and the economy.

3.2.5 Calculation of Daily Abnormal Returns

By studying the COVID-19 event, abnormal return (AR) is used as an equation to describe the present value of a stock at a specific time.

$$AR_t = R_t + E(R)_t$$

Where: AR_t = the abnormal return for a time, R_t = actual return on stock for a time, $E(R)_t$ = expected return on stock for a time.

3.2.6 Calculation of Daily Average Abnormal Return (AAR)

Next, display the daily stock average abnormal returns for each of the findings during the specified period.

$$AAR_t = \frac{1}{N} \sum_{i=1}^N AR_t$$

Where: AAR_t = average abnormal returns, n = number of events, AR_t = the abnormal return for a time.

3.2.7 Test Statistic Significance

Based on the t-statistic and degrees of freedom, a t-test is an inferential statistic used for evaluating the statistical significance of the difference between two groups. The t-statistic is employed to quantify the standard errors, which are the differences between the AAR and zero, to figure out the nature of the relationship among the AAR. An increasing absolute t-value suggests that there is a significant abnormal return.

$$T = \frac{AAR}{SE}$$

Where: T = test statistic, AAR = the average abnormal return, SE = standard error.

The standard error, also known as SE, is a measurement that assesses the level of uncertainty associated with estimating the average abnormal return. It measures the range or spread of abnormal returns relative to the average abnormal return.

$$SE = \frac{\sigma}{\sqrt{n}}$$

Where: SE = standard error, n = number of windows of observation, σ = standard deviation.

3.2.8 Calculation of Daily Cumulative Average Abnormal Return (CAAR).

To assess the performance of all businesses during a specified period, calculate a cumulative abnormal return by adding the unexpected earnings of each company at a given time. This research draws from the previous studies achieved by Haihua (2020) and Fagerholm (2021) to calculate Cumulative Average Abnormal Returns (CAARs) by either aggregating the total abnormal returns or determining their average.

$$CAAR_t = \sum_{t=t_1}^{t_2} AAR_t$$

Where: $CAAR_t$ = cumulative abnormal return, t = time, AAR_t = the average abnormal return for a time.

CHAPTER 4: EMPIRICAL FINDINGS

This section presents the study's results, including the average abnormal returns (AAR) and the cumulative average abnormal returns (CAAR), which clarify the daily average abnormal returns for each industry from day -10 to day 10. This explores the findings, specifically focusing on the impact of event days on unusual returns. When a stock generates unusual returns, it does not always mean it is profitable. This study calculates these values using the Saudi Arabia Stock Index. The fact that this is the case shows the possibility of profitable abnormal earnings in stocks regardless of moves in the market.

4.1 Descriptive Statistics

Before the evaluation process begins, a descriptive statistics explanation of the data provides a general description of the study variable information. Applying the descriptive statistics technique, which includes components like the mean, standard deviation, maximum, and lowest values, can provide a thorough picture of the results (Ghozali, 2011).

Table 3. Descriptive Statistics Pre-Event Period

Industry Group	Observation	Mean	Std. Devt	Minimum	Maximum
Banks	120	2.123E-19	0.002474	-0.005114	0.009001
Capital Goods	120	-3.433E-19	0.003659	-0.010743	0.011565
Commercial & Professional Services	120	0	0.995789	-2.531574	3.484999
Consumer Services	120	-8.789E-17	0.995789	-6.304555	2.613132
Consumer Durables & Apparel	120	0	0.995789	-4.976921	3.169395
Diversified Financials	120	-2.220E-17	0.995789	-3.376884	3.059399
Energy	120	0	0.995789	-5.294486	4.170621
Food and Beverages	120	-2.151E-17	0.995789	-3.490051	3.161136
Food & Staples Retailing	120	-4.163E-17	0.995789	-3.183639	3.213839
Health Care Equipment & Services	120	1.850E-17	0.995789	-2.582184	3.086199
Insurance	120	-4.071E-17	0.995789	-2.728265	3.728120
Media	120	-2.630E-16	0.995789	-2.904868	3.697798
Materials	120	5.089E-17	0.995789	-2.407648	2.897020
Pharma, Biotech & Life Science	120	-2.186E-13	0.995789	-1.892006	1.956755
Retailing	120	-8.697E-17	0.995789	-2.471620	2.973438
Real Estate Management and Development	120	0	0.995789	-2.324098	2.381418
REIT	120	7.587E-17	0.995789	-2.543048	4.447032
Transportation	120	4.903E-17	0.995789	-3.374474	2.463248
Telecommunication services	120	0	0.995789	-3.910537	3.284973
Utilities	120	-5.181E-17	0.995789	-5.371757	2.873083

Source: Secondary Data Processed 2024 by Author's Estimate Using Excel.

The descriptive data gives insight into industry pre-event returns (Table 3). Data analysis shows several major patterns and characteristics. Most industrial groups experienced mean and median returns close to zero, suggesting neutral average returns before the

event. However, the lowest, maximum, and standard deviation returns vary significantly between sectors, showing high return volatility. Energy, Commercial & Professional Services, and Consumer Services have greater return ranges than Health Care Equipment & Services and Real Estate Management and Development. Kurtosis and skewness explain return distribution. Consumer Services and Food & Staples Retailing have high kurtosis and skewness, suggesting regular extreme results and return distribution asymmetry.

Table 4. Descriptive Statistics Post-Event Period

Industry Group	Observation	Mean	Std. Devt.	Minimum	Maximum
Banks	120	0.000243	0.003679	-0.011326	0.011337
Capital Goods	120	0.000707	0.003138	-0.013567	0.008048
Commercial & Professional Services	120	0.120472	1.719489	-3.015168	6.861861
Consumer Services	120	0.332108	1.243402	-3.437894	3.898771
Consumer Durables & Apparel	120	0.128208	2.746976	-11.407181	6.448632
Diversified Financials	120	0.177831	1.144292	-3.021281	3.532122
Energy	120	0.228214	1.282488	-3.033709	5.648092
Food and Beverages	120	0.429424	1.579503	-6.084255	4.989959
Food & Staples Retailing	120	0.160594	1.046969	-3.385869	3.343664
Health Care Equipment & Services	120	-0.208930	2.203910	-6.294712	5.935045
Insurance	120	0.025770	1.138622	-2.945523	3.807290
Media	120	0.567864	1.813001	-3.704781	6.297422
Materials	120	-0.050956	1.270322	-5.277309	2.838712
Pharma, Biotech & Life Science	120	0.003898	0.816900	-2.105521	1.871080
Retailing	120	-0.007037	1.114296	-3.679594	3.056560
Real Estate Management and Development	120	0.087462	1.625681	-5.876756	3.884622
REIT	120	0.155256	1.483205	-5.151665	5.108504
Transportation	120	0.124302	1.129858	-3.560721	3.482335
Telecommunication services	120	0.092857	1.179236	-4.469461	4.584159
Utilities	120	-0.088939	1.167050	-4.186443	4.344083

Source: Secondary Data Processed 2024 by Author's Estimate Using Excel.

Post-event descriptive data show industry group performance (Table 4). Comparing industry mean and median earnings shows significant disparities. Media and energy have greater mean returns than others, suggesting better post-event performance. Health Care Equipment & Services and Materials experienced negative mean returns, indicating lower performance. Studying standard deviation, kurtosis, and skewness shows return variability and distribution. Commercial & Professional Services and Media have greater volatility and positive skewness, suggesting positive abnormal results and high return prospects. In contrast, Utilities and Materials have negative skewness, indicating more negative returns.

4.2 Normality Test

The t-statistic is not a commonly used method for conducting a normality test; it can be used indirectly to assess normality. This process entails converting the data to closely resemble a normal distribution and performing a one-sample t-test to see whether the converted data's mean significantly differs from the predicted value. The t-statistic formula calculates the difference between the sample mean and the hypothesized population mean, considering the sample's standard deviation and size. The modified data indicates a normal distribution if it passes the t-test.

In the banks industry shows in the pre-event period from day -130 to day -11 the normality test is normal bell curve. During event period from day -10 to day 10 the normality test shows the change to skewed bell curve negatively. After event period from day 11 to day 130 shows the change in normality test is normal bell curve.

In the capital goods industry shows in the pre-event period from day -130 to day -11 the normality test is skewed bell curve negatively. During event period from day -10 to day 10 the normality test shows the change to normal bell curve. After event period from day 11 to day 130 shows the change in normality test is skewed bell curve negatively.

In the commercial and professional services industry shows in the pre-event period from day -130 to day -11 the normality test is skewed bell curve negatively. During event period from day -10 to day 10 the normality test shows the change to up normal. After event period from day 11 to day 130 shows the change in normality test is skewed bell curve positively.

In the consumer services industry shows in the pre-event period from day -130 to day -11 the normality test is skewed bell curve negatively. During event period from day -10 to day 10 the normality test shows the change to skewed bell curve positively. After event period from day 11 to day 130 shows the change in normality test is skewed bell curve negatively.

In the consumer durables and apparel industry shows in the pre-event period from day -130 to day -11 the normality test is normal bell curve. During event period from day -10 to day 10 the normality test shows the change to skewed bell curve negatively. After event

period from day 11 to day 130 shows the change in normality test is skewed bell curve negatively.

In the diversified financials industry shows in the pre-event period from day -130 to day -11 the normality test is skewed bell curve negatively. During event period from day -10 to day 10 the normality test shows the change to skewed bell curve negatively. After event period from day 11 to day 130 shows the change in normality test is skewed bell curve negatively.

In the energy industry shows in the pre-event period from day -130 to day -11 the normality test is normal bell curve. During event period from day -10 to day 10 the normality test shows the change to skewed bell curve negatively. After event period from day 11 to day 130 shows the change in normality test is skewed bell curve positively.

In the food and beverages industry shows in the pre-event period from day -130 to day -11 the normality test is skewed bell curve negatively. During event period from day -10 to day 10 the normality test shows the change to skewed bell curve negatively. After event period from day 11 to day 130 shows the change in normality test is skewed bell curve negatively.

In the food and staples retailing industry shows in the pre-event period from day -130 to day -11 the normality test is skewed bell curve negatively. During event period from day -10 to day 10 the normality test shows the change to normal bell curve. After event period from day 11 to day 130 shows the change in normality test is skewed bell curve negatively.

In the health care equipment and services industry shows in the pre-event period from day -130 to day -11 the normality test is skewed bell curve negatively. During event period from day -10 to day 10 the normality test shows the change to skewed bell curve negatively. After event period from day 11 to day 130 shows the change in normality test is skewed bell curve negatively.

In the insurance industry shows in the pre-event period from day -130 to day -11 the normality test is skewed bell curve negatively. During event period from day -10 to day 10 the normality test shows the change to skewed bell curve positively. After event period

from day 11 to day 130 shows the change in normality test is skewed bell curve negatively.

In the media industry shows in the pre-event period from day -130 to day -11 the normality test is skewed bell curve negatively. During event period from day -10 to day 10 the normality test shows the change to skewed bell curve negatively. After event period from day 11 to day 130 shows the change in normality test is normal bell curve.

In the materials industry shows in the pre-event period from day -130 to day -11 the normality test is normal bell curve. During event period from day -10 to day 10 the normality test shows the change to skewed bell curve negatively. After event period from day 11 to day 130 shows the change in normality test is skewed bell curve negatively.

In the pharma, biotech and life science industry shows in the pre-event period from day -130 to day -11 the normality test is normal bell curve. During event period from day -10 to day 10 the normality test shows the change to normal bell curve. After event period from day 11 to day 130 shows the change in normality test is normal bell curve.

In the retailing industry shows in the pre-event period from day -130 to day -11 the normality test is normal bell curve. During event period from day -10 to day 10 the normality test shows the change to skewed bell curve negatively. After event period from day 11 to day 130 shows the change in normality test is skewed bell curve negatively.

In the real estate management and development industry shows in the pre-event period from day -130 to day -11 the normality test is normal bell curve. During event period from day -10 to day 10 the normality test shows the change to skewed bell curve negatively. After event period from day 11 to day 130 shows the change in normality test is skewed bell curve negatively.

In the REIT industry shows in the pre-event period from day -130 to day -11 the normality test is skewed bell curve negatively. During event period from day -10 to day 10 the normality test shows the change to skewed bell curve negatively. After event period from day 11 to day 130 shows the change in normality test is skewed bell curve negatively.

In the transportation industry shows in the pre-event period from day -130 to day -11 the normality test is skewed bell curve negatively. During event period from day -10 to day

10 the normality test shows the change to skewed bell curve positively. After event period from day 11 to day 130 shows the change in normality test is skewed bell curve negatively.

In the telecommunication services industry shows in the pre-event period from day -130 to day -11 the normality test is skewed bell curve negatively. During event period from day -10 to day 10 the normality test shows the change to skewed bell curve negatively. After event period from day 11 to day 130 shows the change in normality test is normal bell curve.

In the utilities industry shows in the pre-event period from day -130 to day -11 the normality test is normal bell curve. During event period from day -10 to day 10 the normality test shows the change to skewed bell curve negatively. After event period from day 11 to day 130 shows the change in normality test is normal bell curve.

The data shows that different industries respond differently to significant events. The banking industry is resilient, reverting to a normal bell curve after negative skewness, while capital goods and consumer durables sectors show vulnerability. Commercial and professional services, consumer services, and energy industries show significant fluctuations, while financials, food and beverages, healthcare, and REIT industries show persistent volatility.

4.3 Average Abnormal Return Result (AAR)

Chapter 4 discusses the findings from the widow event analysis of the average abnormal returns. The window event consists of a total of 21 days. There are ten days of pre-events, ten days of post-events, and the day of the event. The study uses the ARR t-stat in the 120-day pre-event window and the 120-day post-event window to better understand the pattern of AAR. This research study the abnormal returns, ARR t-stat, and event window for each of the twenty industries, which comprise 165 listed companies in the Saudi stock market. The appendix displays all calculations for a sample.

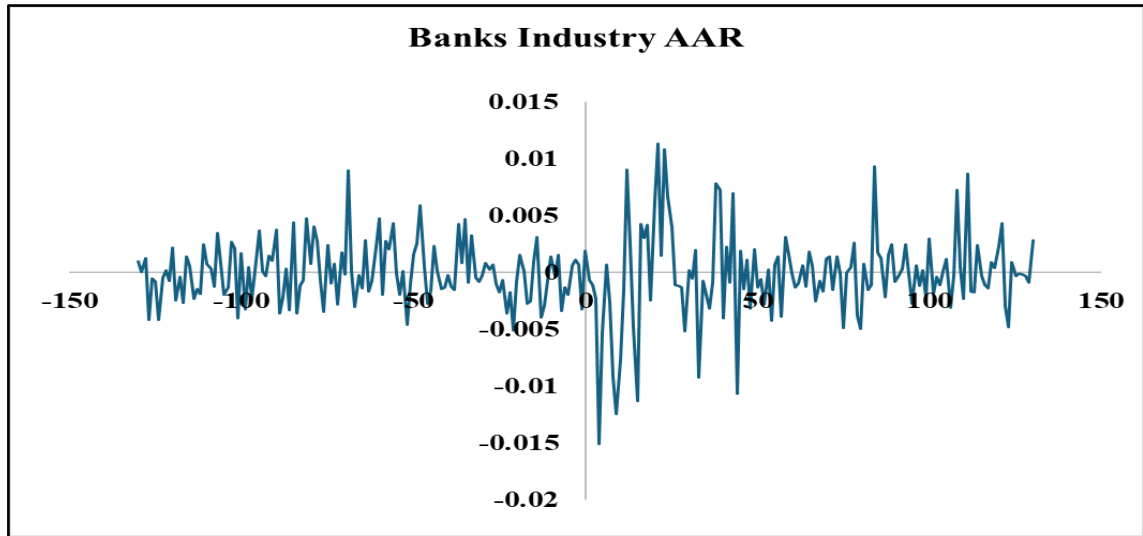


Figure 9. Banking Industry Average Abnormal Return

Source: Secondary Data Processed 2024 by Author's Estimate Using Excel.

In the 120 days before the event, the banking industry displays the following AAR t-stat results: The data shows four abnormal return responses within the period range of -11 to -50, including three positive abnormal returns on days -35, -37, and -48 and one negative abnormal return on day -21. Between -51 and -90, there are six abnormal returns: five positive abnormal returns on days -56, -60, -81, -85, and -69, and one negative abnormal return on day -52. In addition, in the period of -91 to -130, there are two abnormal returns, which are two negative abnormal returns on days -124 and -127.

In the 21 days of the event, the banking industry displays the following AAR t-stat results: The data shows that from day -10 to day 3 are ordinary returns. On days 4 and 5, there are negative abnormal returns. Day 6 and Day 7 are having abnormal returns. Days 8, 9, and 10 have negative abnormal returns.

In the 120 days after the event, the banking industry displays the following AAR t-stat results: The data shows fifteen abnormal return responses within the period range of 11 to 50, including ten positives on days 12, 16, 18, 20, 21, 23, 24, 38, 39, and 43 and having negative abnormal returns on days 14, 15, 29, 33, and 44. Between 51 and 90, there are four abnormal returns: one positive abnormal return on day 84 and three negative abnormal returns on days 54, 75, and 80. In addition, in the period of 91 to 130, there are four abnormal returns: three positive abnormal returns on days 108, 111, and 121, and one negative on day 123.

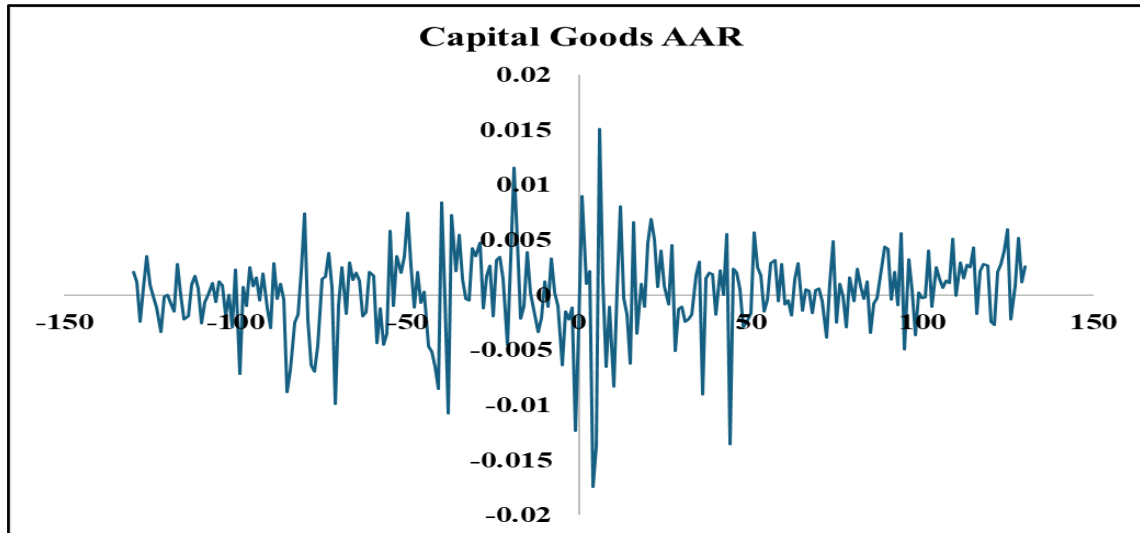


Figure 10. Capital Goods Industry Average Abnormal Return

Source: Secondary Data Processed 2024 by Author's Estimate Using Excel.

In the 120 days before the event, the Capital Goods industry displays the following AAR t-stat results: The data shows seven abnormal return responses within the period range of -11 to -50, including four positive abnormal returns on days -19, -37, -40, and -50 and three negative abnormal return on days -38, -41, and -42. Between -51 and -90, there are six abnormal returns: one positive abnormal return on days -80 and five abnormal returns on days -71, -77, -78, -84, and -85. In addition, in the period of -91 to -130, there is one abnormal return negative abnormal return on day -99.

In the 21 days of the event, the Capital Goods industry displays the following AAR t-stat results: The data shows that from day -10 to day -6 are ordinary returns. On day -5, there is a negative abnormal return. There is an ordinary return from day -4 to day -2. On Day -1, there is a negative abnormal return. There is an ordinary return on day 0. On day 1, there is a positive abnormal return. Days 2 and 3 have ordinary returns. Days 4 and 5 have negative abnormal returns. On day 6, have a positive abnormal return. There is an ordinary return on day 7. On day 8, there is a negative abnormal return. On day 9, there is an ordinary return. On Day 10, have a negative abnormal return.

In the 120 days after the event, the Capital Goods industry displays the following AAR t-stat results: The data shows six abnormal return responses within the period range of 11 to 50, including three positives on days 12, 16, and 21 and having three negative abnormal returns on days 15, 36, and 44. In addition, between 51 and 130, there is an ordinary return.

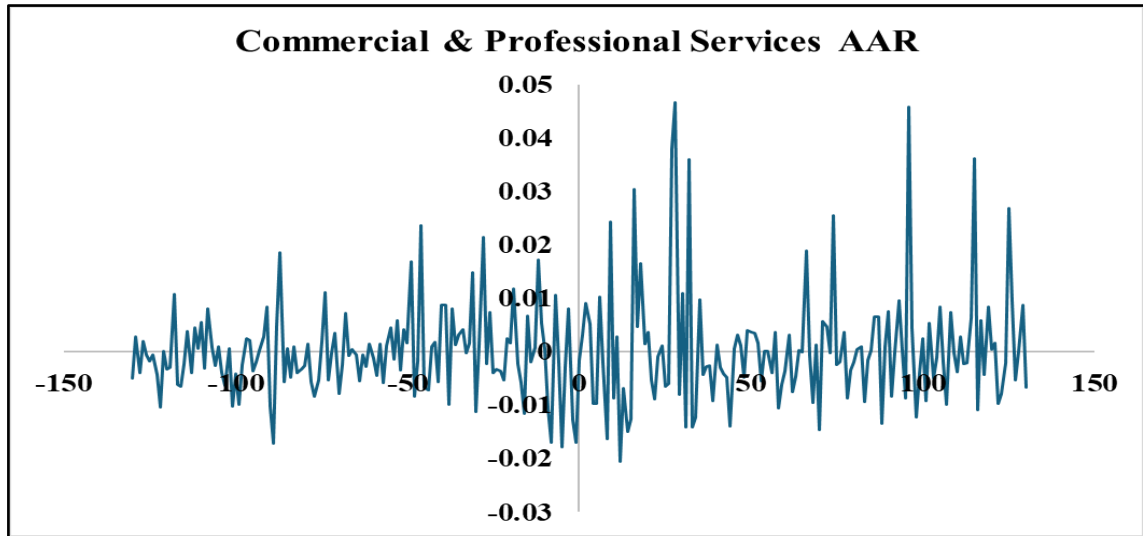


Figure 11. Commercial & Professional Services Industry Average Abnormal Return

Source: Secondary Data Processed 2024 by Author's Estimate Using Excel.

In the 120 days before the event, the Commercial & Professional Services Industry displays the following AAR t-stat results: The data shows eight abnormal return responses within the period range of -11 to -50, including six positive abnormal returns on days -12, -19, -28, -31, -46, and -49 and two negative abnormal return on day -16, and -30. Between -51 and -90, there are two abnormal returns: one positive abnormal return on day -87 and one negative abnormal return on day -89. In addition, in the period of -91 to -130, there is an ordinary return.

In the 21 days of the event, the commercial and professional services industry displays the following AAR t-stat results: The data shows that days -10 and -9 are ordinary returns. On day -8, there is a negative abnormal return. Day -7 and Day 6 are having ordinary returns. On Day -5 having an abnormal return. In Days -4, -3 having ordinary return. Days -2 and -1 have abnormal returns. From Day 0 to Day 7, have ordinary returns. Day 8 includes a negative abnormal return. Day 9 is having a positive abnormal return. Day 10, have an ordinary return.

In the 120 days after the event, the commercial and professional services industry displays the following AAR t-stat results: The data shows twelve abnormal return responses within the period range of 11 to 50, including five positives on days 16, 18, 27, 28, and 32 and seven negative abnormal returns on days 12, 14, 15, 31, 33, 34, and 44. Between 51 and 90, there are four abnormal returns. Specifically, there are two positive abnormal returns on days 66 and 74, and two negative abnormal returns on days 70 and 88. In addition, in

the period of 91 to 130, there are four abnormal returns: three positive abnormal returns on days 96, 115, and 125, and one negative on day 98.

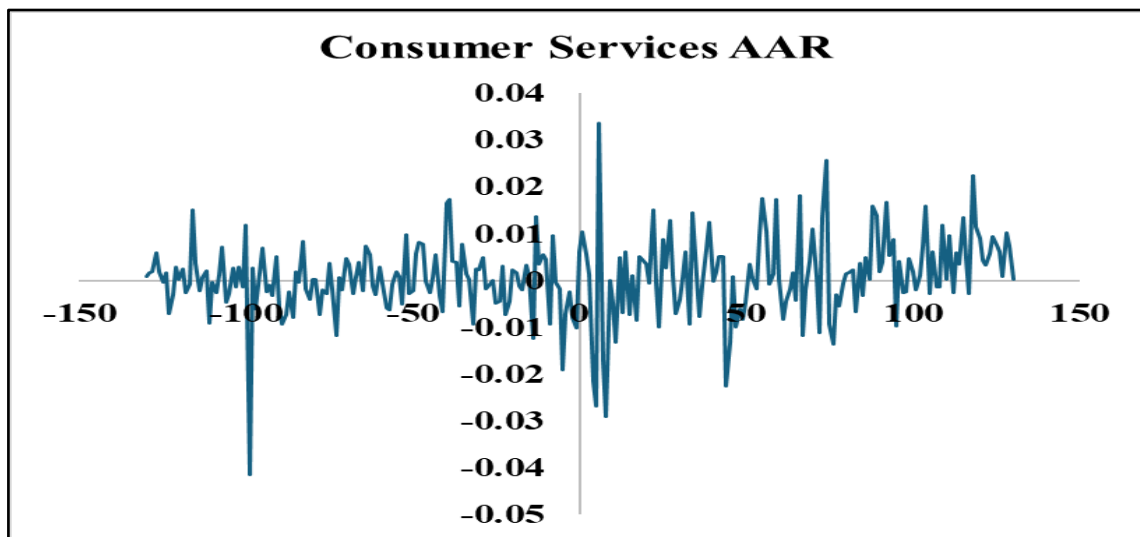


Figure 12. Consumer Services Industry Average Abnormal Return

Source: Secondary Data Processed 2024 by Author's Estimate Using Excel.

In the 120 days before the event, the consumer services industry displays the following AAR t-stat results: The data shows four abnormal return responses within the period range of -11 to -50, including three positive abnormal returns on days -13, -39, and -40 and one negative abnormal return on day -14. Between -51 and -90, there is one abnormal return. It includes a negative abnormal return on day -73. In addition, in the period of -91 to -130, there are three abnormal returns. These consist of two positive abnormal returns on days -100 and -116 and one negative abnormal return on day -99.

In the 21 days of the event, the Consumer Services industry displays the following AAR t-stat results: The data shows that from day -10 to day -6 are ordinary returns. Day -5 is having abnormal returns. From days -4 and 3 are ordinary returns. There are negative abnormal returns on days 4 and 5. Day 6 includes a positive abnormal return. Days 7 and 8 are having a negative abnormal return. On days 9 and 10 are ordinary returns.

In the 120 days after the event, the consumer services industry displays the following AAR t-stat results: The data shows seven abnormal return responses within the period range of 11 to 50, including four positives on days 22, 27, 34, and 39 and having three negative abnormal returns on days 11, 44, and 45. Between 51 and 90, there are eleven

abnormal returns. These consist of eight positive abnormal returns on days 55, 59, 66, 70, 73, 74, 88, and 89 and three negative abnormal returns on days 67, 72, and 76. In addition, in the period of 91 to 130, there are six positive abnormal returns on days 92, 104, 109, 115, 118, and 119.

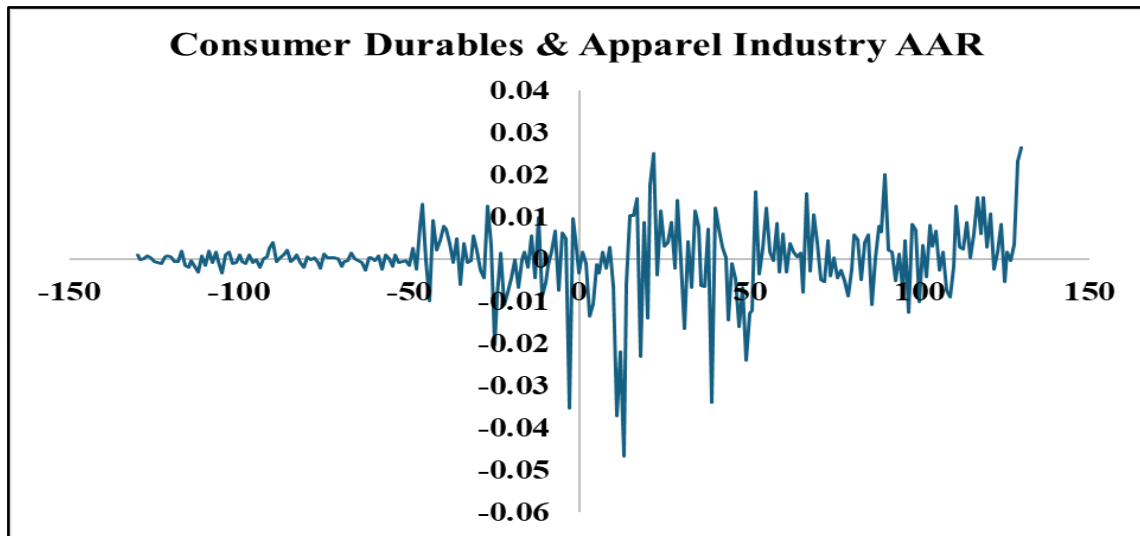


Figure 13. Consumer Durables & Apparel Industry Average Abnormal Return

Source: Secondary Data Processed 2024 by Author's Estimate Using Excel.

In the 120 days before the event, the Consumer Durables and Apparel Industry displays the following AAR t-stat results: The data shows thirteen abnormal return responses within the period range of -11 to -50, including seven positive abnormal returns on days -12, -27, -39, -40, -43, -46, and -47 and six negative abnormal returns on days -11, -21, -22, -24, -25, and -44. Between -51 and -130, there are ordinary returns.

In the 21 days of the event, the Consumer Durables and Apparel Industry displays the following AAR t-stat results: The data shows that from day -10 to day -8 are ordinary returns. On day -7, there is a positive abnormal return. On day -6, there is a negative abnormal return. Days -5 and -4 are having ordinary returns. Day -3 includes a negative abnormal return. Day -2 is having a positive abnormal return. From day -1 to day 2, include ordinary returns. Days 3 and 4 are having a negative abnormal return. From day 5 to day 10, include ordinary returns.

In the 120 days after the event, the Consumer Durables and Apparel Industry displays the following AAR t-stat results: The data shows twenty-six abnormal return responses

within the period range of 11 to 50, including fourteen positives on days 15, 16, 17, 19, 21, 22, 24, 27, 29, 34, 35, 38, 40, and 41 and twelve abnormal returns on days 11, 12, 13, 18, 20, 31, 39, 44, 47, 48, 49, and 50. Between 51 and 90, there are eleven abnormal returns: seven positive abnormal returns on days 52, 55, 58, 67, 69, 88, and 90, and four negative abnormal returns on days 51, 66, 79, and 86. In addition, in the period of 91 to 130, there are seventeen abnormal returns: twelve positive abnormal returns on days 98, 99, 103, 105, 111, 114, 117, 119, 121, 124, 129, and 103, and five negative abnormal returns on days 95, 97, 100, 108, and 109.

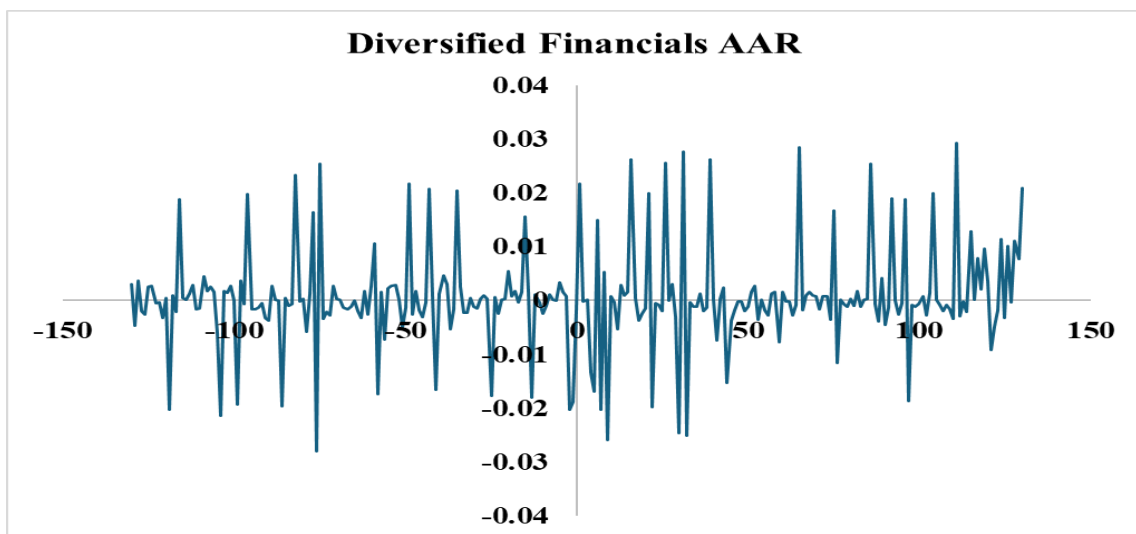


Figure 14. Diversified Financials Industry Average Abnormal Return

Source: Secondary Data Processed 2024 by Author's Estimate Using Excel.

In the 120 days before the event, the Diversified Financials Industry displays the following AAR t-stat results: The data shows seven abnormal return responses within the period range of -11 to -50, including four positive abnormal returns on days -15, -35, -43, and -49 and three negative abnormal returns on days -13, -25, and -14. Between -51 and -90, there are six abnormal returns: three positive abnormal returns on days -75, -77, and -82, and three negative abnormal returns on days -58, -76, and -86. In addition, in the period of -91 to -130, there are five abnormal returns: two positive abnormal returns on days -96 and -116, and three negative abnormal returns on days -99, -104, and -119.

In the 21 days of the event, the Diversified Financials Industry displays the following AAR t-stat results: The data shows that from day -10 to day -3 are ordinary returns. On days -2 and -1 have negative abnormal returns. On day 0 have ordinary return. Day 1 have

abnormal return. From Day 2 to Day 4 have ordinary returns. Day 5 have a negative abnormal return. Day 6 have a positive abnormal return. Day 7 have a negative abnormal return. Days 8 have ordinary return. Day 9 have a negative abnormal return. and 10 have ordinary returns.

In the 120 days after the event, the Diversified Financials Industry displays the following AAR t-stat results: The data shows nine abnormal return responses within the period range of 11 to 50, including five positives on days 16, 21, 26, 31, and 39 and four negative abnormal returns on days 22, 30, 32, and 44. Between 51 and 90, there are three abnormal returns, which are positive abnormal returns on days 65, 75, and 86. In addition, in the period of 91 to 130, there are six abnormal returns: five positive abnormal returns on days 92, 96, 104, 111, and 130, and one negative on day 97.

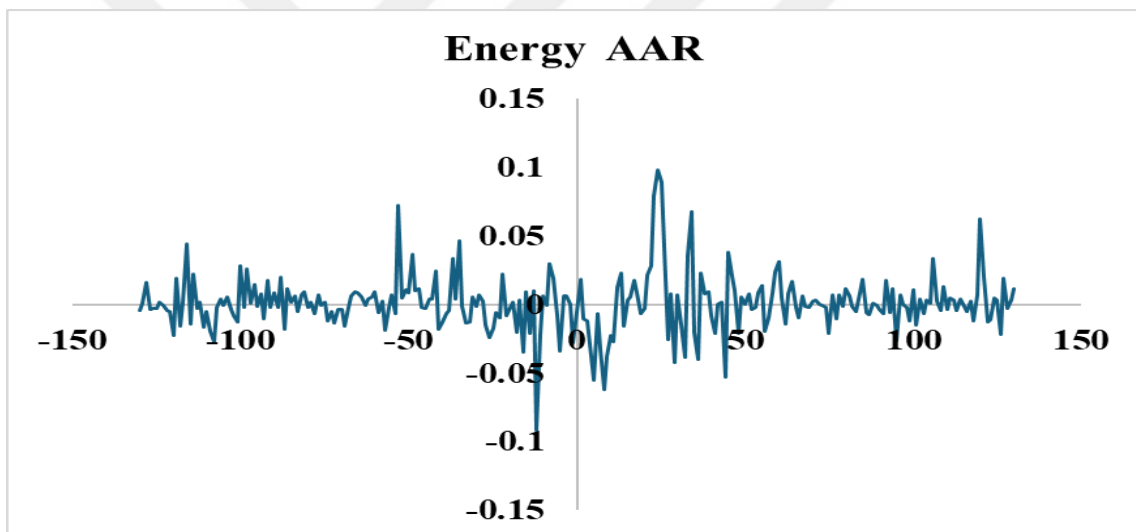


Figure 15. Energy Industry Average Abnormal Return

Source: Secondary Data Processed 2024 by Author's Estimate Using Excel.

In the 120 days before the event, the energy industry displays the following AAR t-stat results: The data shows five abnormal return responses within the period range of -11 to -50, including three positive abnormal returns on days -35, -37, and -49 and two negative abnormal returns on days -12 and -16. Between -51 and -90, there is one abnormal return, specifically a positive abnormal return on day -53. In addition, in the period of -91 to -130, there is one abnormal return, specifically a positive abnormal return on day -116.

In the 21 days of the event, the Energy Industry displays the following AAR t-stat results: The data shows that day -10, and day-9 have ordinary returns. On day -8 have a positive

abnormal return. Day -7 and day -6 have ordinary return. Day -5 have a negative abnormal return. From day -4 to day 3 are ordinary returns. On days 4 and 5, there are negative abnormal returns. Day 6 have ordinary returns. From day 7 to day 9 have negative abnormal returns. Day 10 have ordinary return.

In the 120 days after the event, the Energy Industry displays the following AAR t-stat results: The data shows eleven abnormal return responses within the period range of 11 to 50, including seven positives on days 23, 24, 25, 26, 33, 34, and 45 and having four negative abnormal returns on days 29, 32, 36, and 44. Between 51 and 90, there is one abnormal returns which is positive abnormal return on day 60. In addition, in the period of 91 to 130, there are two abnormal returns which are positive abnormal returns on days 106, and 120.

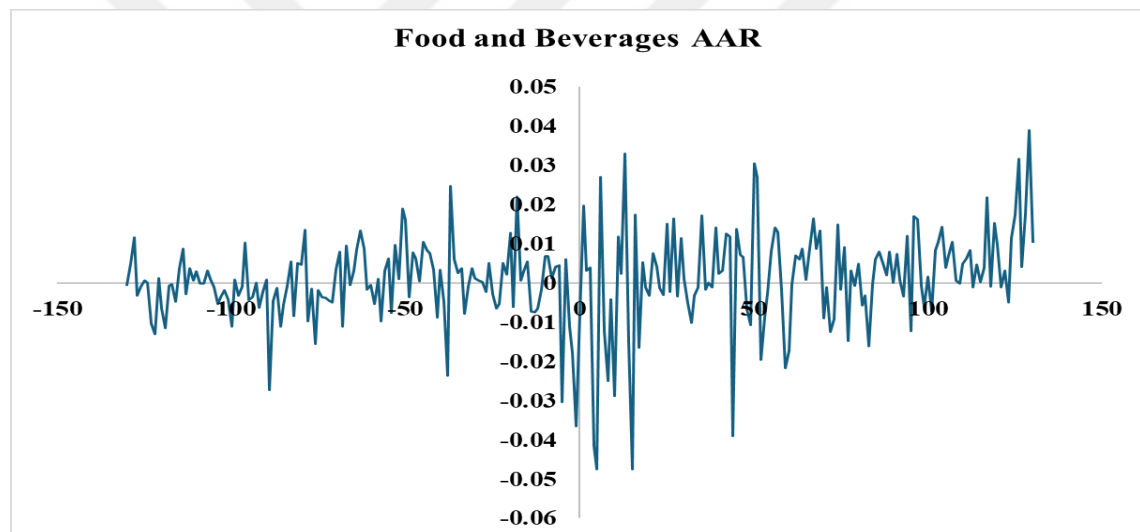


Figure 16. Food and Beverages Industry Average Abnormal Return

Source: Secondary Data Processed 2024 by Author's Estimate Using Excel.

In the 120 days before the event, the Food and Beverages industry displays the following AAR t-stat results: The data shows four abnormal return responses within the period range of -11 to -50, including three positive abnormal returns on days -18, -37, and -50 and one negative abnormal return on day -38. Between -51 and -90, there are five abnormal returns: three positives abnormal returns on days -51, -63, and -79, and two negatives abnormal return on day -76, and -89. In addition, in the period of -91 to -130, there is one abnormal return, which is negative abnormal returns on day -122.

In the 21 days of the event, the Food and Beverages industry displays the following AAR t-stat results: The data shows that from day -10 to day -6 are ordinary returns. On days -5 there is a negative abnormal return. Day -4 and Day -3 are having ordinary returns. Days -2, and -1 have negative abnormal returns. Day 0 have ordinary return. Day 1 have positive abnormal return. Day 2 and day 3 have ordinary returns. Day 4 and day 5 have negative abnormal returns. Day 6 have a positive abnormal return. Day 7 have ordinary return. Day 8 have negative abnormal return. Day 9 have ordinary return. Day 10 have negative abnormal return.

In the 120 days after the event, the Food and Beverages industry displays the following AAR t-stat results: The data shows twelve abnormal return responses within the period range of 11 to 50, including eight positives on days 13, 16, 25, 27, 35, 39, 45, and 50 and having four negative abnormal returns on days 14, 15, 17, and 44. Between 51 and 90, there are eleven abnormal returns: six positive abnormal return on days 51, 56, 57, 67, 69, and 74 and five negative abnormal returns on days 52, 59, 60, 77, and 83. In addition, in the period of 91 to 130, there are nine abnormal returns which are positive abnormal returns on days 96, 97, 104, 117, 119, 125, 126, 128, and 129.

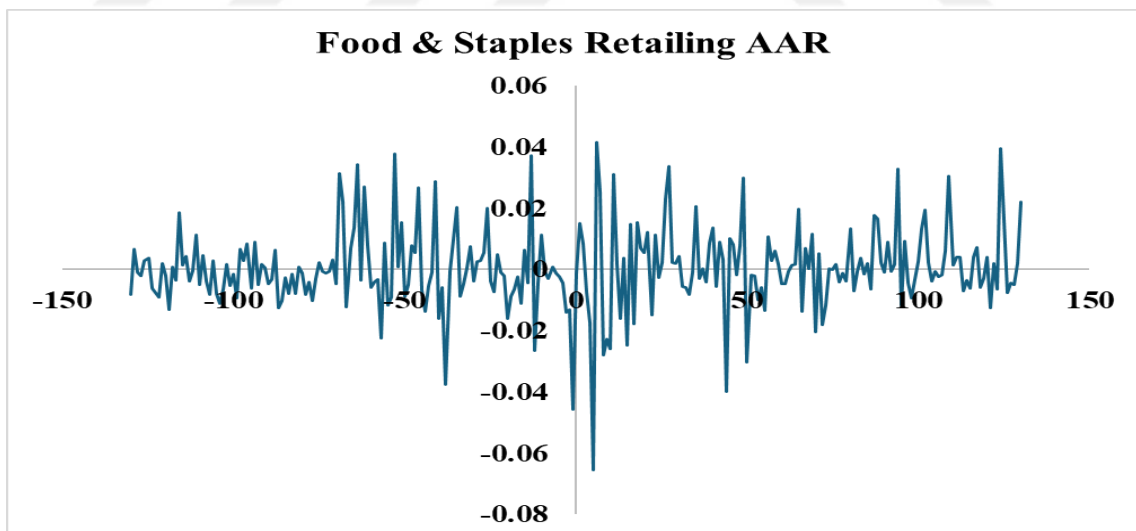


Figure 17. Food & Staples Retailing Industry Average Abnormal Return

Source: Secondary Data Processed 2024 by Author's Estimate Using Excel.

In the 120 days before the event, the Food & Staples Retailing industry displays the following AAR t-stat results: The data shows seven abnormal return responses within the period range of -11 to -50, including five positive abnormal returns on days -13, -26, -35,

-41, and -46 and two negative abnormal return on day -12 and -38. Between -51 and -90, there are six abnormal returns: five positive abnormal returns on days -53, -62, -64, -68, and -69 and one negative abnormal return on day -57. In addition, in the period of -91 to -130, there are ordinary returns.

In the 21 days of the event, the Food & Staples Retailing industry displays the following AAR t-stat results: The data shows that from day -10 to day -2 are ordinary returns. On day -1 have a negative abnormal return. From day 0 to day 4 have ordinary return. Day 5 have negative abnormal return. Day 6 and day 7 have positive abnormal return. From day 8 to day 10 have negative abnormal return.

In the 120 days after the event, the Food & Staples Retailing industry displays the following AAR t-stat results: The data shows eight abnormal return responses within the period range of 11 to 50, including five positives on days 11, 26, 27, 35, and 49 and having three negative abnormal returns on days 51, 44, and 50. Between 51 and 90, there are two abnormal returns: one positive abnormal return on day 65 and one negative abnormal returns on day 70. In addition, in the period of 91 to 130, there are five abnormal returns which are three positive abnormal returns on days 94, 102, 109, 124, and 130.

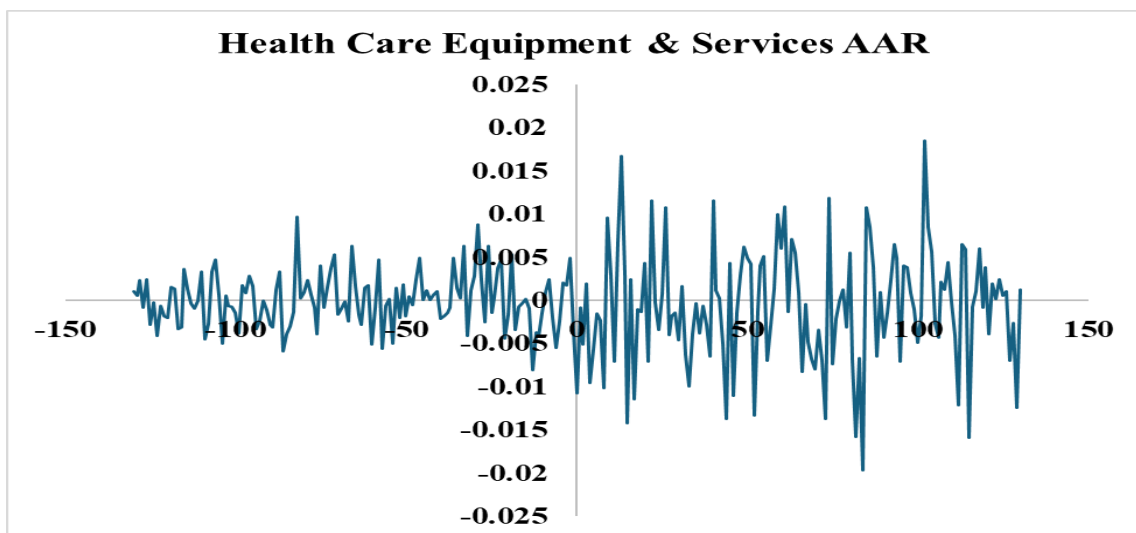


Figure 18. Health Care Equipment & Services Industry Average Abnormal Return

Source: Secondary Data Processed 2024 by Author's Estimate Using Excel.

In the 120 days before the event, the Health Care Equipment and Services industry displays the following AAR t-stat results: The data shows five abnormal return responses within the period range of -11 to -50, including four positive abnormal returns on days -

19, -26, -29, and -33 and one negative abnormal return on day -13. Between -51 and -90, there are five abnormal returns: three positive abnormal returns on days -66, -71, and -82 and two negative abnormal returns on days -57 and -86. In addition, the period of -91 to -130 contains ordinary returns.

In the 21 days of the event, the Health Care Equipment and Services industry displays the following AAR t-stat results: The data shows that from day -10 to day -7 are ordinary returns. Day -6 have a negative abnormal return. From day -5 to day -1 have ordinary return. Day 0 have a negative abnormal return. From day 1 to day 3 have ordinary return. Day 4 and day 5 have a negative abnormal return. Day 6 and day 7 have ordinary return. Day 8 have a negative abnormal return. Day 9 have a positive abnormal return. Day 10 have ordinary return.

In the 120 days after the event, the Health Care Equipment and Services industry displays the following AAR t-stat results: The data shows sixteen abnormal return responses within the period range of 11 to 50, including six positives on days 12, 13, 22, 26, 40, and 49 and having ten negative abnormal returns on days 11, 15, 17, 21, 32, 33, 39, 43, 44, and 46. Between 51 and 90, there are twenty two abnormal returns: nine positive abnormal return on day 59, 60, 61, 63, 64, 74, 80, 85, and 86 and thirteen negative abnormal returns on days 52, 56, 66, 69, 70, 72, 73, 75, 81, 82, 83, 84, and 88. In addition, in the period of 91 to 130, there are twelve abnormal returns: seven positive abnormal returns on days 93, 102, 103, 104, 113, 114, and 118 and five negative on days 95, 112, 115, 127, and 129.

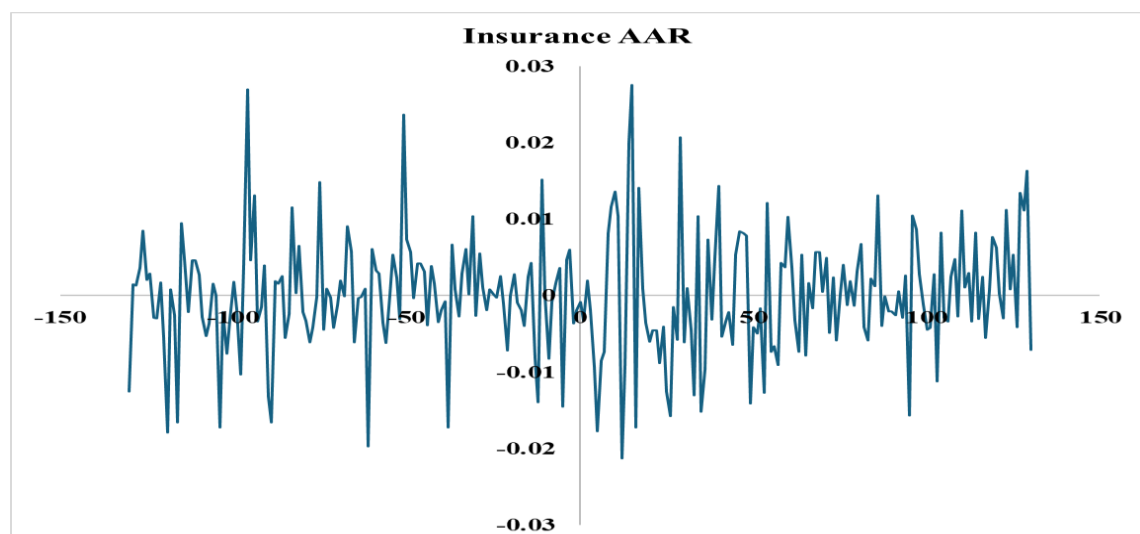


Figure 19. Insurance Industry Average Abnormal Return

Source: Secondary Data Processed 2024 by Author's Estimate Using Excel.

In the 120 days before the event, the insurance industry displays the following AAR t-stat results: The data shows three abnormal return responses within the period range of -11 to -50, including one positive abnormal return on day -11 and two negative abnormal returns on days -12 and -38. Between -51 and -90, there are five abnormal returns: two positive abnormal returns on days -51 and -75 and three negative abnormal returns on days -61, -89, and -90. In addition, in the period of -91 to -130, there are six abnormal returns: two positive abnormal returns on days -94 and -96 and four negative abnormal returns on days -104, -116, -119, and -130.

In the 21 days of the event, the insurance industry displays the following AAR t-stat results: The data shows that from day -10 to day -6 includes ordinary returns. On day -5, there is a negative abnormal return. From day -4 to day 4, there are ordinary returns. Day 5 contains a negative abnormal return. From day 6 to day 9, include ordinary returns. Day 10 contains a positive abnormal return.

In the 120 days after the event, the insurance industry displays the following AAR t-stat results: The data shows twelve abnormal return responses within the period range of 11 to 50, including five positives on days 14, 15, 17, 29, and 40 and seven negative abnormal returns on days 12, 16, 25, 26, 33, 35, and 49. Between 51 and 90, there are three abnormal returns: two positive abnormal returns on days 54 and 86 and one negative abnormal return on day 53. In addition, in the period of 91 to 130, there are three abnormal returns: two positive abnormal returns on days 127 and 129 and one negative abnormal return on days 95.

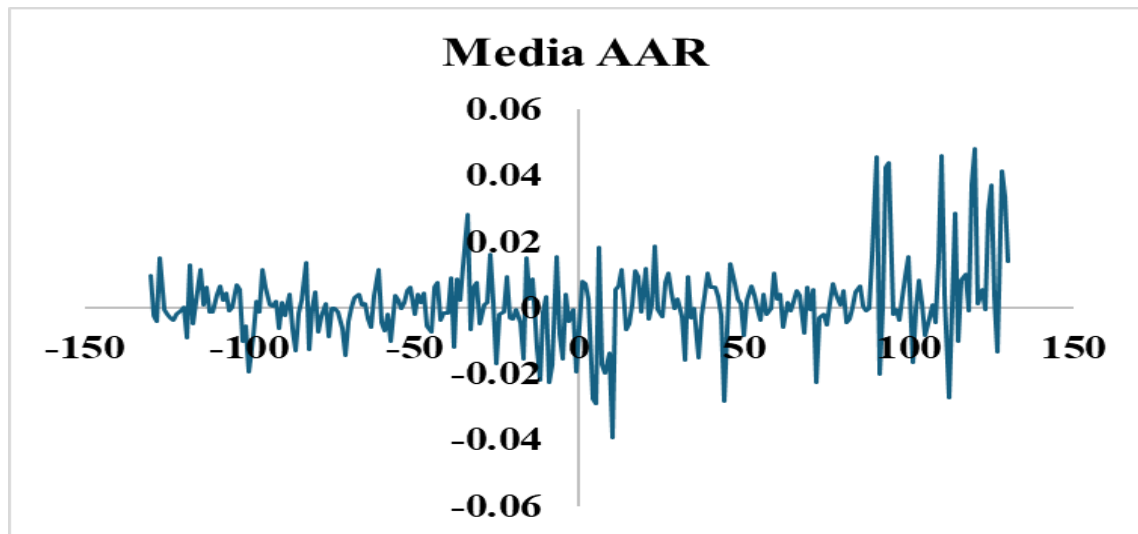


Figure 20. Media Industry Average Abnormal Return

Source: Secondary Data Processed 2024 by Author's Estimate Using Excel.

In the 120 days before the event, the media industry displays the following AAR t-stat results: The data shows seven abnormal return responses within the period range of -11 to -50, including four positive abnormal returns on days -16, -27, -34, and -35 and three negative abnormal returns on days -12, -17, and -25. Between -51 and -90, there are four abnormal returns: one positive abnormal return on day -83 and three negative abnormal returns on days -71, -82, and -86. In addition, in the period of -91 to -130, there are three abnormal returns: two positive abnormal returns on days -118 and -127 and one negative abnormal return on day -100.

In the 21 days of the event, the media industry displays the following AAR t-stat results: The data shows that on day -10, there is an ordinary return. Days -9 and -8 have a negative abnormal return. On day -7, there is a positive abnormal return. Day -6 includes an ordinary return. Day -5 contains a negative abnormal return. From day -4 to day -2, there are ordinary returns. On day -1, show a negative abnormal return. From day 0 to day 3, include ordinary returns. Day 4 and day 5 have a negative abnormal return. Day 6, there is a positive abnormal return. From day 7 to day 10, include a negative abnormal return.

In the 120 days after the event, the media industry displays the following AAR t-stat results: The data shows five abnormal return responses within the period range of 11 to 50, including two positives on days 23 and 46 and three negative abnormal returns on days 32, 36, and 44. Between 51 and 90, there are three abnormal returns: two positive

abnormal returns on days 89 and 90, and one negative abnormal return on day 72. In addition, in the period of 91 to 130, there are seventeen abnormal returns: thirteen positive abnormal returns on days 93, 94, 100, 109, 110, 114, 119, 120, 124, 125, 128, 129, and 130, and four negative abnormal returns on days 91, 101, 112, and 127.

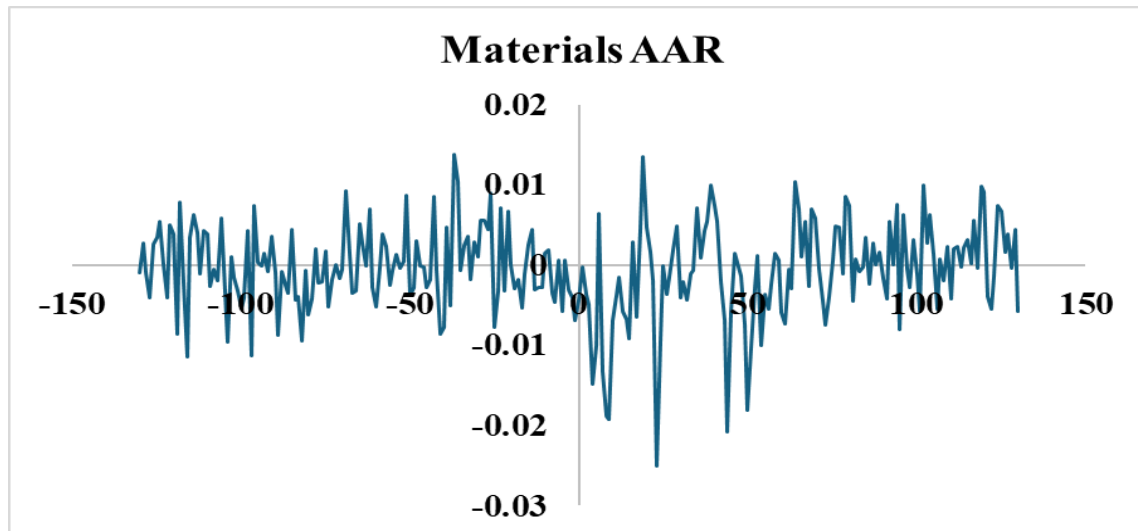


Figure 21. Materials Industry Average Abnormal Return

Source: Secondary Data Processed 2024 by Author's Estimate Using Excel.

In the 120 days before the event, the materials industry displays the following AAR t-stat results: The data shows six abnormal return responses within the period range of -11 to -50, including four positive abnormal returns on days -26, -36, -37, and -43 and two negative abnormal returns on days -40 and -41. Between -51 and -90, there are four abnormal returns: two positive abnormal returns on days -51 and -69, and two negative abnormal returns on days -82 and -89. In addition, in the period of -91 to -130, there are five abnormal returns: one positive abnormal return on day -118 and four negative abnormal returns on days -97, -104, -116, and -119.

In the 21 days of the event, the materials industry displayed the following AAR t-stat results: The data shows that from day -10 to day 3 includes ordinary returns. On days 4 and 5, there are abnormal negative returns. On Day 6, there is an ordinary return. From day 7 to day 9, there are negative abnormal returns. Day 10 includes an ordinary return.

In the 120 days after the event, the materials industry displays the following AAR t-stat results: The data shows seven abnormal return responses within the period range of 11 to 50, including two positive abnormal returns on days 19 and 39 and five negative abnormal

returns on days 15, 23, 24, 44, and 50. Between 51 and 90, there are four abnormal returns: two positive abnormal returns on days 64 and 79, and two abnormal negative returns on days 51 and 54. In addition, in the period of 91 to 130, there are four abnormal returns: three positive abnormal returns on days 102, 119, and 120, and one negative on day 95.

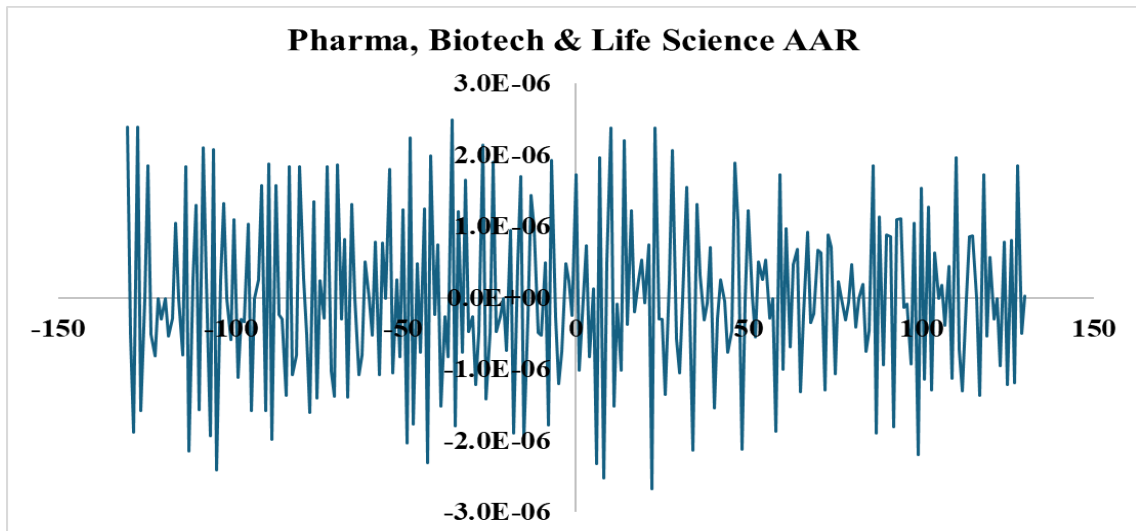


Figure 22. Pharma, Biotech & Life Science Industry Average Abnormal Return

Source: Secondary Data Processed 2024 by Author's Estimate Using Excel.

In the 120 days before the event, the Pharma, Biotech, and Life Science industries display the following AAR t-stat results: The data shows four abnormal return responses within the period range of -11 to -50, including three positive abnormal returns on days -27, -36, and -48 and one negative abnormal return on day -43. Between -51 and -90, there are ordinary returns. In addition, in the period of -91 to -130, there are five abnormal returns: three positive abnormal returns on days -108, -127, and -130, and two negative abnormal returns on days -104 and -112.

In the 21 days of the event, the Pharma, Biotech, and Life Science industries display the following AAR t-stat results: The data shows that from day -10 to day 5, there are ordinary returns. On day 6, have a negative abnormal return. Day 7 shows an ordinary return. On day 8, there is a negative abnormal return. Day 9 contains an ordinary return. On day 10, have a positive abnormal return.

In the 120 days after the event, the Pharma, Biotech, and Life Science industries display the following AAR t-stat results: The data shows five abnormal return responses within the period range of 11 to 50, including two positives on days 14 and 23, and three negative

abnormal returns on days 22, 34, and 48. Between 51 and 90, there are ordinary returns. In addition, from day 91 to day 130, there is one negative abnormal return on day 99.

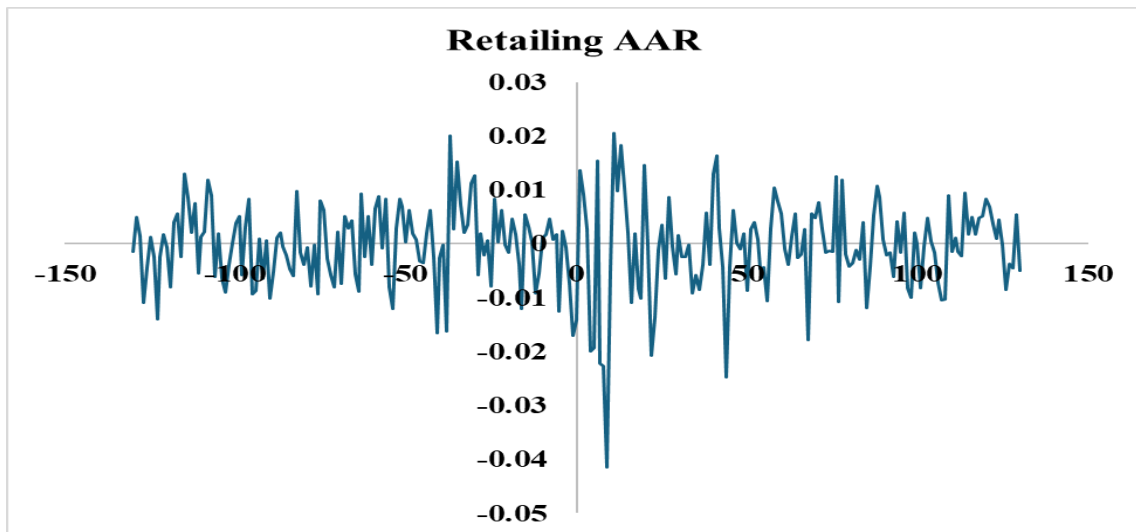


Figure 23. Retailing Industry Average Abnormal Return

Source: Secondary Data Processed 2024 by Author's Estimate Using Excel.

In the 120 days before the event, the Retailing industry displays the following AAR t-stat results: The data shows seven abnormal return responses within the period range of -11 to -50, including four positive abnormal returns on days -30, -31, -35, and -37 and having three negative abnormal return on day -16, -21, and -41. Between -51 and -90, there is one negative abnormal return on day -54. In addition, in the period of -91 to -130, there are three abnormal returns: two positive abnormal returns on days -108 and -115 and one negative abnormal return on days -123.

In the 21 days of the event, the Retailing industry displays the following AAR t-stat results: The data shows that from day -10 to day -6 are ordinary returns. Day -5 includes a negative abnormal return. From day -4 to day -2 contain ordinary returns. Day -1 and day 0 have a negative abnormal return. Day 1 owns a positive abnormal return. Day 2 and day 3 have ordinary returns. Day 4 and day 5 have a negative abnormal return. Day 6, there is a positive abnormal return. From day 7 to day 9, includes a negative abnormal return. Day 10 contains ordinary returns.

In the 120 days after the event, the retail industry displays the following AAR t-stat results: The data shows eight abnormal return responses within the period range of 11 to 50, including five positives on days 11, 13, 20, 40, and 41 and negative abnormal returns

on days 22, 23, and 44. Between 51 and 90, there are four abnormal returns: two positive abnormal returns on days 76 and 78 and two negative abnormal returns on days 68 and 85. In addition, in the period from 91 to 130, there are ordinary returns.

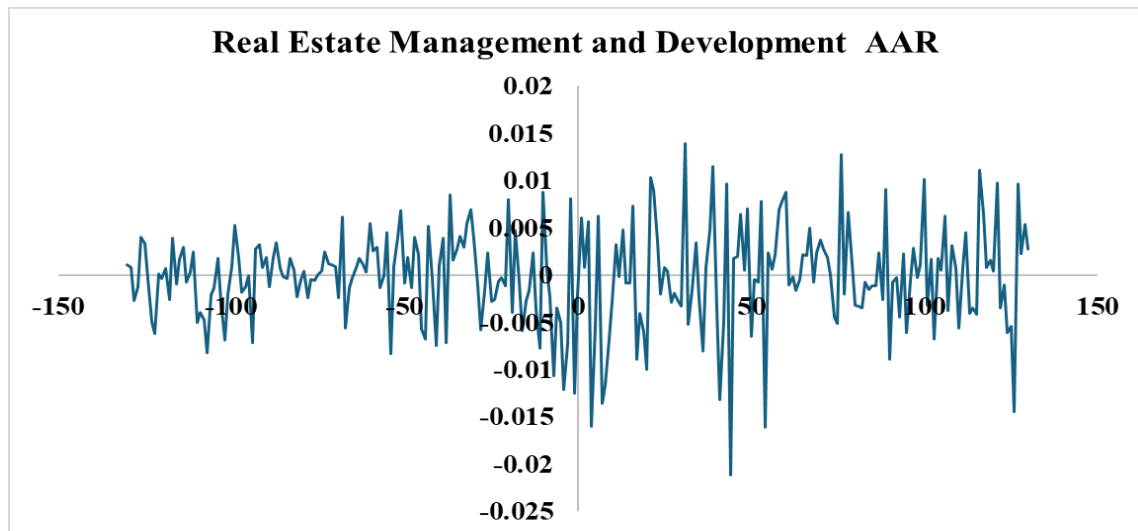


Figure 24. Real Estate Management and Development Industry Average Abnormal Return

Source: Secondary Data Processed 2024 by Author's Estimate Using Excel.

In the 120 days before the event, the Real Estate Management and Development industry displays the following AAR t-stat results: The data shows seven abnormal return responses within the period range of -11 to -50, including three positive abnormal returns on days -20, -31, and -37 and have four negative abnormal return on day -11, -38, -41, and -44. Between -51 and -90, there are three abnormal returns: two positive abnormal returns on days -51 and -68 and one negative abnormal return on day -54. In addition, the period of -91 to -130 includes four abnormal returns. There are negative abnormal returns on days -94, -102, -107, and -122.

In the 21 days of the event, the real estate management and development industry displayed the following AAR t-stat results: The data shows that day -10 includes a positive abnormal return. Day -9 and day -8, there is an ordinary return. Day -7 owns a negative abnormal return. Day -6 and day -5 have ordinary returns. Day -4 and day -3 have negative abnormal returns. Day -2 owns a positive abnormal return. Day -1 includes a negative abnormal return. Day 0 contains an ordinary return. Day 1 shows a positive abnormal return. Day 2 and Day 3, there is an ordinary return. Day 4 contains a negative abnormal return. Day 5 includes an ordinary return. Day 6 shows a positive abnormal

return. From day 7 to day 9, there are negative abnormal returns. Day 10 owns an ordinary return.

In the 120 days after the event, the real estate management and development industry displayed the following AAR t-stat results: The data shows fifteen abnormal return responses within the period range of 11 to 50, including eight positives on days 16, 21, 22, 31, 39, 43, 47, and 49 and seven negative abnormal returns on days 17, 19, 20, 36, 41, 44, and 50. Between 51 and 90, there are nine abnormal returns: one positive abnormal return on days 53, 58, 59, 60, 76, 78, and 89, and two negative abnormal returns on days 54 and 90. In addition, in the period of 91 to 130, there are ten abnormal returns: three positive abnormal returns on days 100, 106, 116, 117, 121, and 127, and four negative abnormal returns on days 95, 103, 124, and 126.

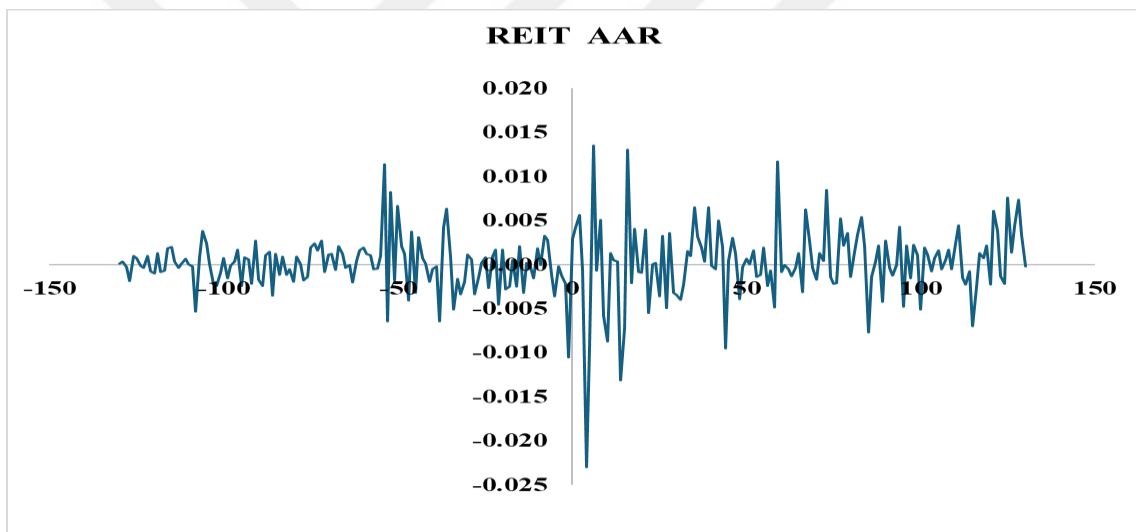


Figure 25. REIT Industry Average Abnormal Return

Source: Secondary Data Processed 2024 by Author's Estimate Using Excel.

In the 120 days before the event, the REIT industry displays the following AAR t-stat results: The data shows six abnormal return responses within the period range of -11 to -50, including three positive abnormal returns on days -36, -37, and -50 and three negative abnormal return on day -21, -34, and -38. Between -51 and -90, there are three abnormal returns: two positive abnormal returns on days -52 and -54 and one negative abnormal return on day -53. In addition, in the period of -91 to -130, there is one negative abnormal return on day -108.

In the 21 days of the event, the REIT industry displays the following AAR t-stat results: The data shows that from day -10 to day -2 contains ordinary returns. On day -1, show an abnormal negative return. Day 0 and Day 1 have an ordinary return. Day 2 contains a positive abnormal return. Day 3 includes an ordinary return. Days 4 and 5 show abnormal negative returns. On Day 6, there is a positive abnormal return. Day 7 owns an ordinary return. Day 8 shows an abnormal positive return. Days 9 and 10 have negative abnormal returns.

In the 120 days after the event, the REIT industry displays the following AAR t-stat results: The data shows nine abnormal return responses within the period range of 11 to 50, including four positives on days 16, 35, 39, and 42 and five negative abnormal returns on days 14, 15, 22, 27, and 44. Between 51 and 90, there are eight abnormal returns: one positive abnormal return on days 59, 67, 73, 77, and 83, and three negative abnormal returns on days 58, 85, and 89. In addition, in the period of 91 to 130, there are nine abnormal returns: five positive abnormal returns on days 94, 111, 121, 125, 127, and 128 and three negative on days 95, 100, and 115.

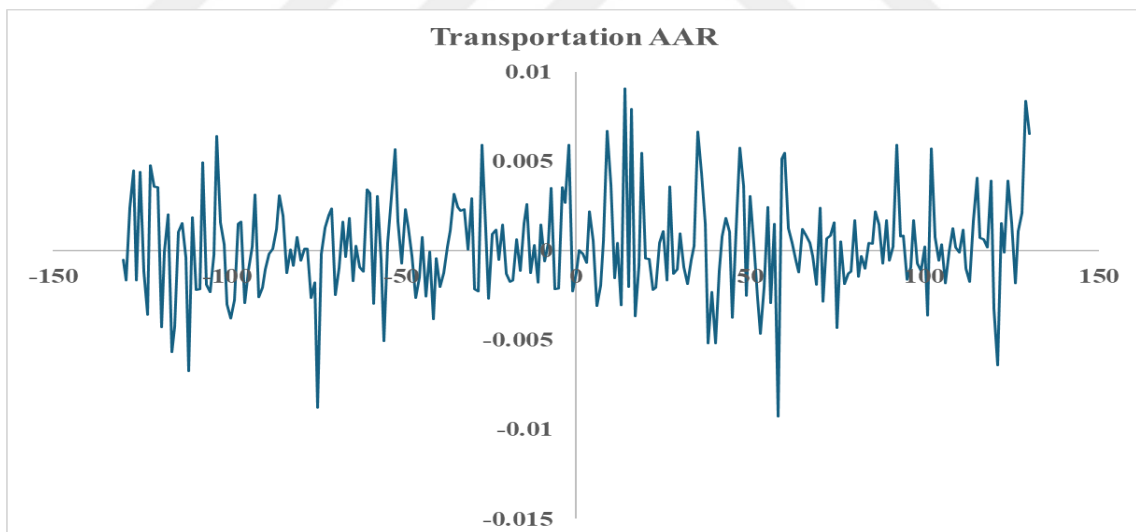


Figure 26. Transportation Industry Average Abnormal Return

Source: Secondary Data Processed 2024 by Author's Estimate Using Excel.

In the 120 days before the event, the transportation industry displays the following AAR t-stat results: The data shows one abnormal return response within the period range of -11 to -50, with positive abnormal returns on days -27. Between -51 and -90, there are three abnormal returns: one positive abnormal return on days -52 and two negative

abnormal returns on days -55 and -74. In addition, in the period of -91 to -130, there are eight abnormal returns: five positive abnormal returns on days -103, -107, 122, 125, and 127, and three negative abnormal returns on days -111, -116, and -119.

In the 21 days of the event, the transportation industry displays the following AAR t-stat results: The data shows that from day -10 to day -3 contains ordinary returns. On days -2, there are positive abnormal returns. Day -1 and Day 8 are having abnormal returns. Day 9 owns a positive abnormal return. On day 10, there is an ordinary return.

In the 120 days after the event, the transportation industry displays the following AAR t-stat results: The data shows eight abnormal return responses within the period range of 11 to 50, including ten positives on days 14, 16, 19, 35, 36, and 47, and two negative abnormal returns on days 38 and 40. Between 51 and 90, there are five abnormal returns: two positive abnormal returns on days 59 and 60, and three negative abnormal returns on days 53, 58, and 75. In addition, in the period of 91 to 130, there are five abnormal returns: four positive abnormal returns on days 92, 102, 129, and 130, and one negative on day 121.

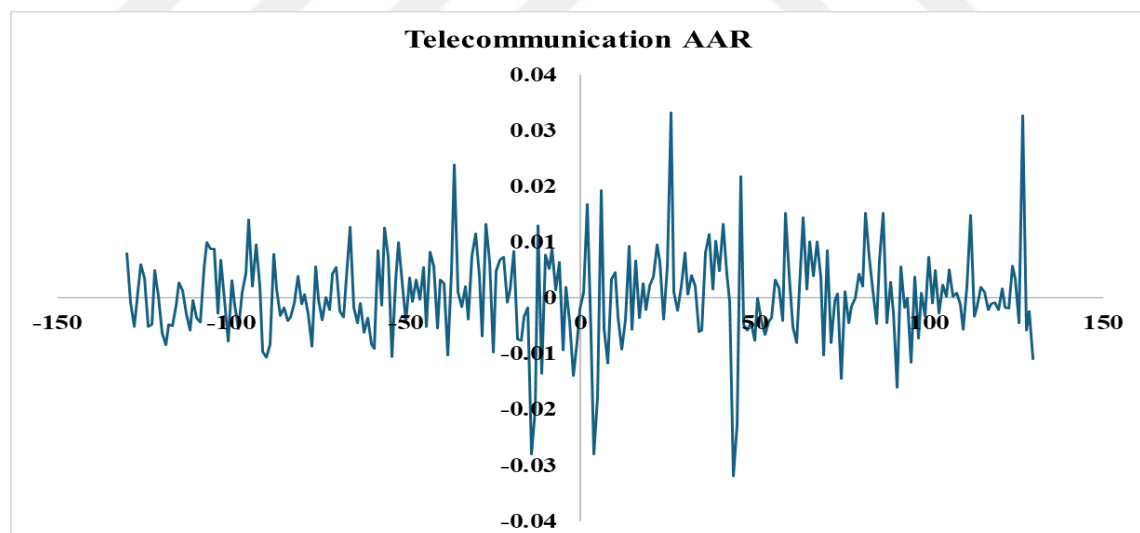


Figure 27. Telecommunication Services Industry Average Abnormal Return

Source: Secondary Data Processed 2024 by Author's Estimate Using Excel.

In the 120 days before the event, the telecommunications industry displays the following AAR t-stat results: The data shows six abnormal return responses within the period range of -11 to -50, including three positive abnormal returns on days -12, -27, and -36 and three negative abnormal returns on days -11, -13, and -14. Between -51 and -90, there are two

positive abnormal returns on days -56 and -66. In addition, in the period of -91 to -130, there is one positive abnormal return on day -95.

In the 21 days of the event, the telecommunications industry displayed the following AAR t-stat results. The data shows that from day -10 to day -3 contains ordinary returns. On day -2, there is a negative abnormal return. From day -1 to day 1, have ordinary returns. On day 2, include a positive abnormal return. Day 3 contains an ordinary return. Day 4 and day 5 have a negative abnormal return. Day 6 includes positive abnormal returns. From day 7 to day 10, this includes ordinary returns.

In the 120 days after the event, the telecommunications industry displays the following AAR t-stat results: The data shows five abnormal return responses within the period range of 11 to 50, including three positives on days 26, 41, and 46 and two negative abnormal returns on days 44 and 45. Between 51 and 90, there are five abnormal returns: four positive abnormal returns on days 59, 64, 82, and 87, and one negative abnormal return on day 75. In addition, in the period of 91 to 130, there are four abnormal returns: three positive abnormal returns on days 112 and 127, and one negative on day 91.

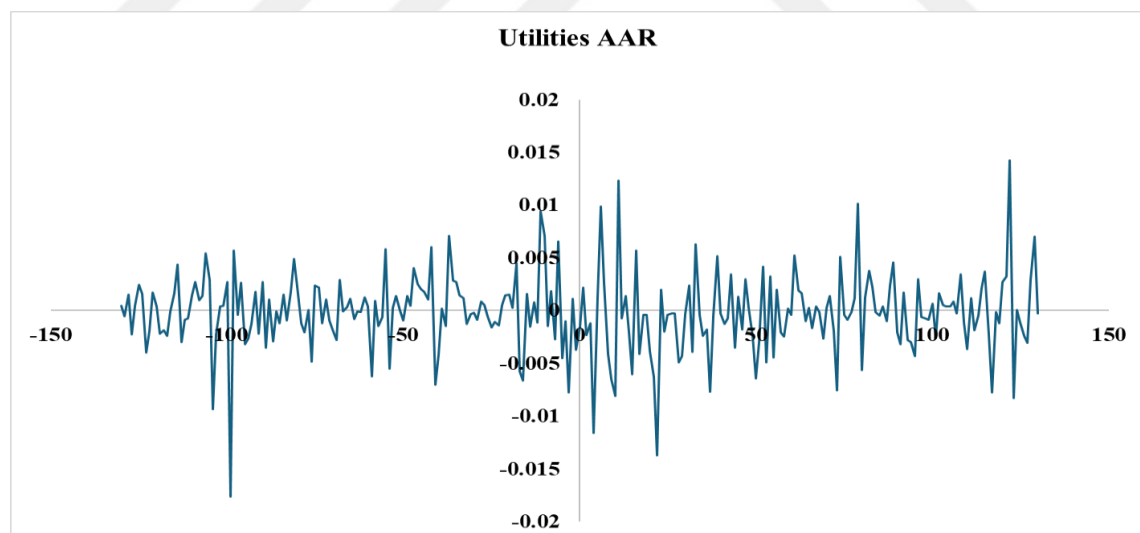


Figure 28. Utilities Industry Average Abnormal Return

Source: Secondary Data Processed 2024 by Author's Estimate Using Excel.

In the 120 days before the event, the utility industry displays the following AAR t-stat results: The data shows six abnormal return responses within the period range of -11 to -50, including three positive abnormal returns on days -11, -37, and -42 and three negative abnormal returns on days -16, -17, and -41. Between -51 and -90, there are three abnormal

returns: one positive abnormal return on days -55 and two negative abnormal returns on days -54 and -59. In addition, in the period of -91 to -130, there are four abnormal returns: two positive abnormal returns on days -98 and -106 and two negative abnormal returns on days -99 and -104.

In the 21 days of the event, the utility industry displays the following AAR t-stat results: The data shows that day -10 contains a positive abnormal return. From day -9 to day -7, owns ordinary returns. Day -6 includes a positive abnormal return. Day -5 and Day -4 have ordinary abnormal returns. Day -3 owns a negative abnormal return. From day -2 to day 3, owns ordinary returns. Day 4 contains an abnormal negative return. Day 5 includes an ordinary return. Day 6 contains a positive abnormal return. Day 7 and Day 8 have ordinary abnormal returns. Days 9 and 10 have a negative abnormal return.

In the 120 days after the event, the utility industry displays the following AAR t-stat results: The data shows eight abnormal return responses within the period range of 11 to 50, including three positives on days 11, 16, and 33 and five negative abnormal returns on days 15, 21, 22, 37, and 50. Between 51 and 90, there are three abnormal returns: one positive abnormal return on day 79 and two negative abnormal returns on days 73 and 80. In addition, the period ranges from 91 to 130, and there are four abnormal returns: two positive abnormal returns on days 122 and 129 and two negative returns on days 117 and 123.

4.4 Cumulative Average Return Result (CAAR)

Table 3 presents a comprehensive analysis of the cumulative average abnormal returns (CAAR) for separated industrial groups over several event windows. These windows include the event day [0], the time before the event [-1, -10], the period after the event [+1, +10], and the overall event window [-10, +10]. Every industry displays different trends in cumulative average abnormal returns (CAAR). It shows how various industries react to specific happenings.

Banks industry shows a minor positive CAAR of 0.194% on the event day itself, indicating a slight uptick. However, this is overshadowed by a small decline of -0.479% in the pre-event period and a significant drop of -5.570% in the post-event period, culminating in an overall decline of -5.854% over the entire [-10, +10] window.

Capital goods industry experiences a negative CAAR of -0.287% on the event day, with more pronounced declines in both the pre-event (-2.087%) and post-event (-1.857%) periods. This results in a total decline of -4.231% over the full event window, suggesting a consistent negative impact. Commercial and professional services industry faces a slight negative CAAR of -0.157% on the event day. The pre-event period shows a substantial decline of -6.084%, while the post-event period presents a slight recovery with a positive CAAR of 0.554%. Nonetheless, the overall effect from [-10, +10] is a significant decline of -5.687%. Consumer services industry bucks the trend on the event day with a positive CAAR of 0.607%. Despite this, it suffers a steep decline of -4.446% in the pre-event period and an even larger drop of -4.888% in the post-event period, resulting in an overall decline of -8.727% over the full window. Consumer durables & apparel industry shows a small negative CAAR of -0.322% on the event day. The pre-event period decline of -1.515% and the post-event decline of -3.200% contribute to a total decline of -5.037%.

Diversified financials industry sees a minor negative CAAR of -0.187% on the event day. This is compounded by a pre-event decline of -3.553% and a post-event decline of -3.380%, leading to an overall decline of -7.120%. Energy industry shows a larger negative CAAR of -0.516% on the event day. The pre-event period is flat at -0.351%, but the post-event period shows a dramatic decline of -25.196%, resulting in a substantial overall decline of -26.063%. Food and beverages industry experience a negative CAAR of -0.763% on the event day. The pre-event decline is significant at -6.629%, and the post-event period further declines by -10.573%, leading to an overall decline of -17.965%. Food and staples retailing industry reports a slight negative CAAR of -0.135% on the event day. The pre-event period shows a large decline of -7.199%, with the post-event period also declining by -7.671%, resulting in a total decline of -15.006%. Health care equipment and services industry faces a substantial negative CAAR of -1.076% on the event day. The pre-event period is stable at -0.281%, but the post-event period shows a decline of -2.086%, leading to an overall decline of -3.443%.

Insurance industry shows a minor negative CAAR of -0.080% on the event day. The pre-event period decline is -1.318%, and the post-event period is similar at -1.299%, resulting in a total decline of -2.698%. Media industry sees a significant negative CAAR of -0.557% on the event day. The pre-event period shows a large decline of -6.476%, and the post-event period continues this trend with a decline of -11.102%, culminating in an

overall decline of -18.135%. Materials industry shows a negative CAAR of -0.439% on the event day. The pre-event period shows a decline of -2.329%, and the post-event period sees a further decline of -8.553%, resulting in an overall decline of -11.321%. pharma, biotech and life science industry are unique in that it shows no CAAR change across all periods, maintaining a neutral position with no decline or increase. Retailing industry faces a substantial negative CAAR of -1.423% on the event day. The pre-event period shows a decline of -2.541%, and the post-event period sees a larger decline of -8.972%, leading to an overall decline of -12.936%.

Real estate management and development industry shows a small negative CAAR of -0.211% on the event day. The pre-event period shows a decline of -3.590%, and the post-event period continues with a decline of -3.722%, resulting in a total decline of -7.523%. REIT industry sees a positive CAAR of 0.292% on the event day. The pre-event period shows a slight decline of -1.142%, but the post-event period sees a further decline of -2.005%, leading to an overall decline of -2.856%. transportation industry shows a minor negative CAAR of -0.122% on the event day. The pre-event period shows a positive CAAR of 0.787%, and the post-event period continues this positive trend with 1.056%, resulting in a total positive CAAR of 1.721%. telecommunication services industry experiences a minor negative CAAR of -0.213% on the event day. The pre-event period shows a slight decline of -0.612%, and the post-event period sees a further decline of -2.664%, resulting in an overall decline of -3.490%. utilities industry owns a minor negative CAAR of -0.152% on the event day. The pre-event period shows a slight decline of -0.463%, and the post-event period sees a further decline of -1.796%, resulting in a total decline of -2.411%.

Table 5. Cumulative Average Abnormal Returns (CAAR)

Industry Group	CAAR [0]	CAAR [-1, -10]	CAAR [+1, +10]	CAAR [-10, +10]
TBNI	0.194%	-0.479%	-5.570%	-5.854%
TCGI	-0.287%	-2.087%	-1.857%	-4.231%
TCPIC	-0.157%	-6.084%	0.554%	-5.687%
TCSI	0.607%	-4.446%	-4.888%	-8.727%
TDAI	-0.322%	-1.515%	-3.200%	-5.037%
TDFI	-0.187%	-3.553%	-3.380%	-7.120%
TENI	-0.516%	-0.351%	-25.196%	-26.063%
TFBI	-0.763%	-6.629%	-10.573%	-17.965%
TFSI	-0.135%	-7.199%	-7.671%	-15.006%

THEI	-1.076%	-0.281%	-2.086%	-3.443%
TISII	-0.080%	-1.318%	-1.299%	-2.698%
TMDI	-0.557%	-6.476%	-11.102%	-18.135%
TMTI	-0.439%	-2.329%	-8.553%	-11.321%
TPBI	0.000%	0.000%	0.000%	0.000%
TRLI	-1.423%	-2.541%	-8.972%	-12.936%
TRMI	-0.211%	-3.590%	-3.722%	-7.523%
TRTI	0.292%	-1.142%	-2.005%	-2.856%
TTNI	-0.122%	0.787%	1.056%	1.721%
TTSI	-0.213%	-0.612%	-2.664%	-3.490%
TUTI	-0.152%	-0.463%	-1.796%	-2.411%

Source: Secondary Data Processed 2024 by Author's Estimate Using Excel.

The table indicates a general trend of negative performance across most industry groups, with the majority showing negative Cumulative Average Abnormal Returns (CAAR) over different time windows. Industries such as energy industry (-26.063%) and media industry (-18.135%) have significant declines, suggesting sector-specific challenges. Conversely, transportation industry (1.721%) stands out with positive performance, indicating resilience. This data suggests that investors should consider diversifying their portfolios to spread risk, focusing on more stable sectors like transportation industry, while being cautious with highly volatile or underperforming sectors such as energy industry and media industry. Monitoring market conditions and employing risk management strategies will also be crucial for navigating these trends effectively.

4.5 Comparison of sectors

This summarized the results in this section by applying an established event study methodology to assess the data collected during the study period. This analysed the calculated AR, AAR, and CAAR and considered our results. The researcher's findings are listed below:

The table of Average Abnormal Returns (AAR) across various industry groups over a 21-day event window reveals significant negative returns for different sectors, especially around the event day (Day 0). Several industries, such as energy industry, food and beverages industry, and media industry, exhibit persistent negative AAR, indicating substantial adverse reactions to the event. Conversely, industries like transportation industry show occasional positive returns, but these are less frequent. The presence of

statistically significant negative returns (indicated by **) in many sectors suggests widespread market pessimism during this period.

Given the general negative abnormal returns across many industries, investors should adopt a cautious approach. Diversifying investments can mitigate risks associated with industry-specific declines. Paying close attention to sectors with occasional positive AAR, such as Transportation industry, might present short-term opportunities. However, the overall trend advises maintaining a defensive strategy, perhaps prioritizing more stable assets or sectors less impacted by the event. Employing risk management techniques, like stop-loss orders, can also help protect against further declines.



Table 6: AAR of all Sectors in KSA around the announcement of the COVID-19

<i>Event Day</i>	<i>TBNI</i>	<i>TCGI</i>	<i>TCPIC</i>	<i>TCSI</i>	<i>TDAI</i>	<i>TDFI</i>	<i>TENI</i>	<i>TFBI</i>	<i>TFSI</i>	<i>THEI</i>	<i>TISII</i>	<i>TMDI</i>	<i>TMTI</i>	<i>TPBI</i>	<i>TRLI</i>	<i>TRMI</i>	<i>TRTI</i>	<i>TTNI</i>	<i>TTSI</i>	<i>TUTI</i>
-10	-0.0013**	-0.0016	0.0036**	-0.0048	-0.0127	-0.0012**	0.0002**	0.0304	-0.0304**	0.0050**	-0.0041	-0.0083**	-0.0181**	1.23E-06	-0.0087**	-0.0065**	0.0006**	0.0031**	-0.0077	-0.0064**
-9	0.0073	0.0019	-0.0092**	0.0124	-0.0340**	0.0262**	0.0089	0.0141**	0.0087	-0.0065	0.0050	0.0103	0.0100	7.11E-07	-0.0040	0.0115**	0.0064	-0.0023**	0.0103**	0.0051
-8	0.0011	0.0005**	0.0011	-0.0101**	-0.0160	-0.0002**	0.0100	0.0065**	-0.0017**	-0.0015	0.0082	0.0070**	0.0004	1.07E-06	0.0002**	0.0064**	0.0012**	0.0058	-0.0048**	0.0030**
-7	0.0019**	0.0024**	0.0006	-0.0132**	-0.0010**	-0.0037	0.0380**	0.0137**	0.0100	0.0043**	0.0054	-0.0062**	-0.0060**	-4.59E-07	-0.0042**	0.0018**	0.0004**	-0.0038	-0.0227**	0.0013**
-6	-0.0006**	0.0057**	0.0035	0.0035	-0.0120	0.0017	0.0078	0.0270**	-0.0019**	0.0042	-0.0050**	0.0023**	-0.0103	2.75E-08	0.0028	-0.0004	0.0000**	0.0003	0.0000	-0.0030**
-5	0.0078	0.0020	-0.0025	0.0068	0.0073**	-0.0014	0.0073	-0.0011	-0.0041	-0.0028	-0.0032	0.0037	0.0054	-7.84E-08	0.0057	0.0049**	0.0003	-0.0052	0.0015	-0.0005**
-4	-0.0005	-0.0024	-0.0141	0.0006	-0.0165	0.0276	-0.0153	-0.0051	-0.0055	0.0016	0.0010	-0.0026	-0.0021	-1.61E-08	-0.0024	0.0139**	-0.0040	-0.0009	0.0007	0.0024**
-3	-0.0019	0.0030	0.0098	0.0011	0.0077**	-0.0011	-0.0204	0.0173	0.0207	-0.0003**	-0.0152	-0.0001	0.0071	1.31E-06	-0.0058	-0.0024	0.0065	0.0067	-0.0059	-0.0024**
-2	-0.0015**	0.0020**	0.0032	0.0008**	-0.0046	-0.0018**	0.0204**	0.0073**	0.0080**	-0.0110**	0.0084**	0.0133**	0.0014**	1.89E-06	0.0062**	0.0020	0.0030**	0.0011	0.0217**	-0.0018
-1	0.0070	0.0055	-0.0048	0.0051	0.0004	0.0024	0.0016	0.0119	0.0032	-0.0051	-0.0022	-0.0024	-0.0069	-5.30E-08	-0.0044	0.0097	0.0020**	0.0018	-0.0007**	0.0034
0	0.0021**	-0.0023**	0.0040**	-0.0083**	-0.0239	-0.0020	0.0052**	-0.0107**	0.0300**	0.0062**	-0.0142	0.0013**	-0.0075**	-3.70E-08	0.0018**	0.0070**	-0.0003**	-0.0025	-0.0044	-0.0025
1	-0.0040	-0.0018**	0.0012**	-0.0003	0.0122	0.0002**	-0.0087	0.0024**	0.0135**	0.0116	0.0143	0.0061**	0.0074	-1.54E-06	0.0129**	-0.0035**	-0.0001**	-0.0052	0.0048	-0.0003
2	-0.0032	-0.0029	-0.0048	-0.0061**	-0.0068	-0.0001**	-0.0215**	-0.0068	0.0077**	0.0029	0.0078	0.0024**	-0.0014**	-2.13E-06	-0.0010**	0.0006**	-0.0039	0.0037	-0.0058	0.0003
3	-0.0009	0.0000**	-0.0041	0.0050	0.0029	0.0003**	0.0001	0.0126**	0.0089	0.0002	-0.0034	0.0034	-0.0020	2.51E-07	0.0028**	-0.0050**	0.0050	0.0008	0.0041	-0.0007
4	-0.0008	0.0018	-0.0123	0.0144	0.0114**	-0.0012	0.0678	-0.0011	-0.0010	-0.0039	0.0104	-0.0032**	-0.0007	-2.14E-06	-0.0092	0.0035**	0.0010	0.0003	-0.0060	-0.0004
5	-0.0009	0.0015	-0.0028	-0.0011	-0.0065	-0.0020	0.0231	0.0001	0.0003	-0.0006	0.0074	-0.0025	0.0043	-3.08E-07	-0.0039	0.0009**	0.0019	0.0015	0.0114	-0.0077
6	-0.0031	-0.0090**	-0.0042**	-0.0078**	-0.0061	0.0013	-0.0398**	-0.0016**	-0.0030	-0.0038	-0.0097**	-0.0150**	0.0009	3.22E-07	-0.0086**	-0.0081	0.0032	0.0043	0.0081	-0.0018
7	0.0022	0.0022	-0.0028	0.0019	0.0073	-0.0073	-0.0209	0.0031	-0.0056	0.0011**	-0.0054	0.0061	0.0054	-2.87E-07	0.0163**	-0.0132	-0.0006	-0.0011	0.0132	-0.0013
8	-0.0092	-0.0018	-0.0141**	-0.0094	-0.0066	-0.0004	0.0360**	-0.0032	-0.0081	-0.0100	-0.0131	0.0094**	-0.0011	-2.22E-07	-0.0001	-0.0015	0.0015	-0.0005	0.0020	0.0063
9	0.0020	-0.0022	0.0361	0.0061	0.0043	-0.0250	-0.0388	-0.0101	-0.0057	-0.0063	-0.0045	-0.0158**	-0.0044	1.55E-06	-0.0024	-0.0052	-0.0023	-0.0019	0.0041	-0.0039
10	-0.0107	-0.0136	-0.0139	-0.0227	-0.0143**	-0.0152	-0.0528	-0.0390	-0.0399	-0.0137	-0.0064	-0.0282	-0.0208	-7.63E-07	-0.0248	-0.0211	-0.0095	0.0010	-0.0320	-0.0035

Notes: significant at 5 %

Source: Author's computation

The Table 6 provides the Average Abnormal Returns (AAR) for several sector groupings within 21 days around an event, ranging from day -10 to day +10. These earnings quantify the difference between the actual returns and the expected profits, providing valuable information about the market's response to the event.

In the bank sector there is a significant abnormal return at 5% in days -10, -7, -6, -2, and 0. In capital goods there is a significant abnormal return at 5% in days -8, -7, -6, -2, 0, 1, 3, and 6. In the Commercial & Professional Services sector there is a significant abnormal return at 5% in days -10, -9, 0, 1, 6, and 8. In the Consumer services sector, there is a significant abnormal return at 5% in days -8, -7, -2, 0, 2, and 6. In the Consumer Durables & Apparel sector there is a significant abnormal return at 5% in days -7, -9, -5, -3, 4, 10. In the Diversified Financials sector there is a significant abnormal return at 5% in days -9, -2, -8, 2, 1, -10 and 3. In Energy sector there is a significant abnormal return at 5% in days -2, 2, -10, -7, 0, 6, and 8. In Food and Beverages sector there is a significant abnormal return at 5% in days -2, -7, 1, 6, -9, -8, 0, 3 and -6. Food & Staples Retailing sector there is a significant abnormal return at 5% in days -2, 1, -6, 0, -8, 2 and -10. Health Care Equipment & Services sector there is a significant abnormal return at 5% in days -2, 0, -10, -7, 7 and -3. Insurance sector there is a significant abnormal return at 5% in days -6, -2 and 6. Media sector there is a significant abnormal return at 5% in days -2, -6, 6, 0, -10, -7, 1, -8, 2, 8, 4 and 9. Materials sector there is a significant abnormal return at 5% in days -2, 0, -10, -7 and 2. Pharma, biotech and life science sector there is a significant abnormal return at 5% in days -8, -6 and 0. Retailing sector there is a significant abnormal return at 5% in days 0, -8, -2, -10, -7, 2, 6, 1, 7 and 3. Real estate management and development sector there is a significant abnormal return at 5% in days 0, -8, -10, -7, 2, 1, 3, 4, -9, -5, 5 and -4. REIT sector there is a significant abnormal return at 5% in days 0, -8, -10, -7, 1, -2, -6 and -1. Transportation sector there is a significant abnormal return at 5% in days -10 and -9. Telecommunication services sector there is a significant abnormal return at 5% in days -9, -8, -7, -2 and -1. Utilities sector there is a significant abnormal return at 5% in days -8, -7, -10, -6, -5, -4 and -3.

Table 7: CAAR of all Sectors in KSA around the announcement of the COVID-19

<i>Event Day</i>	<i>TBNI</i>	<i>TCGI</i>	<i>TCPIC</i>	<i>TCSI</i>	<i>TDAI</i>	<i>TDFI</i>	<i>TENI</i>	<i>TFBI</i>	<i>TFSI</i>	<i>THEI</i>	<i>TISII</i>	<i>TMDI</i>	<i>TMTI</i>	<i>TPBI</i>	<i>TRLI</i>	<i>TRMI</i>	<i>TRTI</i>	<i>TTNI</i>	<i>TTSI</i>	<i>TUTI</i>
-10	0.0014	0.0012	0.0005	0.0045	-0.0056	-0.0025	0.0058	0.0068	0.0112	-0.0014	0.0000	0.0033	0.0014	0.0000	0.0011	0.0088	0.0018	0.0015	0.0077	0.0071
-9	0.0010	0.0002	-0.0101	-0.0048	-0.0070	-0.0010	0.0054	0.0137	0.0105	-0.0004	-0.0083	-0.0195	0.0034	0.0000	0.0028	0.0093	0.0017	0.0009	0.0129	0.0056
-8	0.0026	0.0035	-0.0270**	0.0048	-0.0052	0.0011	0.0353	0.0148	0.0076	0.0020	-0.0091	-0.0367	-0.0001	0.0000	0.0074	0.0070	0.0049	0.0014	0.0216	0.0075
-7	-0.0008	0.0037	-0.0164	0.0044	0.0016	0.0001	0.0541**	0.0189	0.0086	0.0000	-0.0075	-0.0212	-0.0047	0.0000	0.0083	-0.0036	0.0077	0.0049	0.0230	0.0047
-6	-0.0021	0.0027	-0.0185	0.0026	-0.0057	0.0000	0.0461	0.0235	0.0074	-0.0055	-0.0039	-0.0293	-0.0040	0.0000	0.0099	-0.0071	0.0065	0.0028	0.0293	0.0113
-5	-0.0041	-0.0037	-0.0364**	-0.0166	0.0007	0.0034	0.0119	-0.0069	0.0051	-0.0079	-0.0184	-0.0449	-0.0098	0.0000	-0.0027	-0.0121	0.0029	0.0006	0.0199	0.0068
-4	-0.0034	-0.0052	-0.0392**	-0.0237	0.0056	0.0016	0.0179	-0.0009	0.0006	-0.0059	-0.0137	-0.0410	-0.0093	0.0000	-0.0003	-0.0242	0.0026	0.0042	0.0218	0.0057
-3	-0.0023	-0.0074	-0.0312	-0.0262	-0.0298	0.0007	0.0242	-0.0119	-0.0133	-0.0041	-0.0077	-0.0450	-0.0124	0.0000	-0.0010	-0.0315	0.0014	0.0069	0.0174	-0.0020
-2	-0.0016	-0.0085	-0.0439**	-0.0342	-0.0201	-0.0203	0.0243	-0.0298	-0.0264	0.0008	-0.0113	-0.0454	-0.0164	0.0000	-0.0083	-0.0234	-0.0008	0.0128	0.0034	-0.0009
-1	-0.0048	-0.0209	-0.0608**	-0.0445	-0.0151	-0.0188	-0.0035	-0.0663**	-0.0720	-0.0028	-0.0132	-0.0648	-0.0233	0.0000	-0.0254	-0.0359	-0.0114	0.0106	-0.0044	-0.0046
0	-0.0028	-0.0237	-0.0624**	-0.0384	-0.0184	-0.0019	-0.0087	-0.0739**	-0.0733	-0.0136	-0.0140	-0.0703	-0.0277	0.0000	-0.0396**	-0.0380	-0.0085	0.0093	-0.0064	-0.0061
1	-0.0035	-0.0148	-0.0593**	-0.0280	-0.0168	0.0216	0.0096	-0.0543	-0.0584	-0.0145	-0.0173	-0.0624	-0.0279	0.0000	-0.0261	-0.0319	-0.0043	0.0094	-0.0055	-0.0040
2	-0.0046	-0.0137	-0.0502**	-0.0225	-0.0178	-0.0002	-0.0006	-0.0512	-0.0500	-0.0195	-0.0154	-0.0552	-0.0315	0.0000	-0.0169	-0.0311	0.0013	0.0092	0.0113	-0.0063
3	-0.0069	-0.0116	-0.0450	-0.0213	-0.0312	0.0001	-0.0130	-0.0472	-0.0573	-0.0176	-0.0173	-0.0527	-0.0364	0.0000	-0.0143	-0.0254	0.0005	0.0085	0.0045	-0.0075
4	-0.0220	-0.0290	-0.0547**	-0.0429	-0.0417	-0.0134	-0.0423	-0.0888**	-0.0747	-0.0272	-0.0267	-0.0801	-0.0512**	0.0000	-0.0343	-0.0414	-0.0225	0.0107	-0.0236	-0.0192
5	-0.0273	-0.0427	-0.0643**	-0.0698**	-0.0429	-0.0169	-0.0980**	-0.1363**	-0.1403**	-0.0329	-0.0444	-0.1093	-0.0613**	0.0000	-0.0536**	-0.0468**	-0.0318**	0.0113	-0.0413	-0.0178
6	-0.0266	-0.0276	-0.0541	-0.0361	-0.0462	0.0150	-0.1050**	-0.1093**	-0.0988**	-0.0344	-0.0530	-0.0913	-0.0549**	0.0000	-0.0382	-0.0405	-0.0183	0.0082	-0.0221	-0.0080
7	-0.0292	-0.0264	-0.0562	-0.0535	-0.0446	-0.0202	-0.1379**	-0.1216**	-0.0735	-0.0368	-0.0604**	-0.1086	-0.0683**	0.0000	-0.0603**	-0.0541**	-0.0190	0.0063	-0.0277	-0.0054
8	-0.0384	-0.0330	-0.0725**	-0.0825**	-0.0467	0.0052	-0.2003**	-0.1466**	-0.1013**	-0.0470	-0.0522	-0.1284**	-0.0870**	0.0000	-0.0829**	-0.0657**	-0.0140	0.0068	-0.0393	-0.0095
9	-0.0509	-0.0340	-0.0481	-0.0824**	-0.0439	-0.0259**	-0.2379**	-0.1508**	-0.1240**	-0.0374	-0.0406	-0.1421**	-0.1063**	0.0000	-0.1244**	-0.0725**	-0.0198	0.0135	-0.0360	-0.0160
10	-0.0585	-0.0423	-0.0569	-0.0873**	-0.0504	0.0008	-0.2606**	-0.1797**	-0.1501**	-0.0344	-0.0270	-0.1814**	-0.1132**	0.0000	-0.1294**	-0.0752**	-0.0286	0.0172	-0.0314	-0.0241

Notes: significant at 5 %

Source: Author's computation

The Table 7 shows industries' cumulative abnormal returns (CAAR) over event days. The CAAR values show how these businesses' stock prices performed compared to the market average during the event. The data shows that the event caused a key negative influence on the enterprises' stock values. Most CAAR values decrease from day -10 to day 10, suggesting a fall in abnormal returns. It shows investors responded negatively to the incident, lowering stock prices for the corporations studied. The event's cause becomes even greater by many statistically significant CAAR readings (signs **). The CAAR analysis shows that the event's unfavourable market sentiment hurt the businesses' stock market performance.

The following Table7 provides an overview of the cumulative average abnormal returns (CAAR) for the period before and after the day of the occurrence (-10, +10) for each sector in the Saudi Exchange.

In the commercial and professional services sector, there is a significant abnormal return of 5% on days -8, -5, -4, -2, -1, 0, 1, 2, 4, 5, and 8. In the consumer services sector, there is a significant abnormal return of 5% on days 5, 8, 9, and 10. In the Diversified Financials sector, there is a significant abnormal return of 5% on day 9. In the energy sector, there is a significant abnormal return of 5% on days 5, 8, 9, 10, -7, 6, and 7. In the food and beverage sector, there is a significant abnormal return of 5% on days 5, 8, 9, 10, 6, 7, -1, 0, and 4. In the food & staples retailing sector, there is a significant abnormal return of 5% on days 5, 8, 9, 10, and 6. On day 7, the insurance sector saw a significantly abnormal return of 5%. In the media sector, there is a significant abnormal return of 5% on days 8, 9, and 10. In the materials sector, there is a significant abnormal return of 5% on days 5, 8, 9, 10, 6, 7, and 4. In the retail sector, there is a significant abnormal return of 5% on days 5, 8, 9, 10, 7, and 0. In the real estate management and development sector, there is a significant abnormal return of 5% on days 5, 8, 9, 10, and 7. In the REIT sector, there is a significant abnormal return of 5% on day 5.

The Cumulative Average Abnormal Returns (CAAR) table highlights the impact of an event across various industries over a 21-day window. The table shows a pronounced and consistent decline in CAARs, particularly evident in significant negative values (marked with **) across multiple sectors like commercial and professional services industry, consumer services industry, media industry, food and beverages industry, and materials

industry. This indicates that the event had a broadly negative impact, with certain industries experiencing more pronounced adverse effects.

Investors should exercise caution, particularly in sectors with significant and persistent negative CAARs. Diversifying investments to minimize exposure to the most affected industries could help mitigate risk. Additionally, maintaining a defensive investment strategy, possibly shifting towards more stable or less impacted sectors, might be prudent. It is also essential to stay informed about industry-specific developments that could influence future performance. Utilizing risk management tools such as stop-loss orders could further protect against potential downturns.



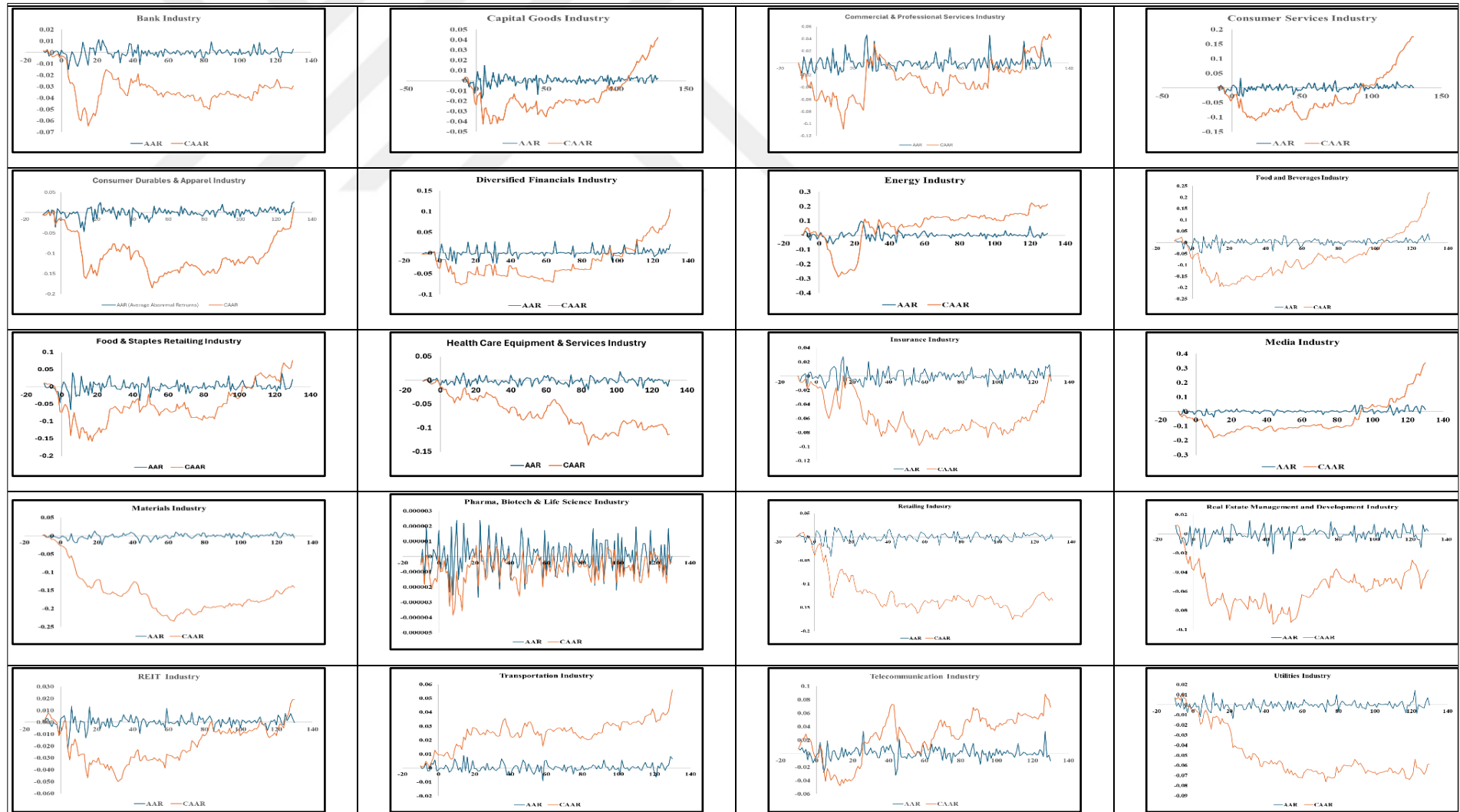


Figure 29 AAR and CAAR for All Industry in Saudi Arabia During Event Window

Cumulative abnormal returns (CAAR) for companies over 21 event days have been declining, with noticeable decreases, as shown in the table. Companies such as commercial and professional services industry and energy industry are experiencing significant negative impacts on their stock performances. As the event day drew near, the negative tendency became more noticeable, and positive returns had less effect.

Before the event, majority of sectors faced considerable changes. It is important to note that banks industry and energy industry experienced especially significant declines on day -10, with AARs of -0.0124% and -0.0376%, respectively. On day -10, commercial and professional services industry experienced a positive AAR of 0.0244%; however, the following day, it experienced a significant decline of -0.0127%. In the interim, consumer services industry demonstrated positive momentum on day -8, with an AAR of 0.0337%.

Most sectors recognized negative AARs on the event day (day 0), which suggests a deleterious market response. Energy industry and food and beverages industry exhibited significant negative AARs of -0.0625% and -0.0250%, respectively. Similarly, retailing industry and real estate management and development industry also exhibited substantial negative AARs of -0.0226% and -0.0116%, respectively.

After the event, many sectors maintained negative AARs, which indicated persistent marketplace uncertainty. In the days that followed the event, food and staples retailing industry and diversified financials industry continued to register negative AARs. However, there were cases of positive returns. For instance, commercial and professional services industry had a positive AAR of 0.0150% on day +3, and materials industry experienced a positive AAR of 0.0196% on day +3.

CONCLUSION

The study employs an event study approach to explore the impact of an event on the stock returns of various industries. The study found large anomalous returns near the 5% level in several industries, indicating market responses. The CAAR values showed a declining trend, indicating a negative impact on the stock prices of the analysed firms. Several industries had large negative AARs, particularly on the day of the incident, reflecting the poor market mood. Even though there some instances of positive returns, several different industries continued to have negative AARs after the event, which indicated that market uncertainty still present. The findings shed light on the significantly negative impact that the incident had on the overall performance of the market.

This study investigates the semi-strong variant of the Efficient Market Hypothesis considering the COVID-19 pandemic. The market model uses a formula to calculate the alpha and beta coefficients during the procedures for performing an abnormal return analysis. The market model created the forecast for daily trading 120 days before the news of the COVID-19 epidemic in Saudi Arabia.

During the study on Saudi market, several challenges are detected. Due to scarcity of studies regarding with Saudi market, a foreign methodology is adapted for analysing the Saudi market. Moreover, the study did not include certain businesses due to the limited availability of stock information.

The purpose of this research is to explore the effect that COVID-19 impact on the stock market in Saudi Arabia. The thesis uses the event study method and market model to assess the impact of COVID-19 on 20 industries listed on the Saudi market exchange. It determined that the Saudi Arabian stock markets could divided into twenty sectors: banks, capital goods, commercial & professional services, consumer services, consumer durables & apparel, diversified financials, energy, food and beverages, food & staples retailing, health care equipment & services, insurance, media, materials, pharma, biotech & life science, retailing, real estate management and development, REIT, transportation, telecommunication services, and utilities.

The study evaluates normality test changes across sectors pre-, during, and post-event. The banks, consumer durables and apparel, energy, materials, pharma, biotech, life

sciences, retailing, real estate management and development, telecommunications, and utilities sectors changed to usual bell curve after the incident. capital goods, commercial and professional services, consumer services, diversified financials, food and beverages, food and staples retailing, health care equipment and services, insurance, media, REIT, and transportation industries fluctuated sharply and remained negatively skewed post-event. In reaction to the incident, various sectors showed differing resilience and stability.

The results from the table underscore a prevalent trend of negative performance across a wide array of industry groups, as evidenced by the majority displaying negative Cumulative Average Abnormal Returns (CAAR) over various time windows. Industries such as energy industry (-26.063%) and media industry (-18.135%) are marked by significant declines, pointing to sector-specific challenges and vulnerabilities. Conversely, transportation industry (1.721%) emerges as an outlier with positive performance, indicating a degree of resilience and potential stability. This contrast suggests that investors should consider diversifying their portfolios to distribute risk more effectively, with a particular focus on more stable sectors like transportation industry, while exercising caution with highly volatile or underperforming sectors such as energy industry and media industry. Continuous monitoring of market conditions and employing robust risk management strategies will be crucial in navigating these trends and mitigating potential losses effectively.

Examining the table of Average Abnormal Returns (AAR) across various industry groups over a 21-day event window further reveals significant negative returns for many sectors, particularly around the event day (Day 0). Several industries, including energy industry, food and beverages industry, and media industry, show persistent negative AAR, indicating substantial adverse reactions to the event. In contrast, industries such as transportation industry exhibit occasional positive returns, though these instances are less frequent. The presence of statistically significant negative returns (indicated by **) in many sectors underscores widespread market pessimism during this period, reinforcing the need for a cautious investment approach.

Given the widespread negative abnormal returns across many industries, it is advisable for investors to adopt a cautious and defensive approach. Diversifying investments can help mitigate the risks associated with industry-specific declines and broader market

downturns. Investors should pay close attention to sectors with occasional positive AAR, such as transportation industry, which might present short-term opportunities despite the overall negative trend. However, maintaining a defensive strategy, prioritizing more stable assets or sectors less impacted by the event, is prudent. Employing risk management techniques, such as stop-loss orders, can also provide additional protection against further declines and unexpected market movements.

The CAAR table illustrates the impact of an event across various industries over a 21-day window, with a pronounced and consistent decline in CAARs. This trend is particularly evident in significant negative values (marked with **) across multiple sectors like commercial and professional services industry, consumer services industry, media industry, food and beverages industry, and materials industry. This pattern indicates that the event had a broadly negative impact, with certain industries experiencing more pronounced adverse effects. Such a widespread and significant decline in CAARs suggests that the event likely triggered substantial market pessimism and uncertainty, affecting investor sentiment and sector performance.

In light of these findings, investors should exercise caution, particularly in sectors with significant and persistent negative CAARs. Diversifying investments to minimize exposure to the most affected industries can help mitigate risk and reduce potential losses. Additionally, maintaining a defensive investment strategy, possibly shifting towards more stable or less impacted sectors, might be a prudent course of action. It is also essential for investors to stay informed about industry-specific developments and market conditions that could influence future performance. Utilizing risk management tools, such as stop-loss orders, can further protect against potential downturns and provide a safety net in volatile market conditions.

Overall, the analysis highlights the importance of diversification and risk management in investment strategies, especially during periods of market uncertainty and widespread negative performance. By spreading investments across various sectors and employing defensive tactics, investors can better navigate adverse market trends and protect their portfolios from significant declines. Continuous monitoring of market conditions and staying informed about industry-specific developments will also be crucial in making informed investment decisions and adapting to changing market dynamics.

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APPENDICES

Appendix 1: Sample Of Calculation Market Return for The Utilities Sector, And Stock Return, Normal Return, And Abnormal Return for The Companies in the Utilities Sector Before the COVID-19 Event.

Days	Date	Utilities (TUT)			National Gas & Industrialization Co (2080)				Saudi Electricity Company (5110)			
		Market Price	Market Return	Stock Price	Stock Return	Normal Return	Abnormal Return	Stock Price	Stock Return	Normal Return	Abnormal Return	
-50	12/23/2019	4512.97	0.018657837	30.1	0.003333333	0.00555691	-0.002223576	20.86	0.020547945	0.020189965	0.000357988	
-49	12/24/2019	4499.16	-0.003060069	30.2	0.003322259	8.84889E-05	0.00323377	20.78	-0.00385091	-0.003400043	-0.000435048	
-48	12/25/2019	4432.74	-0.014762756	30.15	-0.001656529	-0.002858168	0.001202539	20.44	-0.016361886	-0.016111512	-0.000250375	
-47	12/26/2019	4429.88	-0.000645199	30.45	0.009950249	0.000656357	0.009253712	20.4	-0.001956947	-0.00077701	-0.001179938	
-46	12/29/2019	4432.36	0.000559835	30.65	0.006568144	0.000999956	0.005568169	20.4	0	0.000531899	-0.000551899	
-45	12/30/2019	4397.84	-0.007788176	30.75	0.003262643	-0.001102016	0.003464659	20.22	-0.008823529	-0.008535717	-0.000287812	
-44	12/31/2019	4399.7	0.000422935	30.9	0.004878049	0.000965486	0.003912563	20.22	0	0.000383199	-0.000383199	
-43	01/01/2020	4400.94	0.000281837	31	0.003236246	0.000929958	0.002306288	20.22	0	0.000229938	-0.000229938	
-42	01/02/2020	4406.52	0.001267911	31.45	0.014516129	0.001178245	0.013337884	20.22	0	0.001301012	-0.001301012	
-41	01/05/2020	4335.52	-0.016112488	30.85	-0.019077901	-0.003198021	-0.01587988	19.9	-0.015825915	-0.017577592	-0.001751677	
-40	01/06/2020	4393.25	0.013315588	30.7	-0.004862237	0.004211768	-0.009074004	20.2	0.015075377	0.01438721	0.000688167	
-39	01/07/2020	4344.96	-0.010991863	30.65	-0.001628664	-0.001908683	0.000280018	19.96	-0.011881188	-0.012015564	-0.000134376	
-38	01/08/2020	4303.37	-0.00957201	30.5	-0.004893964	-0.001551173	-0.003342791	19.76	-0.01002004	-0.010473319	-0.000453279	
-37	01/09/2020	4354.51	0.01188371	31.1	0.019672131	0.003851231	0.015820901	19.98	0.011133603	0.012831902	-0.001698299	
-36	01/12/2020	4369.53	0.003449297	31.35	0.008038585	0.001727503	0.006311082	20.04	0.003003003	0.003670436	-0.000667433	
-35	01/13/2020	4441.41	0.016450282	31.7	0.011164274	0.005001062	0.006163212	20.38	0.016966068	0.017792117	-0.000826049	
-34	01/14/2020	4426.75	-0.003300754	31.8	0.003154574	2.78862E-05	0.003126688	20.3	-0.003925417	-0.003661475	-0.000263942	
-33	01/15/2020	4395.59	-0.007039024	31.85	0.001572327	-0.000913385	0.002485712	20.14	-0.007881773	-0.007721988	-0.000159786	
-32	01/16/2020	4427.37	0.007229974	31.85	0	0.002679452	-0.002679452	20.3	0.007944389	0.007777701	0.000167379	
-31	01/19/2020	4451.83	0.005524725	31.9	0.001569859	0.002250081	-0.000680223	20.42	0.00591133	0.005924767	-1.3437E-05	
-30	01/20/2020	4419.43	-0.007277906	31.85	-0.001567398	-0.000973534	-0.000593864	20.26	-0.007835455	-0.007981462	-0.000146006	
-29	01/21/2020	4386.4	-0.007473814	31.75	-0.003139717	-0.001022862	-0.002116855	20.1	-0.007897335	-0.008194258	-0.000296923	
-28	01/22/2020	4367.16	-0.004386285	31.8	0.001574803	-0.000245443	0.001820246	20	-0.004975124	-0.00484058	-0.000134544	
-27	01/23/2020	4359.83	-0.001678436	31.85	0.001572227	0.000436375	0.001135952	19.96	-0.002	-0.001899313	-0.000100687	
-26	01/26/2020	4339.35	-0.004697431	31.8	-0.001569859	-0.000323788	-0.001246071	19.86	-0.00501002	-0.005178547	-0.000168527	
-25	01/27/2020	4305.71	-0.007752313	31.65	-0.004716981	-0.001092986	-0.003623995	19.7	-0.008056395	-0.008496763	-0.000440368	
-24	01/28/2020	4305.09	-0.000143995	31.6	-0.001579779	0.000822736	-0.002402515	19.7	0	-0.000232601	0.000232601	
-23	01/29/2020	4340.84	0.008304124	31.6	0	0.002949915	-0.002949915	19.88	0.009137056	0.008943753	0.000193303	
-22	01/30/2020	4333.52	-0.00168631	31.65	0.001582278	0.000434392	0.001147886	19.84	-0.002012072	-0.001907865	-0.000104208	
-21	02/02/2020	4318.87	-0.003380624	31.75	0.003159558	7.77543E-06	0.003151782	19.76	-0.004032258	-0.00374823	-0.000284028	
-20	02/03/2020	4300.24	-0.004313628	31.85	0.003149606	-0.000227149	0.003376755	19.66	-0.005060729	-0.004761661	-0.000299068	
-19	02/04/2020	4329.29	0.006755437	31.95	0.003139717	0.002559966	0.000579751	19.8	0.007121058	0.007261568	-0.00014051	
-18	02/05/2020	4305.2	-0.005564423	32.25	0.009389671	-0.00054209	0.009931762	19.66	-0.007070707	-0.006120275	-0.000950432	
-17	02/06/2020	4349.16	0.010210908	31.95	-0.009302326	0.00343003	-0.012733356	19.9	0.012207528	0.011014903	0.0001192625	
-16	02/09/2020	4294.66	-0.012531155	31.4	-0.017214397	-0.002296266	-0.014918131	19.66	-0.012060302	-0.013687546	0.001627244	
-15	02/10/2020	4223.15	-0.016650911	31.4	0	-0.003333592	0.003333592	19.3	-0.018311292	-0.018162427	-0.000148864	
-14	02/11/2020	4059.28	-0.038802789	31	-0.012738854	-0.008911285	-0.003827569	18.5	-0.041450777	-0.042223818	0.00077304	
-13	02/12/2020	4044	-0.003764214	31.05	0.001612903	-8.88101E-05	0.001701713	18.42	-0.004324324	-0.004164887	-0.000159438	
-12	02/13/2020	3994.47	-0.012247774	30.9	-0.004830918	-0.002224913	-0.002606005	18.18	-0.013029316	-0.013379737	0.000350421	
-11	02/16/2020	3905.32	-0.022318355	31.4	0.01618123	-0.004760616	0.020941846	17.7	-0.02640264	-0.024318411	-0.00208423	

Appendix 2: Sample Of Calculation Market Return for The Utilities Sector, And Stock Return, Normal Return, And Abnormal Return for The Companies in the Utilities Sector during the COVID-19 Event (-10, +10)

Days	Utilities (TUT)			National Gas & Industrialization Co (2080)				Saudi Electricity Company (5110)			
	Date	Market Price	Market Return	Stock Price	Stock Return	Normal Return	Abnormal Return	Stock Price	Stock Return	Normal Return	Abnormal Return
-10	02/17/2020	3867.2	-0.009761044	31.85	0.01433121	-0.001598771	0.015929981	17.48	-0.012429379	-0.010678648	-0.00175073
-9	02/18/2020	3833.55	-0.008701386	31.7	-0.004709576	-0.001331956	-0.00337762	17.32	-0.009153318	-0.009527647	0.000374329
-8	02/19/2020	3851.93	0.004794512	31.9	0.006309148	0.002066219	0.004242929	17.4	0.004618938	0.005131609	-0.000512671
-7	02/20/2020	3861.98	0.002609082	31.75	-0.004702194	0.001515942	-0.006218137	17.46	0.003448276	0.002757793	0.000690483
-6	02/23/2020	3790.84	-0.018420603	32.1	0.011023622	-0.003779189	0.014802811	17.08	-0.021764032	-0.020084669	-0.001679363
-5	02/24/2020	3648.32	-0.037595889	31.5	-0.018691589	-0.008607395	-0.010084194	16.4	-0.039812646	-0.040912881	0.001100235
-4	02/25/2020	3692.64	0.012148057	31.55	0.001587302	0.003917791	-0.00233049	16.62	0.013414634	0.013119037	0.000295597
-3	02/26/2020	3775.71	0.0224961	31.2	-0.011093502	0.006523358	-0.017616861	17.06	0.026474128	0.02435909	0.002115037
-2	02/27/2020	3724.06	-0.013679546	31.2	0	-0.002585423	0.002585423	16.8	-0.015240328	-0.014934929	-0.000305399
-1	03/01/2020	3623.13	-0.027102141	30.75	-0.014423077	-0.005965141	-0.008457936	16.32	-0.028571429	-0.029514563	0.000943135
0	03/02/2020	3589.49	-0.00928479	30.6	-0.004878049	-0.001478853	-0.003399195	16.16	-0.009803922	-0.01016134	0.000357419
1	03/03/2020	3693.77	0.029051481	31	0.013071895	0.008173958	0.004897937	16.66	0.030940594	0.03147955	-0.000538956
2	03/04/2020	3687.94	-0.001578333	30.85	-0.00483871	0.00046158	-0.00530029	16.64	-0.00120048	-0.001790581	0.0005901
3	03/05/2020	3691.29	0.000908366	30.8	-0.001620746	0.001087714	-0.002708459	16.66	0.001201923	0.000910474	0.000291449
4	03/08/2020	3587.52	-0.028112123	29.8	-0.032467532	-0.006219448	-0.026248085	16.2	-0.027611044	-0.030611607	0.003000562
5	03/09/2020	3389.12	-0.055302828	29.5	-0.010067114	-0.013065882	0.002989768	15.22	-0.060493827	-0.060146174	-0.000347654
6	03/10/2020	3581.54	0.0567756	30.6	0.037288136	0.015154753	0.022133383	16.12	0.05913272	0.06159373	-0.00246101
7	03/11/2020	3531.13	-0.014074951	30.7	0.003267974	-0.002664983	0.005952957	15.86	-0.016129032	-0.015364418	-0.000764614
8	03/12/2020	3442.12	-0.025207228	30.25	-0.01465798	-0.005488015	-0.009169966	15.44	-0.026481715	-0.027456307	0.000974592
9	03/15/2020	3453.06	0.0003178274	29.85	-0.01322314	0.001659261	-0.014882402	15.52	0.005181347	0.00337605	0.001805297
10	03/16/2020	3299.49	-0.044473597	29	-0.028475712	-0.010339155	-0.018136557	14.8	-0.046391753	-0.048383454	0.001991702

Appendix 3: Sample Of Calculation Market Return for The Utilities Sector, And Stock Return, Normal Return, And Abnormal Return for The Companies in the Utilities Sector after the COVID-19 Event.

		Utilities (TUT)			National Gas & Industrialization Co (2080)			Saudi Electricity Company (5110)			
Days	Date	Market Price	Market Return	Stock Price	Stock Return	Normal Return	Abnormal Return	Stock Price	Stock Return	Normal Return	Abnormal Return
11	03/17/2020	3281.6	-0.00542205	29.8	0.027586207	-0.000506242	0.028092449	14.66	-0.009459459	-0.005965629	-0.003493833
12	03/18/2020	3269.06	-0.003821307	29.75	-0.001677852	-0.000103186	-0.001574667	14.6	-0.004092769	-0.0042269	0.000134131
13	03/19/2020	3372.73	0.03171248	30.1	0.011764706	0.00884398	0.002920726	15.1	0.034246575	0.03436993	-0.000123355
14	03/22/2020	3310.03	-0.018590281	29.85	-0.008305648	-0.003821913	-0.004483735	14.8	-0.01986755	-0.020268974	0.000401424
15	03/23/2020	3235.67	-0.022465053	29.3	-0.018425461	-0.004797554	-0.013627907	14.46	-0.022972973	-0.024477754	0.001504781
16	03/24/2020	3322.57	0.02685688	29.9	0.020477816	0.007621373	0.012856443	14.86	0.027662517	0.029095773	-0.001433255
17	03/25/2020	3347.9	0.007623617	29.7	-0.006688963	0.002778568	-0.009467531	15	0.009421265	0.008204585	0.00121668
18	03/26/2020	3372.36	0.007306072	29.75	0.001683502	0.002698613	-0.001015111	15.12	0.008	0.007859669	0.000140331
19	03/29/2020	3396.82	0.007253081	29.8	0.001680672	0.00268527	-0.001004598	15.24	0.007936508	0.007802109	0.000134399
20	03/30/2020	3389.74	-0.002084302	29.55	-0.008389262	0.00033418	-0.008723442	15.22	-0.001312336	-0.002340165	0.001027829
21	03/31/2020	3527.56	0.040657986	29.45	-0.003384095	0.011096397	-0.014480492	15.92	0.045992116	0.044086546	0.00190557
22	04/01/2020	3736.51	0.059233578	29	-0.015280136	0.015773605	-0.031053741	17	0.067839196	0.064263371	0.003575825
23	04/02/2020	3758.86	0.005981518	29.2	0.006969552	0.002365099	0.004531453	17.1	0.005882353	0.006420936	-0.000538583
24	04/05/2020	3712.67	-0.0122883	29	-0.006849315	-0.002235117	-0.004614198	16.88	-0.012865497	-0.013423756	0.000558259
25	04/06/2020	3712.67	0	29	0	0.000858993	-0.000858993	16.88	0	-7.61937E-05	7.61937E-05
26	04/07/2020	3757.62	0.01210719	29.1	0.003448276	0.003907501	-0.000459225	17.1	0.013033175	0.013074646	-4.1471E-05
27	04/08/2020	3753.64	-0.001059181	29.1	0	0.000592299	-0.000592299	17.08	-0.001169591	-0.001226677	5.70865E-05
28	04/09/2020	3876.18	0.032645645	29.05	-0.001718213	0.009078944	-0.010797158	17.7	0.036299766	0.035383535	0.000916231
29	04/12/2020	3726.34	-0.038656616	28.5	-0.018932874	-0.008874479	-0.010058395	16.98	-0.040677966	-0.042065043	0.001387077
30	04/13/2020	3750.8	0.006564082	28.55	0.001754386	0.002511784	-0.000757398	17.1	0.007067138	0.007053718	1.34203E-05
31	04/14/2020	3838.57	0.023400341	28.9	0.012259194	0.00675104	0.005508155	17.52	0.024561404	0.025341278	-0.000779874
32	04/15/2020	3851.98	0.003493488	28.7	-0.006920415	0.00173863	-0.008659045	17.6	0.00456621	0.003718437	-0.000847774
33	04/16/2020	3633.47	-0.05672667	28.7	0	-0.013424396	0.013424396	16.5	-0.0625	-0.061692753	-0.000807247
34	04/19/2020	3657.93	0.006731857	28.75	0.00174216	0.002554029	-0.000811869	16.62	0.007272727	0.007235955	3.67721E-05
35	04/20/2020	3599.21	-0.016052795	28.5	-0.008695652	-0.003182991	-0.005512661	16.34	-0.016847172	-0.017512754	0.000665582
36	04/21/2020	3496.17	-0.028628505	28.2	-0.010526316	-0.006349469	-0.004176847	15.84	-0.030599755	-0.031172501	0.000552745
37	04/22/2020	3649.25	0.043785056	28.05	-0.005319149	0.011883772	-0.017202921	16.62	0.049242424	0.047483173	0.001759251
38	04/23/2020	3628.76	-0.005614852	28	-0.001782531	-0.000554788	-0.001227743	16.52	-0.006016847	-0.006175051	0.000158204
39	04/26/2020	3730.93	0.028155623	28.55	0.019642857	0.007948388	0.01169447	17	0.02905569	0.030506469	-0.001450779
40	04/27/2020	3678.04	-0.01417609	28.45	-0.003502627	-0.002710449	-0.000792177	16.74	-0.015294118	-0.015474275	0.000180158
41	04/28/2020	3705.86	0.007563811	28.45	0	0.00276351	-0.00276351	16.88	0.008363202	0.008139625	0.000223577
42	04/29/2020	3742.23	0.009814186	28.5	0.001757469	0.003330139	-0.00172669	17.06	0.010663507	0.010583984	7.95232E-05
43	04/30/2020	3745.33	0.000828383	28.55	0.00877193	0.001067575	0.0007704355	17.06	0	0.000823597	-0.000823597
44	05/03/2020	3469.85	-0.073552931	28	-0.026086957	-0.017661133	-0.008425823	15.72	-0.078546307	-0.079969452	0.001423145
45	05/04/2020	3467.12	-0.000786778	28.1	0.003571429	0.000660888	0.00291054	15.7	-0.001272265	-0.000930792	-0.000341472
46	05/05/2020	3486.36	0.005549274	28.05	-0.0017579359	0.002256263	-0.0040335622	15.8	0.006369427	0.005951433	0.000417994
47	05/06/2020	3431.98	-0.01559793	28.15	0.0003565062	-0.003068459	0.006633522	15.52	-0.017721519	-0.017018679	-0.00070284
48	05/07/2020	3387.66	-0.012913828	28.1	-0.001776199	-0.002392621	0.000616422	15.3	-0.014175258	-0.014103205	-7.20525E-05
49	05/10/2020	3426.77	0.011544842	28.05	-0.001779339	0.003765906	-0.005545265	15.5	0.013071895	0.012463824	0.000608071
50	05/11/2020	3442.29	0.004529046	27.7	-0.012477718	0.001999376	-0.014477095	15.6	0.006451613	0.00484326	0.001608353

Appendix 4: Sample Of Calculation of Average Abnormal Return, T-Statistics with significant test of The Companies in The Utilities Sector Before The COVID-19 Event.

Days	Utilities (TUT)		one-tail			
	AAR (Average Abnormal Returns)	t-statistics AAR	significant at 0.5%	significant at 1%	significant at 5%	significant at 10%
-50	-0.000932798	-0.284235921	Not Significant	Not Significant	Not Significant	Not Significant
-49	0.001399361	0.426403997	Not Significant	Not Significant	Not Significant	Not Significant
-48	0.000476082	0.145068549	Not Significant	Not Significant	Not Significant	Not Significant
-47	0.004036887	1.230093224	Significant	Significant	Significant	Significant
-46	0.002518145	0.767312181	Not Significant	Not Significant	Not Significant	Not Significant
-45	0.002038423	0.621134736	Not Significant	Not Significant	Not Significant	Not Significant
-44	0.001764682	0.537722175	Not Significant	Not Significant	Not Significant	Not Significant
-43	0.001038175	0.316345646	Not Significant	Not Significant	Not Significant	Not Significant
-42	0.006018436	1.83389748	Significant	Significant	Significant	Significant
-41	-0.007064101	-2.152525663	Significant	Significant	Significant	Significant
-40	-0.004192919	-1.27763814	Significant	Significant	Significant	Significant
-39	0.000207197	0.063135751	Not Significant	Not Significant	Not Significant	Not Significant
-38	-0.001444756	-0.440236294	Not Significant	Not Significant	Not Significant	Not Significant
-37	0.007061301	2.15167225	Significant	Significant	Significant	Significant
-36	0.002821825	0.859847457	Not Significant	Not Significant	Not Significant	Not Significant
-35	0.002668582	0.813152272	Not Significant	Not Significant	Not Significant	Not Significant
-34	0.001431373	0.436158394	Not Significant	Not Significant	Not Significant	Not Significant
-33	0.001162963	0.354370352	Not Significant	Not Significant	Not Significant	Not Significant
-32	-0.001256036	-0.38273092	Not Significant	Not Significant	Not Significant	Not Significant
-31	-0.00034683	-0.105683667	Not Significant	Not Significant	Not Significant	Not Significant
-30	-0.000223929	-0.068234195	Not Significant	Not Significant	Not Significant	Not Significant
-29	-0.000909966	-0.277278797	Not Significant	Not Significant	Not Significant	Not Significant
-28	0.000842851	0.256827935	Not Significant	Not Significant	Not Significant	Not Significant
-27	0.000517633	0.157729531	Not Significant	Not Significant	Not Significant	Not Significant
-26	-0.000538772	-0.164170973	Not Significant	Not Significant	Not Significant	Not Significant
-25	-0.001591813	-0.485046691	Not Significant	Not Significant	Not Significant	Not Significant
-24	-0.001084957	-0.330600875	Not Significant	Not Significant	Not Significant	Not Significant
-23	-0.001378306	-0.419988187	Not Significant	Not Significant	Not Significant	Not Significant
-22	0.000521839	0.15901136	Not Significant	Not Significant	Not Significant	Not Significant
-21	0.001433877	0.436921418	Not Significant	Not Significant	Not Significant	Not Significant
-20	0.001538843	0.468906068	Not Significant	Not Significant	Not Significant	Not Significant
-19	0.000219621	0.066921318	Not Significant	Not Significant	Not Significant	Not Significant
-18	0.004490665	1.368365227	Significant	Significant	Significant	Significant
-17	-0.005769866	-1.758154787	Significant	Significant	Significant	Significant
-16	-0.006645444	-2.024955026	Significant	Significant	Significant	Significant
-15	0.001592364	0.485214476	Not Significant	Not Significant	Not Significant	Not Significant
-14	-0.001527264	-0.465377738	Not Significant	Not Significant	Not Significant	Not Significant
-13	0.000771138	0.234975946	Not Significant	Not Significant	Not Significant	Not Significant
-12	-0.001127792	-0.343653221	Not Significant	Not Significant	Not Significant	Not Significant
-11	0.009428808	2.873083251	Significant	Significant	Significant	Significant

Appendix 5: Sample Of Calculation of Average Abnormal Return, T-Statistics with significant test of The Companies in The Utilities Sector During The COVID-19 Event. (-10, +10)

Days	Utilities (TUT)		one-tail			
	AAR (Average Abnormal Retruns)	t-statistics AAR	significant at 0.5 %	significant at 1 %	significant at 5 %	significant at 10 %
-10	0.007089625	2.160303128	Significant	Significant	Significant	Significant
-9	-0.001501646	-0.457571369	Not Significant	Not Significant	Not Significant	Not Significant
-8	0.001865129	0.568329625	Not Significant	Not Significant	Not Significant	Not Significant
-7	-0.002763827	-0.842174843	Not Significant	Not Significant	Not Significant	Not Significant
-6	0.006561724	1.999444497	Significant	Significant	Significant	Significant
-5	-0.004491979	-1.368765816	Significant	Significant	Significant	Significant
-4	-0.001017446	-0.310029386	Not Significant	Not Significant	Not Significant	Not Significant
-3	-0.007750912	-2.361805847	Significant	Significant	Significant	Significant
-2	0.001140012	0.347376793	Not Significant	Not Significant	Not Significant	Not Significant
-1	-0.003757401	-1.144929923	Significant	Significant	Significant	Significant
0	-0.001520888	-0.463434892	Not Significant	Not Significant	Not Significant	Not Significant
1	0.00217949	0.664119713	Not Significant	Not Significant	Not Significant	Not Significant
2	-0.002355095	-0.717628624	Not Significant	Not Significant	Not Significant	Not Significant
3	-0.001208505	-0.36824766	Not Significant	Not Significant	Not Significant	Not Significant
4	-0.011623761	-3.541914606	Significant	Significant	Significant	Significant
5	0.001325557	0.40391485	Not Significant	Not Significant	Not Significant	Not Significant
6	0.009836186	2.997216726	Significant	Significant	Significant	Significant
7	0.002594171	0.790478516	Not Significant	Not Significant	Not Significant	Not Significant
8	-0.004097687	-1.248619626	Significant	Significant	Significant	Significant
9	-0.006538552	-1.992383838	Significant	Significant	Significant	Significant
10	-0.008072427	-2.459776002	Significant	Significant	Significant	Significant

Appendix 6: Sample Of Calculation of Average Abnormal Return, T-Statistics with significant test of The Companies in The Utilities Sector After The COVID-19 Event.

Days	Utilities (TUT)		one-tail			
	AAR (Average Abnormal Returns)	t-statistics AAR	significant at 0.5%	significant at 1%	significant at 5%	significant at 10%
11	0.012299309	3.747763088	Significant	Significant	Significant	Significant
12	-0.000720268	-0.219475217	Not Significant	Not Significant	Not Significant	Not Significant
13	0.001398686	0.426198141	Not Significant	Not Significant	Not Significant	Not Significant
14	-0.002041155	-0.621967223	Not Significant	Not Significant	Not Significant	Not Significant
15	-0.006061563	-1.847038781	Significant	Significant	Significant	Significant
16	0.005711594	1.740398588	Significant	Significant	Significant	Significant
17	-0.004125426	-1.257072105	Significant	Significant	Significant	Significant
18	-0.00043739	-0.133278493	Not Significant	Not Significant	Not Significant	Not Significant
19	-0.000435099	-0.132580565	Not Significant	Not Significant	Not Significant	Not Significant
20	-0.003847807	-1.172477842	Significant	Significant	Significant	Significant
21	-0.006287461	-1.915873004	Significant	Significant	Significant	Significant
22	-0.013738958	-4.186443073	Significant	Significant	Significant	Significant
23	0.001996435	0.608340295	Not Significant	Not Significant	Not Significant	Not Significant
24	-0.00202797	-0.617949302	Not Significant	Not Significant	Not Significant	Not Significant
25	-0.0003914	-0.119264743	Not Significant	Not Significant	Not Significant	Not Significant
26	-0.000250348	-0.076284435	Not Significant	Not Significant	Not Significant	Not Significant
27	-0.000267606	-0.081543164	Not Significant	Not Significant	Not Significant	Not Significant
28	-0.004940463	-1.505424863	Significant	Significant	Significant	Significant
29	-0.004335659	-1.321132964	Significant	Significant	Significant	Significant
30	-0.000371989	-0.11335003	Not Significant	Not Significant	Not Significant	Not Significant
31	0.00236414	0.72038497	Not Significant	Not Significant	Not Significant	Not Significant
32	-0.003905636	-1.190099184	Significant	Significant	Significant	Significant
33	0.006308574	1.922306477	Significant	Significant	Significant	Significant
34	-0.000387548	-0.118091138	Not Significant	Not Significant	Not Significant	Not Significant
35	-0.00242354	-0.738484823	Not Significant	Not Significant	Not Significant	Not Significant
36	-0.001802051	-0.549108831	Not Significant	Not Significant	Not Significant	Not Significant
37	-0.007721835	-2.352945766	Significant	Significant	Significant	Significant
38	-0.000534769	-0.162951371	Not Significant	Not Significant	Not Significant	Not Significant
39	0.005121845	1.560694359	Significant	Significant	Significant	Significant
40	-0.00030601	-0.093245299	Not Significant	Not Significant	Not Significant	Not Significant
41	-0.001269966	-0.386975566	Not Significant	Not Significant	Not Significant	Not Significant
42	-0.000746573	-0.227490755	Not Significant	Not Significant	Not Significant	Not Significant
43	0.003440379	1.048329301	Significant	Significant	Significant	Significant
44	-0.003501339	-1.066904556	Significant	Significant	Significant	Significant
45	0.001284534	0.391414572	Not Significant	Not Significant	Not Significant	Not Significant
46	-0.001808814	-0.551169757	Not Significant	Not Significant	Not Significant	Not Significant
47	0.002965341	0.903578792	Not Significant	Not Significant	Not Significant	Significant
48	0.000272185	0.082938243	Not Significant	Not Significant	Not Significant	Not Significant
49	-0.002468597	-0.752214335	Not Significant	Not Significant	Not Significant	Not Significant
50	-0.006434371	-1.960638446	Significant	Significant	Significant	Significant

Appendix 7: Sample Of Calculation of Cumulative Average Abnormal Return the Companies in The Utilities Sector During The COVID-19 Event.

Days	CAAR	
-10	0.007089625	-0.00462672
-9	0.00558798	
-8	0.007453109	
-7	0.004689282	
-6	0.011251006	
-5	0.006759026	
-4	0.00574158	
-3	-0.002009331	
-2	-0.00086932	
-1	-0.00462672	
0	-0.006147608	-0.001520888
1	-0.003968118	
2	-0.006323213	
3	-0.007531718	
4	-0.019155479	
5	-0.017829922	
6	-0.007993736	
7	-0.005399565	
8	-0.009497251	
9	-0.016035804	
10	-0.024108231	-0.017960623

Appendix 8: Descriptive Statistic for Pre-Event, During-Event, Post-Event for Utilities
Industry (UTILITIES INDUSTRY)

Descriptive Statistic for 21 Days		Descriptive Statistic for 120 Days pre-event		Descriptive Statistic for 120 Days post-event	
Mean	-0.349814218	Mean	-5.18104E-17	Mean	-0.088939286
Standard Error	0.350230822	Standard Error	0.090902725	Standard Error	0.10653658
Median	-0.457571369	Median	0.084797073	Median	-0.11867794
Mode	#N/A	Mode	#N/A	Mode	-0.119264743
Standard Deviation	1.60495925	Standard Deviation	0.995789455	Standard Deviation	1.167049762
Sample Variance	2.575894195	Sample Variance	0.991596639	Sample Variance	1.362005146
Kurtosis	0.045877313	Kurtosis	7.096324731	Kurtosis	2.963381123
Skewness	0.178966702	Skewness	-1.337975394	Skewness	0.393735406
Range	6.539131332	Range	8.244839797	Range	8.530526358
Minimum	-3.541914606	Minimum	-5.371756546	Minimum	-4.186443073
Maximum	2.997216726	Maximum	2.873083251	Maximum	4.344083285
Sum	-7.346098585	Sum	-6.21725E-15	Sum	-10.67271434
Count	21	Count	120	Count	120
Largest(1)	2.997216726	Largest(1)	2.873083251	Largest(1)	4.344083285
Smallest(1)	-3.541914606	Smallest(1)	-5.371756546	Smallest(1)	-4.186443073
Confidence Level(95.0%)	0.730566892	Confidence Level(95.0%)	0.179996474	Confidence Level(95.0%)	0.210953069