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How does COVID-19 Affect the Stock Market in Norway?

An Event Study Comparing the Norwegian Stock Market to the Stock Markets in Sweden and Denmark

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ABSTRACT

The outbreak of COVID-19 weakened the world economy and the overall stock market crashed. The purpose of this thesis was to examine how the stock market reacted to key events during the COVID-19 pandemic. The first event was the first confirmed COVID-19 case in Norway on February 26, 2020, the second event was WHO declaring COVID-19 a pandemic on March 11, 2020, and the third event was the Norwegian government's press conference regarding the second COVID-19 wave on October 23, 2020. Our main focus was to investigate Oslo Stock Exchange, but we also compared Norway to Sweden and Denmark. In addition to this, we also analyzed if any firm-specific factors affected the return. We conducted an event study methodology to measure abnormal returns. Then we regressed these abnormal returns from one of the events to analyze the causes.

First, our results show that the stock market in Norway was negatively affected by COVID-19. Second, we found that the day that WHO declared COVID-19 as a pandemic had the most impact on the stock markets out of the three events, and Norway was more negatively affected than Sweden and Denmark. Third, our additional study show that trading volume was the factor that had the most impact on the return. Profitability and firm size were also influential factors, but not to the same extent. Lastly, the health care sector was hit the hardest, followed by the financials and energy sectors. Industrials and consumer staples were the least negatively affected.

PREFACE

As we found ourselves in the midst of a pandemic, we were curious on how this situation affected the stock market. COVID-19 is the most influential crisis of our adult age, and we wanted to take a deep dive into how the stock market crashed due to three of the most affected events. This has been an exciting and educational semester that has given us a greater insight into the stock market and its reactions to news.

We would like to give a special thanks to our supervisor, Danielle Zhang, for supporting us and giving us highly useful help during our research. She has always been available and provided detailed and clear input, as she early in the process got acquainted with our problem. Thank you for believing in us and our thesis.

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LIST OF ABBREVIATIONS

AR = abnormal return

AAR = average abnormal return

CAR = cumulative abnormal return

CAAR = cumulative average abnormal return

EMH = efficient market hypothesis

n = number of observations

OLS = ordinary least squares

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

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

$\bar{R}_i$ = Expected mean return

u_i = error term

X = independent variable

Y = dependent variable

β = beta

σ = volatility

LIST OF EQUATIONS

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1. INTRODUCTION

The background for this study is the COVID-19 pandemic that first occurred in Wuhan in China, late 2019. This is a virus that can cause a mild cold or more serious disease, like acute respiratory syndrome, and in some cases, death (Klinger, 2021). The pandemic has had a great impact on the stock exchanges around the world. In this research we will look at how Norwegian firms were hurt by COVID-19.

1.1. RESEARCH QUESTIONS

In just a short amount of time, COVID-19 affected the entire world's economy. How can a virus cause a stock market to plunge? In our thesis, we want to achieve a deeper understanding on what happened to the stock exchange exactly when three of the biggest events related to COVID-19 occurred. These events are the first confirmed COVID-19 case in Norway, WHO declaring COVID-19 a pandemic and the Norwegian government's press conference regarding the second COVID-19 wave. What factors on the companies' side had an impact on the return during these events? Were any sectors more exposed than others?

Our main concern is the stock returns on Oslo Stock Exchange, but we will also consider the stock market in both Sweden and Denmark. We will investigate if there are any differences in how the stock exchanges were affected considering the countries' different strategies. Our last event took place in October, which gives us the opportunity to take a closer look at whether the market reacted the same way later in the pandemic, or if we learned something from the outbreak.

From figure 1 below, it is clear that the daily return in 2019 was mostly stable, while in 2020, it was more volatile. Due to the fact that we want to investigate what happened just when the events occurred, we will focus on one day prior to the event day, the event day itself and one day after the event occurred. The day prior to and after each event are all highlighted in the figure.

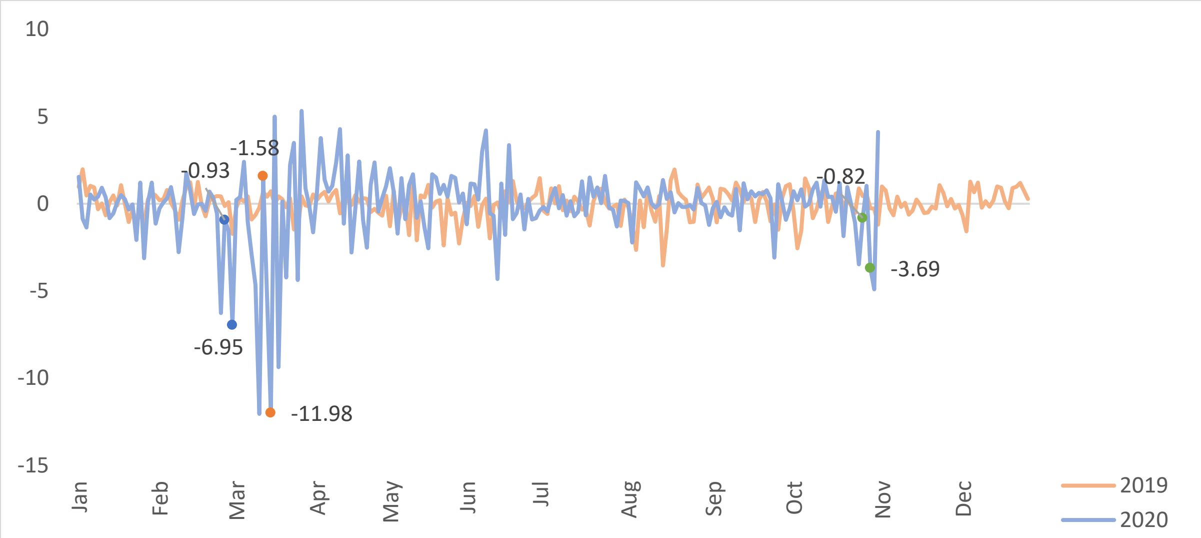

Figure 1: Daily return (%) on Oslo Stock Exchange

In this figure, we plot daily return for 2019 and January 2020 to October 28, 2020. Please refer to section 3.1.4. for details on how we construct daily returns. The day before and after each event is highlighted. The three major events are the first confirmed COVID-19 case in Norway, WHO declaring COVID-19 a pandemic, and the Norwegian government's press conference regarding the second COVID-19 wave, as described in section 3.1.1. – 3.1.3. All the numbers are in percentage.

We will conduct an empirical analysis through an event study, where we focus on three of the most influential events during the pandemic. Moreover, to get a closer look at the abnormal return related to these three events, we will implement several multiple regressions. Here we will focus on major, important aspects related to a company. Based on this, we are able to answer the following research question:

How does COVID-19 Affect the Stock Market in Norway?

1.2. RESEARCH PURPOSES & CONTRIBUTION

There is a lot of research regarding the effect on the stock markets due to different crises, like the financial crisis in 2008 and the SARS epidemic in 2003. Most of this research is centered in Asian countries as well as in the G-20 countries, but for the Scandinavian countries there is not a lot of existing literature.

COVID-19 is an ongoing pandemic that started in early 2020. It is therefore natural that there are some shortcomings in the literature. The existing literature mainly looks at the first period of the pandemic, that is, March 2020. However, our research add to the literature by examining three different events, where the third event took place in October 2020. The other two events occurred in late February 2020 and in March 2020.

Most of the literature related to COVID-19 is also typically addressing the most affected locations and the biggest, most influential countries, like the Asian- and G-20 countries. Our study differs from the existing research by looking at the Scandinavian countries, as we found that there was a lack of this in the literature. Our last contribution to the literature is whether the choice of strategy can have a bearing on the impact on the stock market. Hence, we believe that this research will bring out new knowledge and perspectives on this current topic.

1.3. OUTLINE

To achieve a clear structure, we have chosen to divide our thesis into the following five sections:

Section 1: Introduction. In this section we introduce the problem and present our research question and the associated hypotheses. Furthermore, we consider the purposes and contributions of the thesis.

Section 2: Literature Review & Hypotheses. The purpose of this section is to review the theoretical framework and the literature related to our research. First, we look at similar historical crises in addition to literature on these. Then we review theory regarding factors that relate to how firms react to a crisis. We also review literature regarding our additional study on sectors. Lastly, we develop our hypotheses.

Section 3: Methodology. In this section we explain our research design. First we describe the event study methodology including the three events, our estimation period, the event windows and our data set for event study. Then we review how we constructed our multiple regressions and the related sample and data set.

Section 4: Empirical Analysis & Results. In this section we discuss all figures and tables. We compare all three events in Norway, followed by comparing event 2 in Norway to Sweden and Denmark. Then, we present and analyze our multiple regressions. Finally, we discuss our findings. These results will make it possible to answer the research question.

Section 5: Conclusion. In this last section we come to a conclusion based on our findings. In addition to this, we give some suggestions for possible further research and implications.

2. LITERATURE REVIEW & HYPOTHESES

In this following section, we go through all relevant theory and literature related to the problem of our thesis.

2.1. LITERATURE REVIEW

2.1.1. THE IMPACT OF OTHER UNEXPECTED CRISES ON THE STOCK MARKET

According to Burch et al. (2016), crisis events must satisfy three criteria: they are unexpected, negative and increase investor attention, the market volatility increases, and they stand out from recent market conditions. Looking at financial markets, the COVID-19 pandemic has several similarities to previous disasters. Existing literature shows that other disease outbreaks such as SARS and Ebola had an effect on stock returns and volatility, in addition to natural disasters, the financial crisis of 2008, and even terrorism (Baker, et al., 2020). Those are events that caused a shock, fear and panic among investors, which lead to great economic uncertainty (Singh et al., 2020). Behavioral finance states that emergencies have an impact on stock prices, and investors' behavior can seriously affect financial markets (Debondt & Thaler, 1995). During a recession, investors have fewer resources and are naturally less willing to undertake risk (Campbell & Cochrane, 1999).

Another coronavirus that has ravaged in this century is the severe acute respiratory syndrome (SARS) that was first identified in 2003. WHO issued a global alert for the virus on March 12, 2003 (Centers for Disease Control and Prevention, 2013). On March 11, 2003 the weekly return on the S&P 500 was 7.23%, while on March 13, the weekly return had dropped down to -3.67%. The epidemic did not have an obvious effect on the world markets in general, as most countries barely had any cases at all. Nevertheless, it did impact the most affected countries' stock indices, like China and Vietnam, in a negative way (Siu & Wong, 2004). Chen, Jang and Kim (2007) also found that the SARS epidemic had a significant impact on the financial integration of the stock markets in Asia.

The Ebola epidemic broke out in 2014. Ichev and Marinc (2018) found that the Ebola outbreak events affected the US stock market, but it was more relevant for companies closer to the birthplace of the virus. They also argue that the implied volatility increased after the outbreak of Ebola. The SARS- and Ebola epidemics caused short-lived spikes in the volatility, while the Swine Flu pandemic, which broke out in 2009, didn't lead to any remarkable effects on the stock markets (Baker, et al., 2020).

According to existing literature, natural disasters are also able to affect the stock markets. Worthington and Valadkhani (2004) studied the capital market in Australia, and found that cyclones, earthquakes and bushfires had a major impact on the returns. Nguyen and Chaiechi (2021) state that natural disasters have a negative effect on the Hong Kong stock market return and volatility. However, this effect tend to only last for a few days.

The New York terrorist attacks on September 11, 2001, resulted in a big decrease in the U.S. financial markets in the following trading days (Burch et al., 2016). To prevent a collapse, the New York Stock Exchange did not open the day of the occurrence. Not only did the event have an impact on the US economy; it also negatively affected the global stock markets. The event caused a significant drop in global stock prices, though they recovered fast (Nikkinen et al., 2008). On September 10, 2001 the daily return on the S&P 500 was 0.62%, while on September 17 it had dropped to -5.05%.

The financial crisis in 2008 is one of the worst recessions the world has ever experienced. It was mainly caused by several years of low interest rates and relaxed lending standards, which created a large number of subprime mortgages. This eventually resulted in the bursting of the housing bubble (Singh M., 2021). The last straw was the collapse of the Lehman Brothers on September 15 (Edey, 2009). The stock markets around the world crashed. On September 14, 2008 the weekly return on the S&P 500 was 0.75%, and on September 16 it had dropped to -20.08%. From the peak in 2007 to the end of the recession in 2009, the stocks in the US were decreased by 40% (Patton, 2020).

2.1.2. FACTORS RELATED TO HOW FIRMS REACT TO CRISES

Profitability

Bunn and Redwood (2003) argue that internal funds work as a buffer to absorb unexpected losses. Existing literature states that firms with lower profitability are more likely to fail (Zingales (1998); Fotopoulos & Louri (2000); Bunn & Redwood (2003); Bridges & Guariglia (2008); Bellone et al. (2008); Huynh et al. (2010)).

Firm size

Economic shocks will have a different impact on small and large companies, but there are disagreements in the literature about whether it is the small or large companies that perform better. Smaller companies are less resilient to recessions as they have relative resource poverty, and limited options of financing and access to resources (Lai et al., 2016). Lee, Chen and Ning (2017) find that firm size have a negative and significant effect on firm performance both in a crisis and in a non-crisis period. So, in contrast, they argue that if a firm is smaller, they perform better. This also confirms the findings of Halkos and Tzeremes (2007) that a smaller firm can be more efficient, because their structure is more flexible and non-hierarchical and does normally not suffer from agency problems.

Trading volume

A high trading volume results in higher liquidity for the firm (Mitchell, 2021). Though, a typical reaction among investors in a crisis, is to sell their shares and buy securities with a lower risk (Lowrey, 2020). Bremer and Hiraki (1999) argue that stocks with a higher trading volume tend to have larger return reversals. Also, Lee et al. (2003) investigated the Australian market, and found that high volume stocks have significantly lower returns compared to stocks with lower trading volume.

Growth opportunity

A higher growth opportunity is an indicator of how the market values the company. Basu (1983) and Jaffe, Keim and Westerfield (1989) found that stocks with a low price to book value is associated with positive abnormal returns. In addition, Bauman, Conover and Miller (1998) argue that the price to book value have a stable, negative relationship with the stock return. Lee, Chen and Ning (2017) also find that growth opportunities have a negative and significant effect on firm performance both in a crisis and in a non-crisis period.

Tangibility

Tangibility is a measure of how fast a company recover from a crisis. There is different thoughts on how the tangibility or leverage ratio relates to the firms reaction in a crisis. Beltratti and Stulz (2012) found that banks that has significantly more equity, and thereby less leverage (debt over equity) before a crisis, performed better in the crises. Webber (2001), found that firms that has a high leverage ratio grows fast, but are vulnerable to external shocks. Lee, Chen and Ning (2017) found that leverage have a positive and significant effect on the firm performance before a crises, but the effect is not significant during the crises. Farinha and Santos (2006) and Bridges and Guariglia (2008) document that firms with more tangible assets are more likely to survive a crisis.

The article by Modigliani and Miller (1958), "The Cost of Capital, Corporation Finance and the Theory of Investment", is the most central contribution about capital structure in the research literature. Capital structure is primarily about how much debt a company has in relation to assets or equity. They believe that the firm's value will not be affected by their choice of capital structure (Brealey et al., 2020, p. 431).

Headquarter

There are no relevant existing literature on how a company's headquarter location affects return in a crisis. However, we believe that firms that are located in Norway will be less affected by COVID-19, as there is more financial security and high political trust. However, only 30 out of 157 companies are headquartered abroad. These 30 companies' headquarters are also spread across several different countries that has handled the situation differently in relation to strategies and number of cases. As a result, this variable might be less significant.

2.1.3. ADDITIONAL STUDY ON SECTORS

According to Narayan and Sharma (2011), the sectors are heterogeneous and can therefore react to market shocks in different ways. In addition to this, Phan, Sharma and Narayan (2015) found evidence that the return predictability can connect to certain industry characteristics. That means that the relationship between the supply and demand varies with the characteristics of the sectors during COVID-19. The firms are categorized into sectors, which is the industry classification benchmark industry name of each firm. The sectors are listed below:

Basic materials

Companies that extract or process raw materials, and manufacturers of semi-finished goods. This sector includes chemicals and basic resources (FTSE Russell, 2020). Due to the outbreak of the pandemic, there were shipment delays and big projects were put on hold

(Alam et al., 2020). This led to a decrease in the demand for basic materials. We therefore expect this sector to be mostly affected in the beginning of the pandemic, as there was high uncertainty in the economy and about whether the production would continue. However, this uncertainty recovered quickly, and we don't believe that event 3 will be affected as much.

Consumer discretionary

Companies that supply products and services directly to the consumer and their purchasing habits are cyclical in nature (discretionary). This sector includes automobiles and parts, consumer products and services, media, retail and travel and leisure (including airlines) (FTSE Russell, 2020). In an economic crisis like this, we believe that the trade in non-essential goods will be reduced, as people would rather save what they have for necessary goods. Nobody knew how this pandemic would develop, and the fear of unemployment can affect how much money people dare to spend. Despite this, the population of Norway is generally not too worried about the economy compared to other countries. On the other hand, movement control affected people's movement pattern. They stopped travelling, going to restaurants and hotels. Wang (2013) established that major international events have an impact on airlines' share price. During the outbreak of SARS, passenger traffic was declined by 5.6%, causing a significant number of redundancies (Harbison, 2003). The 9/11 terrorist attack resulted in a drop of 36.2% in passenger traffic of European airlines (Sparaco, 2001).

Consumer staples

Companies that supply products and services directly to the consumer and their purchasing habits are non-cyclical in nature (staples). This sector includes all the necessities that people need, including food, beverage, tobacco, personal care, drug and grocery stores (FTSE Russell, 2020). This means that these are products that people are going to buy no matter what (Udland, 2015). The outbreak of COVID-19 caused panic buying and hoarding. Therefore, this sector might not be negatively affected. During event 2 and 3 it might be more affected, due to less export. Right after event 2, the boarders to Sweden were closed, which also affected Norwegians' trading habits. Those who usually buy food, beverage and alcohol in Sweden now had to buy this in Norway. This will counteract the negative export effect.

Energy

Companies that involve in energy extraction, process, and production activities and produce related energy equipment. This includes oil and gas producers, oil equipment services and distribution and alternative energy (like renewable energy) (FTSE Russell, 2020). The demand for energy, like oil, has decreased a lot during the pandemic. This is because, among other things, the need for gas decreased, as people stayed home. In April 2020, oil consumption fell by 25 percent, while the demand for energy from renewable sources did not decrease as much (Isbrekken, 2020). The OPEC countries agreed to make a cut in oil production due to the big drop from COVID-19 (Reed & Krauss, 2020). Hence, we suppose that there will be a negative abnormal return for energy, especially in event 1 and 2.

Actions taken to reduce the spread of COVID-19 have affected the operation of business, industries and transportation, which has led to a change in the electric load demand pattern. Due to changes in work situation and lifestyle, the demand for electricity at home has increased, while the energy demand for industrial and commercial has decreased. This may be due to, among other things, lower industrial production and lower demand for fuel for transport. All over, this has affected the national energy demand pattern (Elavarasan et al., 2020).

Financials

Companies involved in savings, insurance, loans, security investment and related activities such as financial data and information providers (FTSE Russell, 2020). In March, as the pandemic escalated, the demand for loans fell. People were insecure about their future, travels were postponed, projects were paused, and the need for money was not as high as usual. Furthermore, the banks slowed down their activity (Axo Finans, 2021). As a result, it is realistic to believe that this sector was negatively affected by the virus at the beginning of the pandemic. Later in 2020, like in our event 3, the demand for loans was higher. Due to the historically low interest rates, house price growth was higher than normally across the whole country (Strømnes, 2021). We thus believe that the impact in event 3 was significantly more positive than in events 1 and 2.

Health care

Companies that manufacture health care equipment and supplies or companies that deliver health care-related services such as lab services, in-home medical care and run health care facilities. This includes health care equipment and services, pharmaceuticals and biotechnology (FTSE Russell, 2020). This sector has been the most important sector during the pandemic. With a growing number of cases and hospitalizations, the need for health care workers increased at the same pace. There was an increased demand for medical equipment and medicine. Also, the need for a vaccine has been in great focus, and the world invested a lot in such companies. Chen, Chen, Tang and Huang (2009) found that the demand for medical- and health care equipment increased significantly during the SARS epidemic, resulting in an increase in the share price. In addition, Al-Awadhi, Alsaifi, Al-Awadhi and Alhamadi (2020) argue that the pharmaceuticals outperform other sectors in China during COVID-19. Thus, we believe that the health care sector will be less negatively affected in Norway as well.

Industrials

Companies engaged in manufacturing and distribution of capital goods and provider of business support services. This sector includes construction and materials, industrial goods and services (FTSE Russell, 2020). We expect that there will be some negative effect on this sector due to COVID-19. The reason is that the demand from customers in Norway are reduced. For export-oriented chains, the international demand has decreased (Asphjell, 2020). The differences between the firms in this sector is big. The companies that sell to industries such as the aviation industry and the hotel industry have struggled more than those who sell products to people's everyday lives, such as outdoor life (Sunde, 2020).

Real estate

This includes real estate investment and services development, and real estate investment trust (FTSE Russell, 2020). We believe that this sector was highly affected from event 2, because of the uncertainty surrounding the housing market, as we also discussed for the finance sector. The demand fell as people had to save their money to meet daily needs. Though, the housing market in Hong Kong did not strongly react to the SARS epidemic

(Wong, 2008). However, in event 3, the housing market was much better as the uncertainty quickly faded. As a result, we believe that the effect was less negative during event 3.

Technology

Companies that are mainly involved in the advancement of the information technology and electronics industries, including software and computer services, technology hardware and equipment (FTSE Russell, 2020). When the pandemic broke out, the whole world became more dependent on digital interaction, both at work and in their spare time. The technology sector thus had to develop rapidly and come up with smart solutions. Nevertheless, this sector may face some problems relating shipments delays of electronic goods, in addition to movement control regulations (Alam et al., 2020). According to Stuart Carlaw (2020), COVID-19 will have a huge and long-term influence on biometrics firms and related technology developers. Thus, several conflicting effects bring abnormal return in separate directions. For event 1 and 2, we believe that the abnormal return will be more negative. The reason behind this is that it took some time before the technology was developed. For event 3, there is no reason to believe that the abnormal return will be highly negative, as the need for new technology had escalated.

Telecommunication

Companies that own and operate telecommunication infrastructure to offer delivery services, including fixed line- and mobile telecommunication (FTSE Russell, 2020). The reasoning behind this sector is similar to the technology sector. Conference and activities were cancelled or postponed, and since we could not travel like before, people needed to communicate more digitally. Thus, this sector performed quite well, as the demand for services that promote to work at home, increased significantly (Ramelli & Wagner, 2020). Event 1 and 2 occurred in the beginning of the pandemic, which means that the need for these services has not yet arisen. For event 3, the demand for these types of goods and services are higher. We therefore expect a less abnormal return in event 3 than for event 1 and 2. However, this sector only contains two firms and will not be representative in our analysis.

Utilities

Companies that distribute electric, gas, water and multi-utilities. Most of these companies are highly affected by government regulation (FTSE Russell, 2020). We believe that this sector will be highly affected in the first two events, because of significantly lower activity in the distribution channels of this sector. The impact will possibly not be as great in event 3, as activity was back to a more normal level. This sector only contains one firm and will therefore not be representative in our analysis. As most of these firms are a part of the public sector, they will not be listed at the stock exchange.

2.2. HYPOTHESES DEVELOPMENT

2.2.1. THE IMPACT OF COVID-19 ON STOCK MARKETS

On March 11, 2020, the World Health Organization (WHO) declared COVID-19 as a global pandemic. Since then, this has had a great impact on the stock exchanges all over the world. On March 12, Wall Street experienced its worst day since 1987. In Norway, the stock exchange experienced its biggest drop in one day since the financial crisis in 2008. The increase on Oslo Stock Exchange over the past three and a half years was lost in just three weeks (Ghaderi et al., 2020).

Sansa (2020) studied the effect of COVID-19 on the financial markets in the United States and China and concluded that there was a significant effect between the stock market and the number of confirmed cases. From figure 2 we can see the effect from the number of confirmed COVID-19 cases on the return on Oslo Stock Exchange.

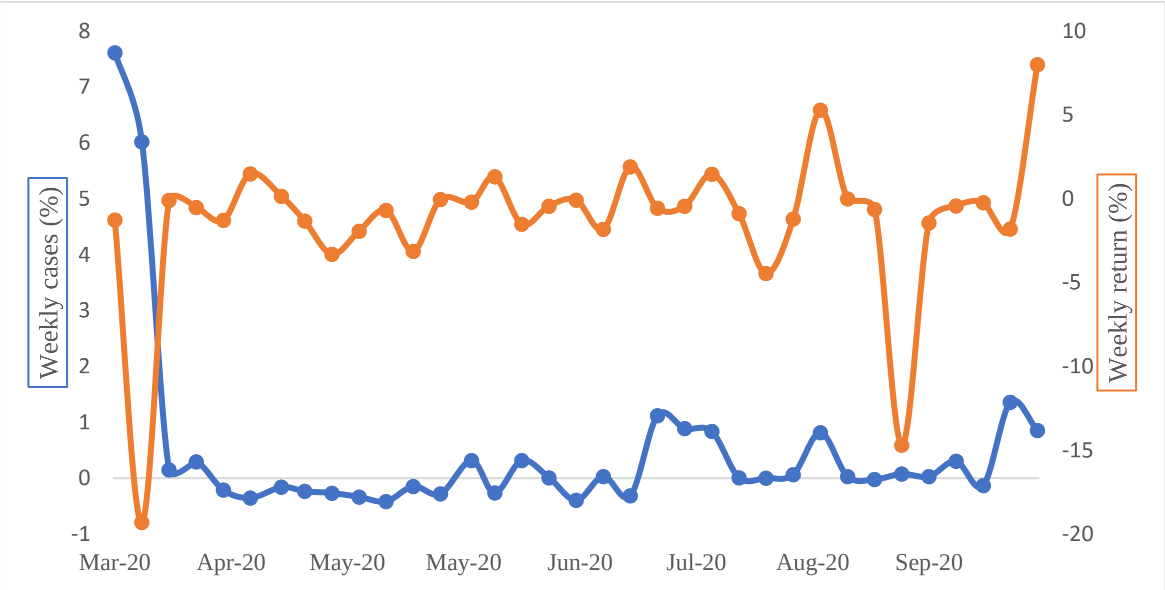

Figure 2: Weekly Cases & Return (%) in Norway

The blue line represents the percentage change of weekly confirmed COVID-19 cases in Norway and is connected to the vertical axis on the left, while the orange line represents the percentage change of weekly returns at Oslo Stock Exchange, and is connected to the vertical axis on the right.

At the beginning of the pandemic, we can see a significant connection between the number of cases and return. As the infection rate increases, the return decreases, and vice versa. This connection becomes less clear throughout the pandemic. The biggest drop in the return is around March 11, 2020, when WHO declared the virus a pandemic. This was also a time when the number of infected cases were increasing, as, at the time, there were not any restrictions. Later in March, and further throughout the year, infection rates and returns both seem to be more stable, with only minor fluctuations. The last few days in our figure show a more volatile period. This is the same time as the "the second wave" arose in Norway. As the correlation between weekly cases and weekly return seem to be minor between April and September, we created a separate figure where this part of the data is compressed and moved closer to each other.

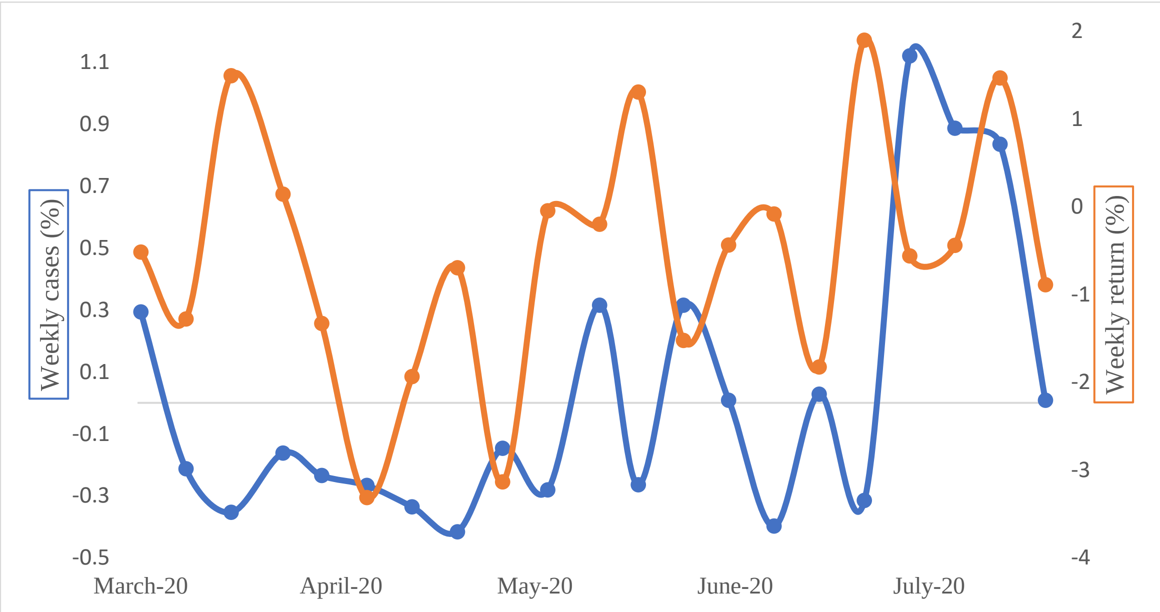

Figure 3: Weekly Cases & Return (%) in Norway (Compressed Version)

The blue line represents the percentage change of weekly confirmed COVID-19 cases in Norway and is connected to the vertical axis on the left, while the orange line represents the percentage change of weekly returns at Oslo Stock Exchange, and is connected to the vertical axis on the right.

In this figure, we can see more clearly that the infection rates had a certain effect on the return, not just at the beginning of the pandemic, but also throughout the period. The lines goes in the opposite direction from each other, which shows a correlation between the two. When the number of confirmed cases increases, the return falls, and vice versa.

In addition to this, as we discussed in section 2.1.1., previous studies found a significant negative effect from unexpected crises on the stock price and volatility (Siu & Wong (2004); Chen, Jang & Kim (2007); Ichev & Marinc (2018); Baker et al. (2020); Worthington & Valadkhani (2004); Nguyen & Chaiechi (2021); Burch et al. (2016); Nikkinen et al. (2008); Patton (2020)). Based on this information, we propose the following hypotheses:

(1) COVID-19 has a negative impact on the performance of listed companies on Oslo Stock Exchange.

(2) The first COVID-19 case in Norway did affect the stock returns.

(3) WHO declaring COVID-19 as a pandemic did affect the stock returns.

(4) The government's press conference on the second wave did affect the stock returns.

(5) The three events did not affect the stock returns equally.

(6) The three events did not affect the volatility equally.

Norway and Denmark have had close to the same strategy to handle this pandemic. Both countries adopted the "control-strategy," where the reproduction rate should be kept under 1. In this case the pandemic will not be eliminated, but the infection will be as low that it is considered to be under control (Veberg, 2020). Early in March 2020, both Norway and Denmark already started to cancel arrangements, and they introduced lockdown as soon as they lost control over the virus. The press conferences regarding lockdown were held around noon on March 12 in Norway and in the evening on March 11 in Denmark. After this, the governments have kept a strict strategy, and introduced restrictions where it has been necessary to keep the spread of infection in check. Over the past year, this has led to severe shutdowns in both countries. Despite the similar strategies, several other factors play a role in the impact on the stock markets. We therefore expect a certain difference between the countries. Based on this information, we propose the following hypotheses:

(7) The stock returns did not change as much in Norway and Denmark.

(8) The volatility did not change as much in Norway and Denmark.

In contrast to Norway and Denmark, Sweden implemented a less strict strategy. They put a greater responsibility to their population and focused on protecting seniors and the most vulnerable citizens. They encouraged to practice social distancing in public, yet all bars, restaurants and shops stayed open. The Swedish state epidemiologist Anders Tegnell communicated his beliefs in herd immunity, even if this was never officially a part of the Swedish strategy (Lindström, 2020). Based on this information, we propose the following hypotheses:

(9) The stock returns did not change as much in Norway and Sweden.

(10) The volatility did not change as much in Norway and Sweden.

2.2.2. THE IMPACT OF COVID-19 ON NORWEGIAN LISTED STOCKS

As discussed in section 2.1.2., Bunn and Redwood (2003) found that the firm's funds work as a buffer to absorb losses. Zingales (1998), Fotopoulos and Louri (2000), Bunn and Redwood (2003), Bridges and Guariglia (2008), Bellone et al. (2008) and Huynh et al. (2010) argued that firms with lower profitability are more likely to perform worse. We therefore expect that profitability will decrease the abnormal return. In other words, if a company's profitability is high, the stock returns will be less affected by COVID-19. Based on this information, we propose the following three hypotheses:

(11) Abnormal return in event 1 does depend on the company's profitability before COVID-19.

(12) Abnormal return in event 2 does depend on the company's profitability before COVID-19.

(13) Abnormal return in event 3 does depend on the company's profitability before COVID-19.

As discussed in section 2.1.2., both Lee, Chen and Ning (2017) and Halkos and Tzeremes (2007) argue that if a firm is smaller they perform better. In contrast, Lai et al. (2016) states that smaller companies are less resilient to recessions. Due to this we believe that if the firm size is bigger, the stock returns will be less affected, as bigger companies are generally more stable and handle recessions better. Based on this information, we propose the following three hypotheses:

(14) Abnormal return in event 1 does depend on the firm size before COVID-19.

(15) Abnormal return in event 2 does depend on the firm size before COVID-19.

(16) Abnormal return in event 3 does depend on the firm size before COVID-19.

As discussed in section 2.1.2., Mitchell (2021) argue that a high trading volume results in higher liquidity for the firm. Bremer and Hiraki (1999) found that stocks with a higher trading volume have larger return reversals. Lee et al. (2003) found that stocks with a higher trading volume have lower return. Lowrey (2020) argue that investors tend to sell their shares to buy securities with a lower risk in a crisis. Therefore, we believe that companies with a higher trading volume will be negatively affected, as they have a larger number of shares in circulation that may be lost. Based on this information, we propose the following three hypotheses:

(17) Abnormal return in event 1 does depend on the company's trading volume before COVID-19.

(18) Abnormal return in event 2 does depend on the company's trading volume before COVID-19.

(19) Abnormal return in event 3 does depend on the company's trading volume before COVID-19.

As discussed in section 2.1.2., Basu (1983), Jaffe, Keim and Westerfield (1989) and Bauman, Conover and Miller (1998) found that a low price to book value results in more positive abnormal returns. Lee, Chen and Ning (2017) state that growth opportunities have a negative effect on the firm performance. We therefore believe that a company with a higher growth opportunity, will be negatively affected by COVID-19. Based on this information, we propose the following three hypotheses:

(20) Abnormal return in event 1 does depend on the company's growth opportunity before COVID-19.

(21) Abnormal return in event 2 does depend on the company's growth opportunity before COVID-19.

(22) Abnormal return in event 3 does depend on the company's growth opportunity before COVID-19.

As discussed in section 2.1.2., Modigliani and Miller (1958) argue that the firm's value is not affected by their capital structure. On the other hand, Beltratti and Stulz (2012) found that firms with a higher tangibility perform better in a crisis. Webber (2001) states that more tangible assets are vulnerable to external shocks. Farinha and Santos (2006) and Bridges and Guariglia (2008) document that firms with higher tangibility are more likely to survive a crisis. Thus, we believe that more tangible assets will have more positive abnormal return, as it is easier for them to obtain more liquidity faster. Based on this information, we propose the following three hypotheses:

(23) Abnormal return in event 1 does depend on the company's tangibility before COVID-19.

(24) Abnormal return in event 2 does depend on the company's tangibility before COVID-19.

(25) Abnormal return in event 3 does depend on the company's tangibility before COVID-19.

As discussed in section 2.1.2., we believe that companies located abroad will have a more negative abnormal return than the Norway-based firms, as there is more financial security and higher political trust in Norway. Based on this information, we propose the following three hypotheses:

(26) Abnormal return in event 1 does depend on where the headquarter of the company is located.

(27) Abnormal return in event 2 does depend on where the headquarter of the company is located.

(28) Abnormal return in event 3 does depend on where the headquarter of the company is located.

3. METHODOLOGY

This following section contains a review of our research design. In order to test our hypotheses on the impact of COVID-19 on stock markets, we apply an event study. To test how Norwegian listed stocks react to COVID-19 we use multiple regression analyses.

3.1. EVENT STUDY

Event study is one way to look at the effect of an event on firm value. These studies are used to measure the effects on a security's value from an economic occurrence (MacKinlay, 1997). It can either be done to study one specific firm, a sector or the overall market (Hayes, 2020). The starting point is a specific event that is expected to have an impact on the financial performance in some way. The event can have either a negative or a positive impact. Some examples on such events are the listing of a firm, firms merging, a stock split, etc. The effects are measured by collecting financial market data. This information can be useful, as it may work as an indicator for how a security will react to certain events (Hayes, 2020).

The first thing to do when performing an event study is to define an event window and an estimation period. The event window is simply based on the event day, which is the day the event of interest occurs, but it can also be defined to be longer than this exact day. To get a better view of the full effect, it might be relevant to include the day prior to or after the event day. If something is announced in the afternoon, the event day itself will most likely not show the full effect from the event. Or, if some information about the announcement is released earlier, or it is clear that this event will happen, these days should also be considered to be included.

The estimation period is a period preceding the event that is sufficiently long to be able to perform the estimations properly (Aktas et al., 2007). It is used for estimating an average expected return from "normal" times, which is supposed to indicate what the return should be during the event window. What is crucial in this case, is that "normal times" are defined properly. The most common way is to use the 250 days prior to the event window (MacKinlay, 1997). In some cases, it might be better to use an estimation period that is not immediately prior to the event day. Unrelated events might be present, which will interfere with the estimation (Aktas et al., 2007).

According to the efficient market hypothesis, or EMH, prices reflect all information that is available at all times and are always trading at a fair value (Downey, 2021). It describes the market's response to new information. In other words, it is not possible for investors to "beat the market", which means that the market is efficient. Fama (1965) described an efficient market for the first time in literature as "a market where there are large numbers of rational profit maximizers actively competing, with each trying to predict future market values of individual securities, and where important current information is almost freely available to all participants". This idea is what makes it possible to study the effect of an event.

The abnormal return is what shows the impact from the event. This is defined as unusual profits or losses that is generated by an investment or a portfolio over a period. The return diverges from the portfolios expected mean return. The abnormal return is calculated by finding the difference between the expected return and the realized return. This can be either positive or negative. The cumulative abnormal return will then be the sum of all abnormal returns for a given period. This can be used to look at how big effect different events have had on the stock prices. Both the abnormal return and the cumulative abnormal return helps the investors to determine the risk-adjusted performance, when you compare it to the market risk (Barone, 2021).

3.1.1. EVENT 1: FEBRUARY 26, 2020

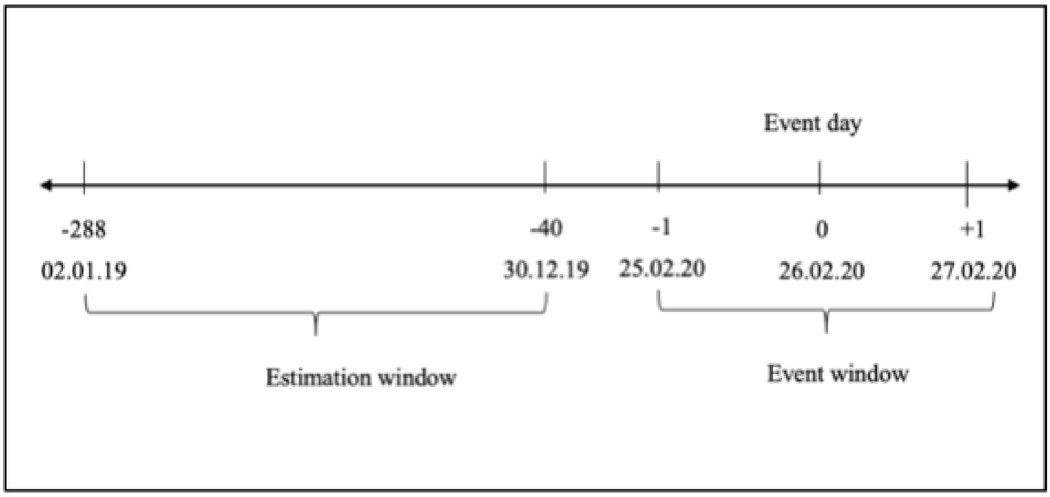

Figure 4: Event 1 timeline

In this figure, we show the estimation window and event window for event 1, which is the first confirmed COVID-19 case in Norway, on February 26, 2020.

The first event is the first confirmed COVID-19 case in Norway, on February 26, 2020. The virus had already hit most European countries, and some Norwegians abroad had been infected. People realized that the virus would also hit Norway soon, which might have influenced the stock market. The news was announced at night on February 26, and the effect on the stock market will therefore appear on February 27. Our event window is hence from February 25 to February 27. This event only applies to Norway and will thus not be compared to Sweden and Denmark.

3.1.2. EVENT 2: MARCH 11, 2020

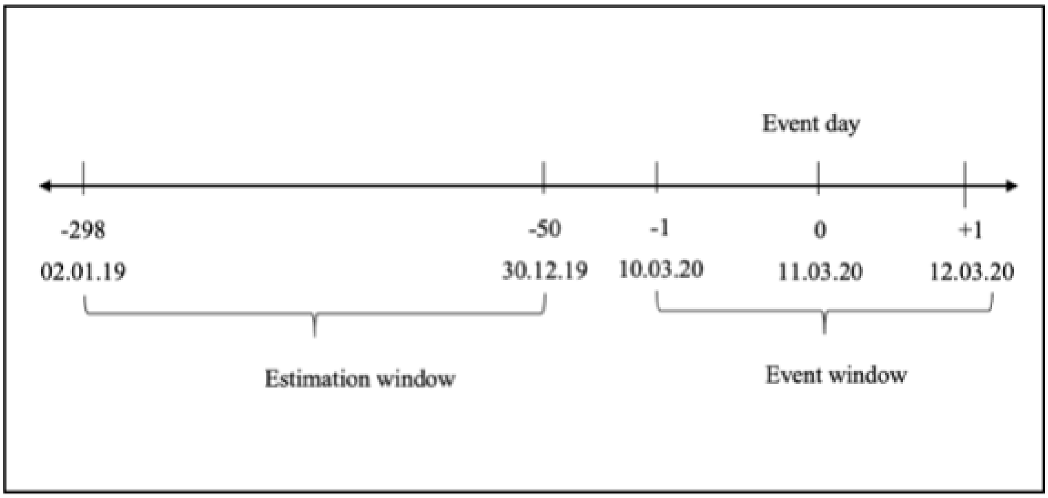

Figure 5: Event 2 timeline

In this figure, we show the estimation window and event window for event 2, which is WHO declaring COVID-19 a pandemic, on March 11, 2020.

The second event is the day that WHO declared COVID-19 as a pandemic, on March 11, 2020. Even before this day, people were starting to realize where this was headed. The press conference took place in the evening, and that is why our event window is from March 10 to March 12. As this event is an international event, it will be compared to the stock markets in Sweden and Denmark.

3.1.3. EVENT 3: OCTOBER 23, 2020

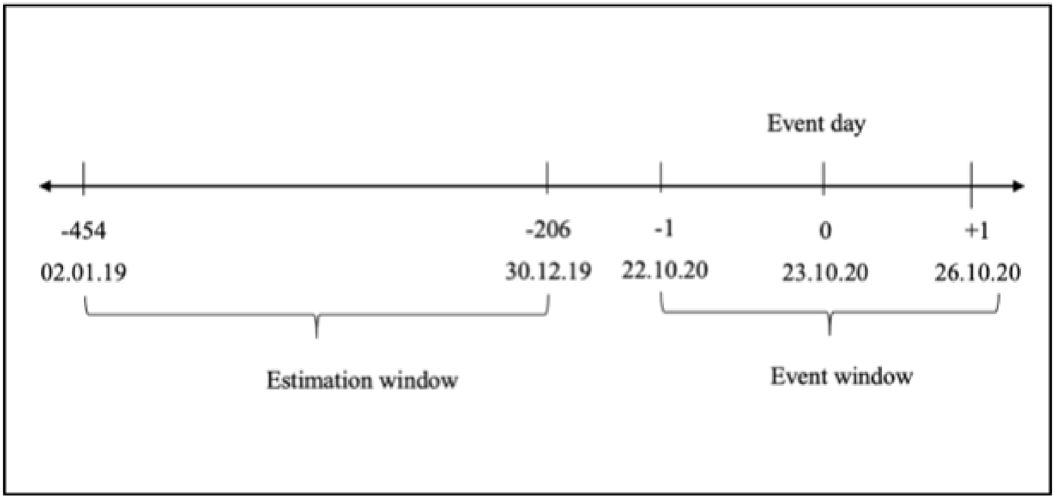

Figure 6: Event 3 timeline

In this figure, we show the estimation window and event window for event 3, which is Norwegian government had a press conference regarding the second COVID-19 wave, on October 23, 2020.

The third event is the day that the Norwegian government had a press conference regarding the second COVID-19 wave, on October 23, 2020. This press conference was held around noon. Therefore, the stock market had time to react on that same day. The event day was on a Friday which means that the next trading day will be on the following Monday. This may result in a higher return on the next trading day as the market has had more time to take in the news. This press conference was announced a few days ahead. Hence, there might have been a reaction even before the event day. Thus, our event window is from October 22 to October 26. Also, this event only applies to Norway and will not be compared to Sweden and Denmark.

3.1.4. DATA SET FOR EVENT STUDY

In our first data set, we collected the closing price for all companies on the three stock exchanges. For Norway, we collected the closing prices from January 1, 2019 through October 28, 2020. For Sweden and Denmark, we will only look at event 2, because events 1 and 3 are only relevant for Norway. With that in mind, we only collected data from the Stockholm- and Copenhagen Stock Exchange from January 1, 2019, through March 16, 2020. The calculations below are the same for all three countries and events. This data set will mainly be used for creating different figures, but the data set for multiple regressions are also built on these results.

Using the closing price, we calculated the daily return using equation 1. Then we calculated the expected mean return by using equation 2.

$$R_{i,t} = ln\left[\frac{P_{i,t}}{P_{i,t-1}}\right] * 100$$

Equation 1: Daily Return (logarithmic)

$$\bar{R}_i = \frac{1}{N\sum_{t_0}^{t_1} R_{i,t}}$$

Equation 2: Expected Mean Return

The abnormal return can then be calculated for all three event windows and countries, and for each company using equation 3.

$$AR_{i,t} = R_{i,t} - \bar{R}_i$$

Equation 3: Abnormal Return

To get the average abnormal return, we used equation 4.

$$AAR_t = \frac{\sum AR_{i,t}}{n}$$

Equation 4: Average Abnormal Return

To get the cumulative abnormal return, we summarized the abnormal return for all the three days during the event window for each stock, by using equation 5. We then calculated the average CAR for all three events by using equation 6.

$$CAR_{i,t} = \sum AR_{i,t}$$

Equation 5: Cumulative Abnormal Return

$$CAAR_t = \frac{\sum CAR_{i,t}}{n}$$

Equation 6: Cumulative Average Abnormal Return

In addition to looking at the abnormal return, we also analyzed the volatility for all countries and events. To get the volatility, we used the standard deviation function in excel. Then we got the annualized volatility by multiplying the variance by the square root of the number of trading days, as in equation 7.

$$\sigma(annualized) = \sigma * \sqrt{trading\ days}$$

Equation 7: Annualized Volatility

To test the significance, we mainly look at the confidence intervals. First, we calculated the average and standard deviation of all companies for each day during the event windows. Then, we found the standard error by dividing the standard deviation by the square root of the number of trading days in the estimation period. Lastly, we multiplied the standard error by the critical value.

In addition to the confidence intervals, we also used t-stats to test for significance. To calculate the t-stat we used equation 8.

$$t = \frac{\bar{x} - \mu_0}{\frac{s}{\sqrt{n}}}$$

Equation 8: t-stat

From the equations above, we get the following results:

Table 1: Summary of data

In this table, we show a summary of the data set for event study. The three major events are the first confirmed COVID-19 case in Norway, WHO declaring COVID-19 a pandemic, and the Norwegian government's press conference regarding the second COVID-19 wave, as described in section 3.1.1. – 3.1.3. All numbers are in percentage.

	Norway			Sweden	Denmark
Average expected mean return	0.01			0.07	0.03
Annualized volatility, estimation period	45.67			81.21	33.35
Annualized volatility, event window	68.14	116.41	54.46	82.94	91.18
Average abnormal return					
Event window	**Event 1**	**Event 2**	**Event 3**	**Event 2**	**Event 2**
-3	-0.60	-4.68	-1.10	-0.90	-2.09
-2	-6.28	-12.06	-3.48	-1.07	-5.97
-1	-0.95	1.57	-0.83	-1.09	-0.63
0	-1.56	-5.30	1.01	-2.23	-2.37
1	-6.96	-12.00	-3.70	-0.86	-9.93
2	0.20	4.98	-4.91	-16.30	1.82
3	0.37	-9.38	4.12	7.46	-4.30

3.2. MULTIPLE REGRESSIONS

A linear regression model is often used to find solutions in real-life problems. Ordinary least squares, OLS, is a method that can estimate parameters of a linear regression model (Albert, n.d.). These estimators are random variables because they will depend on data from a random sample. In addition, they depend on a large sample, which makes the OLS estimators normally distributed (Stock & Watson, 2011, p. 179). When creating a multiple regression model, it is important to avoid omitted variable bias. The OLS estimator will have omitted variable bias if the regressor is correlated with one variable that has been omitted from the analysis and when the omitted variable is determinant of the dependent variable (Stock & Watson, 2011, p. 180).

The multiple regression model permits estimating the effect on the dependent variable of changing one of the independent variables while holding the others constant. The population multiple regression function is given by:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots + \beta_k X_{ki} + u_i, i = 1, \ldots, n$$

Equation 9: Multiple regression function

The error term, u_i, consists of all the factors that determines the dependent variable, Y_i, that is not already included in the function. This term is homoscedastic if the variance of the conditional distribution of u is constant for i = 1, …, n. Otherwise the error term is heteroskedastic (Stock & Watson, 2011, p. 188).

Two of the most common summary statistics in multiple regression models are R^2 and adjusted R^2, which describe the “fits” of the data. R^2 is the fraction of the sample variance of the dependent variable that is explained by the regressors. Adjusted R^2 is a modified version of the R^2. This does not automatically rise when a new regressor is included (Stock & Watson, 2011, pp. 193-194).

3.3. SAMPLE & DATA

3.3.1. SAMPLE

In our thesis, we use a quantitative research method, as our analyses require a big sample. We have collected the data from Thomson Reuters Eikon. To get the best possible view of the situation on Oslo Stock Exchange, we will compare Norway with two similar countries, where one country had a similar strict strategy, and another country that had a laxer strategy. To get a representative sample, we collected data from all listed companies on Oslo-, Stockholm- and Copenhagen Stock Exchange.

Some companies did not qualify for our sample. To be included, the companies must have at least 150 trading days during the estimation period. We chose 150 trading days as a criterion as this will amount more than half of 2019 for all three countries. The total number of trading days in Norway was 224, 250 days in Sweden, and 248 days in Denmark. Some companies did not have any trading days at all, while others were listed later in 2019 or 2020. There were also some companies that didn't have any data during the event window. According to these criteria, we excluded 24 firms from Norway, 28 from Sweden, and 10 from Denmark. Hence, the sample size for each country is 157 in Norway, 339 in Sweden, and 116 in Denmark.

The three events we will study are the first COVID-19 case in Norway, WHO declaring COVID-19 as a pandemic and when the Norwegian government had a press conference on the second COVID-19 wave. To be able to see the impact of the events on the stock exchange, we will use an event study. All three events have an event window of three days to see if there is any reactions immediately before and after the event day. For our figures we will look at the entire event window, while in our regressions we will mainly focus on the day in event window where the markets absorbed the news.

Our estimation period is from 01.01.2019 to 31.12.2019. Despite the trade war between China and the US, the Oslo Stock Exchange increased about 17% in 2019 (Knudsen, 2019). To get the expected mean return, we need to get estimates from a "normal" period, which is not affected by the events in any way. We chose this as our estimation period as the virus already had start to spread in China in early 2020. WHO also warned all hospitals about the virus on January 14, 2020 (Reuters, 2020). COVID-19 had reached Europe long before it was detected in the Scandinavian countries, and the uncertainty in the world might have influenced the stock markets some time before event 1. We therefore use data from all of 2019, when COVID-19 still hadn't occurred or had an effect on the stock markets.

3.3.2. DATA SET FOR MULTIPLE REGRESSIONS

To investigate if there are any factors that had a significant impact on the abnormal return on Oslo Stock Exchange, we created three almost identical data sets with abnormal return as a dependent variable. In addition to this, we will also use the cumulative abnormal return, CAR, as a dependent variable, to see if there is a difference. The data sets contains all the dependent- and independent variables that we need to run the regressions. We have included two dependent variables for each event. For event 1 and 2, we use AR1 as the dependent variable, which is the abnormal return one day after the event day. However, for event 3, AR0, which is the abnormal return on the event day, will work as the dependent variable. These are the days that the market absorbed the news, as for event 1 and 2, the news were announced after the stock exchange was closed on the event day.

The independent variables we have included in this data set, are profitability, firm size, trading volume, growth opportunity, tangibility, headquarter and sectors. All of these variables are listed below. Together, these variables reflect most aspects of the firm. All data for these variables, including the definitions below, are collected from the Thomson Reuters Eikon program. To see what factors that played a role on how much COVID-19 affected the return, the independent variables are based on numbers from 2019.

Profitability: Normalized EBITDA is the net income from continuing operations before interests, income taxes, depreciation and amortization, excluding non-recurring items and non-cash equity compensation expense. This variable is a measure for the companies' profitability in 2019. To scale this variable, we divided normalized EBITDA by total assets, where the total assets variable is a measure for the companies' size as of 31.12.2019.

Firm size: Market value for the company is the consolidated market value as of 31.12.2019. This is a measure for the firm size. To scale this variable, we take the logarithm.

Trading volume: Average volume is the average trading volume for each company for 2019. This is a measure on the market strength that shows the overall level of interests for the stock. To scale this variable, we take the logarithm.

Growth opportunity: Price to book value per share (daily time series ratio) is the company's latest closing price divided by its book value per share. This is a measure of a company's growth opportunity. The total equity in 2019 divided by current total shares outstanding.

Tangibility: The tangibility variable is calculated as the tangible book value per share times the shares outstanding. The tangible book value per share (total equity) is the tangible book value as of the end of 2019 divided by total common shares outstanding for 2019. It represents total equity adjusted for net intangibles and net goodwill. The shares outstanding (common stock primary issue) represents the number of common shares outstanding in a company as of the end of 2019. To scale this variable, we divided by total assets.

Headquarter: Headquarter is the country of headquarters, either Norway or abroad for each firm. This can show whether there is a difference in the reaction for companies headquartered abroad. To prepare this variable, we made it a dummy variable, as the value 1 is abroad.

Table 2: Summary statistics of the variables

In this table, we show a summary of the variables.

	N	**Mean**	**Median**	**Std. Dev.**	**10th Percentile**	**90th Percentile**
Profitability	157	0.01	0.07	0.39	-0.04	0.20
Firm size	157	22.22	21.78	3.28	19.35	24.37
Trading volume	157	11.92	11.88	1.57	9.91	14.09
Growth opportunity	157	2.61	1.38	4.17	0.43	5.92
Tangibility	157	0.23	0.21	0.33	-0.09	0.63
Headquarter	157	0.18	0.00	0.39	0.00	1.00

From these variables, we get the following regression estimation equations:

$$AR0 = \alpha + \beta_1 * profitability + \beta_2 * firm\ size + \beta_3 * trading\ volume + \beta_4 * growth\ opportunity + \beta_5 * tangibility + \beta_6 * headquarter + u_i$$

Equation 10: Regression Estimation Equation for AR0

$$AR1 = \alpha + \beta_1 * profitability + \beta_2 * firm\ size + \beta_3 * trading\ volume + \beta_4 * growth\ opportunity + \beta_5 * tangibility + \beta_6 * headquarter + u_i$$

Equation 11: Regression Estimation Equation for AR1

$$CAR = \alpha + \beta_1 * profitability + \beta_2 * firm\ size + \beta_3 * trading\ volume + \beta_4 * growth\ opportunity + \beta_5 * tangibility + \beta_6 * headquarter + u_i$$

Equation 12: Regression Estimation Equation for CAR

For our additional study, we use the sector variable. Sectors is the industry classification benchmark industry name of each firm. To prepare this variable, we created a factor variable. Also, to include all sectors and avoid perfect multicollinearity, we omitted the constant. To look at each sectors' level, we used the "ibn" command in Stata. From this, we get the following regression estimation equation:

$CAR = \alpha + B_i*sector_i + u_i$

Equation 13: Regression Estimation Equation for Sectors

4. EMPIRICAL ANALYSIS & RESULTS

In this following section we will discuss and analyze our regressions and figures.

4.1. COMPARING THE MARKET REACTIONS TO THREE MAJOR EVENTS

We will now look at the cumulative average abnormal return for each of the three events and compare the volatility for each event to the volatility in the estimation period. By doing this, we can answer the following hypotheses:

(1) COVID-19 has a negative impact on the performance of listed companies on Oslo Stock Exchange.

(2) The first COVID-19 case in Norway did affect the stock returns.

(3) WHO declaring COVID-19 as a pandemic did affect the stock returns.

(4) The government's press conference on the second wave did affect the stock returns.

(5) The three events did not affect the stock returns equally.

(6) The three events did not affect the volatility equally.

4.1.1. CUMULATIVE AVERAGE ABNORMAL RETURN

In this figure, we decided to include 3 days prior to and 3 days after the event day to get a bigger picture of the situation; we wanted to see whether there were any abnormalities in the market before the drop and how the market kept evolving right after the drop. We already know that there had been other COVID-19-related events that had an effect before all events.

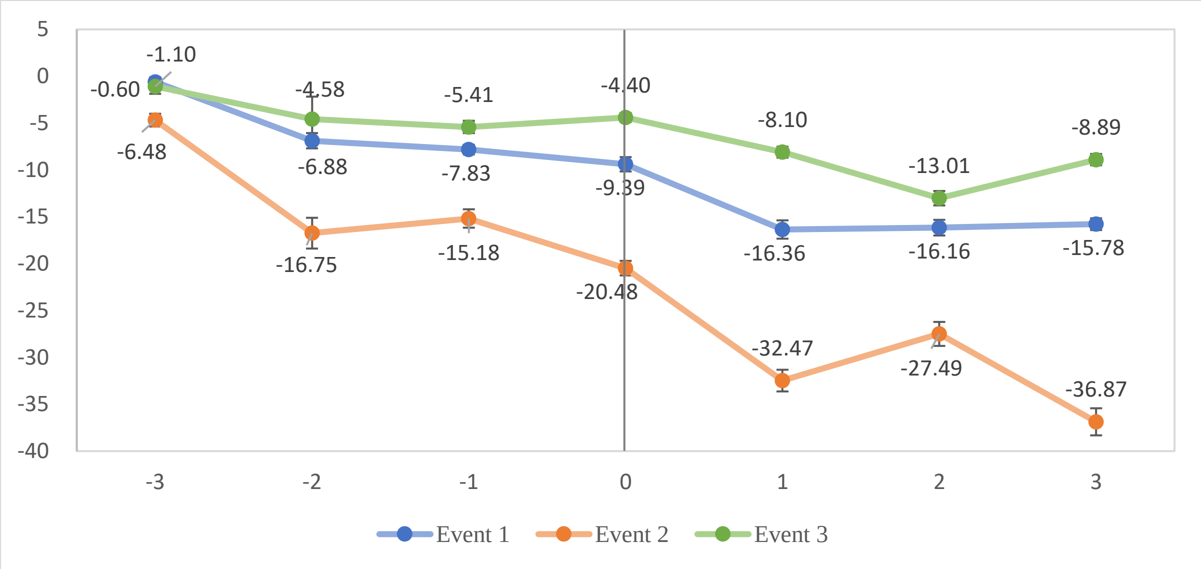

Figure 7: CAAR (%) for three major events

In this figure, we plot cumulative average abnormal returns (CAARs) for the event window from three days before to three days after the event. The three major events are the first confirmed COVID-19 case in Norway, WHO declaring COVID-19 a pandemic, and the Norwegian government's press conference regarding the second COVID-19 wave, as described in section 3.1.1. – 3.1.3. Please refer to section 3.1.4. for the details on how we construct CAAR. All the numbers here are in percentage.

Table 3: t-stats for three major events

In this table, we show the t-stats related to AARs and CAARs from three days before to three days after the event. The three major events are the first confirmed COVID-19 case in Norway, WHO declaring COVID-19 a pandemic, and the Norwegian government's press conference regarding the second COVID-19 wave, as described in section 3.1.1. – 3.1.3. Please refer to section 3.1.4. for the details on how we construct AAR, CAAR and t-stat. We compare the t-stat with a critical value of ±1,98. All the numbers here are in percentage.

Day	**Event 1**		**Event 2**		**Event 3**	
	AAR	**t-stat**	**AAR**	**t-stat**	**AAR**	**t-stat**
-3	-0.60	-2.43	-4.68	-13.66	-1.10	-2.78
-2	-6.28	-15.27	-12.06	-14.55	-3.48	-2.87
-1	-0.95	-3.68	1.57	3.16	-0.83	-2.50
0	-1.56	-4.06	-5.30	-13.51	1.01	4.13
1	-6.96	-14.08	-12.00	-20.54	-3.70	-12.45
2	0.20	0.47	4.98	7.71	-4.91	-12.64
3	0.37	1.18	-9.38	-12.85	4.12	13.47
Event Window	**CAAR**	**t-stat**	**CAAR**	**t-stat**	**CAAR**	**t-stat**
[-3,+3]	-15.78	-6.22	-36.87	-9.17	-8.89	-2.80
[-2,+2]	-15.56	-7.90	-22.81	-7.74	-11.92	-4.82
[-1,+1]	-9.47	-8.32	-15.73	-10.68	-3.52	-4.03
[0,+1]	-8.53	-9.70	-17.29	-17.71	-2.69	-4.97

Table 4: t-stats for the difference between three major events

In this table, we show the t-stats related to AARs on the event days. The three major events are the first confirmed COVID-19 case in Norway, WHO declaring COVID-19 a pandemic, and the Norwegian government's press conference regarding the second COVID-19 wave, as described in section 3.1.1. – 3.1.3. Please refer to section 3.1.4. for the details on how we construct AAR. To obtain the t-stats we used the "t-test: assuming unequal variances" add-in in Excel.

	t-stat	p-value	Critical value
[Event 1, Event 2]	6.79	0.00	1.97
[Event 1, Event 3]	-5.64	0.00	1.97
[Event 2, Event 3]	-13.65	0.00	1.97

From figure 7, it is clear that COVID-19 had a negative impact on the Oslo Stock Exchange, as all numbers are negative. All event windows, from the day prior to and the day after the event day, had significant average abnormal returns, as we can see from the confidence intervals and the t-stats. We can therefore reject the null hypothesis, and conclude that COVID-19 has a negative impact on the performance of listed companies on Oslo Stock Exchange. This is consistent with the literature regarding unexpected crises, as discussed in section 2.1.1.

As described before, event 1 is when the first COVID-19 case was confirmed in Norway. This announcement came on the evening of February 26. Therefore, the biggest reaction on the stock market came the day after. On day 1, the CAAR went from -9.39% to -16.36%, while the reaction the other days was a lot less. The confidence intervals for this event have a fairly small spread, and all intervals are below zero. Also, the t-stats from 3 days prior to the event through day 1 are significant, while day 2 and 3 is not. Though, all the t-stats for the event windows are significant. From this we conclude with a 95% certainty that the abnormal returns from the event are below zero. We can therefore reject the null hypothesis, and conclude with a certainty of 95% that the first case of COVID-19 in Norway did affect the stock returns.

Event 2 is when WHO declared COVID-19 a pandemic, which was announced in the evening. Therefore, the biggest reaction came on March 12, the day after our event day. Here the CAAR went from -20.48% to -32.47%. For event 2, the confidence intervals still have a small spread, and all the intervals are negative. Here all the t-stats are also significant. We can therefore reject the null hypothesis and conclude with a certainty of 95% that WHO declaring COVID-19 as a pandemic did affect the stock returns.

Event 3 is when the Norwegian government had their press conference regarding “the second wave”. This press conference was held around noon on October 23, which means that the market had time to react on that same day. The CAAR on this day was -4.40%, though the reaction on this day is not as negative as for the two other events. In fact, it is more positive than the day before. This confirms that the market was more stable and would not be as affected by such news at that time. On the next trading day, the CAAR is -8.10%, which indicates that the market kept decreasing the days after this event. When it comes to the confidence intervals for event 3, the same applies here as for the other two events. They have a small spread and a negative abnormal return, and all the t-stats are significant. We can reject the null hypothesis and conclude with a 95% certainty that the press conference on the second wave did affect the stock returns. Though, not as much as the other events.

Figure 7 confirms that event 2 was the event with the most negative effect on the stock returns. This finding is as expected as event 2 includes the days that Norway closed down and imposed the strictest restrictions since wartime. For event 1 and 3, the first observation is at a less negative CAAR and the curve is less steep than for event 2. Event 3 had the least abnormal return on the event day, with a CAAR of -4.40%, followed by event 1 with a CAAR of -9.39%. Event 2 had the most negative abnormal return, with a CAAR of -20.48%. Some did not experience the virus as a serious situation until WHO declared it a pandemic. Thus, the impact was not as great in event 1 as in event 2, even if the virus had been detected in Norway.

Event 3 had the least effect, which indicates that most people had now learned from the outbreak six months earlier. In the beginning, many acted in desperation in addition to the fact that there was a lot of uncertainty in the market. Despite some fluctuations, the uncertainty in the market calmed down quickly. This is consistent with the finding by Nikkinen et al. (2008).

All the confidence intervals and t-stats comparing the three events are significant. The CAARs for the three events have such a large spread, which shows that the returns were affected to a very different degree. We can therefore reject the null hypothesis and conclude that the three events did not affect the stock returns equally.

4.1.2. VOLATILITY

According to Baker et al. (2020), the volatility peak caused by the COVID-19 pandemic is the third highest volatility peak since 1900. The volatility of a security or a market index measures the dispersion of returns, where a higher volatility indicates greater risk (Kuepper, 2021). During recessions, the volatility is naturally high, as it is a result of a disproportion of trade orders. To get a better understanding of how volatile the markets were during the events, we compare the volatility during the estimation period to all three event windows.

We will now only look at the original event window that is from the day before to the day after the event days. To make these estimates comparable, we calculated the annualized volatility for the estimation period and for all three events. In this way, we can get a better view on whether there was a difference in how the stock market reacted to the different events.

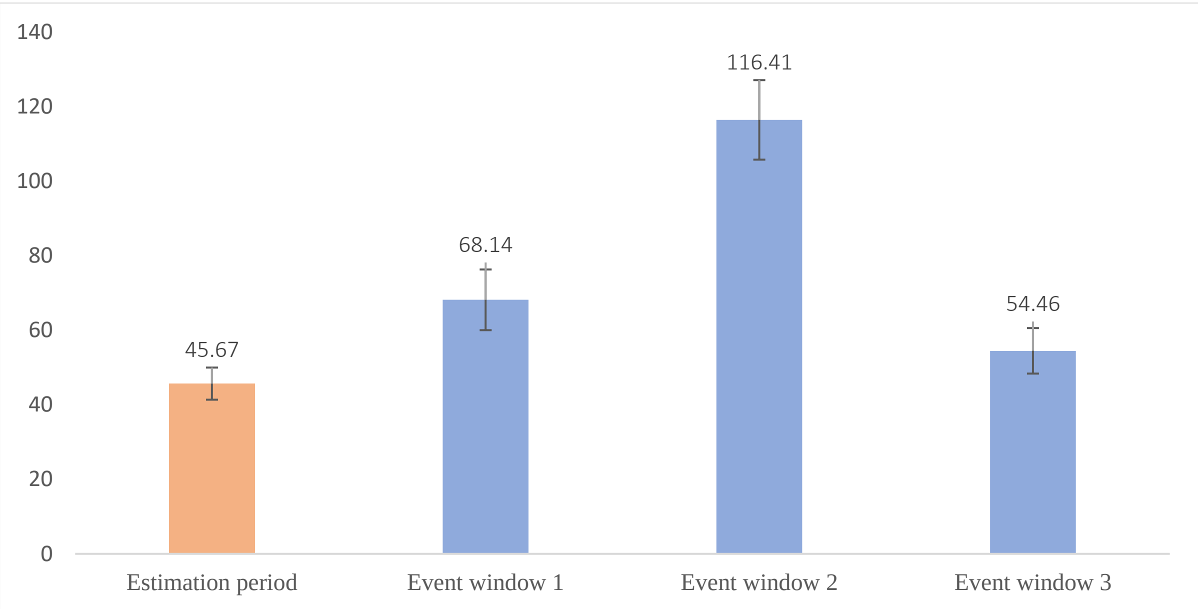

Figure 8: Annualized volatility (%) for three major events and estimation period
In this figure, we show the annualized volatility for the estimation period and event windows from the day before to the day after the event. The three major events are the first confirmed COVID-19 case in Norway, WHO declaring COVID-19 a pandemic and the Norwegian government's press conference regarding the second COVID-19 wave, as described in section 3.1.1 – 3.1.3. The estimation period is 2019, as described in section

3.3.1. Please refer to section 3.1.4. for the details on how we construct the annualized volatility. All the numbers here are in percentage.

Table 5: t-stats for annualized volatility for three major events and estimation period

In this table, we show the t-stats related to average annualized volatility for three events and estimation period. The three major events are the first confirmed COVID-19 case in Norway, WHO declaring COVID-19 a pandemic and the Norwegian government's press conference regarding the second COVID-19 wave, as described in section 3.1.1 – 3.1.3. The estimation period is 2019, as described in section 3.3.1. Please refer to section 3.1.4. for the details on how we construct the annualized volatility. To obtain the t-stats we used the "t-test: assuming unequal variances" add-in in Excel.

	t-stat	p-value	Critical value
[Estimation, Event 1]	-4.83	0.00	1.97
[Estimation, Event 2]	-12.17	0.00	1.97
[Estimation, Event 3]	-2.33	0.02	1.97
[Event 1, Event 2]	-7.12	0.00	1.97
[Event 1, Event 3]	2.66	0.01	1.97
[Event 2, Event 3]	9.98	0.00	1.97

Figure 8 can be closely linked to figure 7. As previously explained, the estimation period represents the "normal" annual volatility. Thus, since the annual volatility for all events are higher than the annual volatility for the estimation period, we can say that there are more fluctuations in the events. As discussed in section 4.1.1., abnormal returns were the most negative in event 2. It is therefore a matter of course that volatility will also be highest in the same event. The volatility for event 3 is almost the same as it was during the estimation period. This reinforces the idea that the market approached more normal during this period.

Event 1 increases the volatility by 22.47%, event 2 increases the volatility by 70.74% while event 3 only increases the volatility by 8.79%. All of these increases are significant. Also, all the confidence intervals have a relatively small spread, and the t-stats for the differences between the events are significant. We can therefore reject the null hypothesis and conclude that the three events did not affect the volatility equally.

4.2. COMPARING NORWAY TO SWEDEN & DENMARK

As previously mentioned, we only focus on event 2 when comparing Norway to the other Scandinavian countries, as this is the only event the three countries have in common. To do this, we will first look at the cumulative average abnormal return for event 2 in each country, and then compare the volatility during the event to the volatility in the estimation period for each country. By doing this, we can answer the following hypotheses:

(7) The stock returns did not change as much in Norway and Denmark.

(8) The volatility did not change as much in Norway and Denmark.

(9) The stock returns did not change as much in Norway and Sweden.

(10) The volatility did not change as much in Norway and Sweden.

4.2.1. CUMULATIVE AVERAGE ABNORMAL RETURN

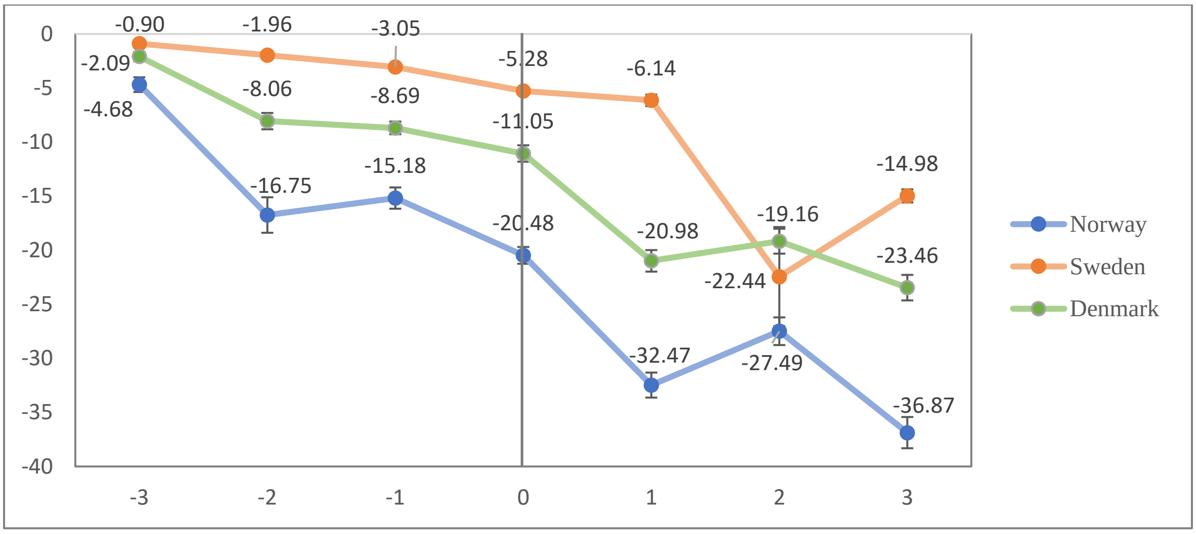

Figure 9: CAAR (%) for Norway, Sweden and Denmark

In this figure, we plot cumulative average abnormal returns (CAARs) for event 2 for Norway, Sweden and Denmark, from three days before to three days after the event. Event 2 is WHO declaring COVID-19 a pandemic, as described in section 3.1.2. Please refer to section 3.1.4. for the details on how we construct CAAR. All the numbers here are in percentage.

Table 6: t-stats for Norway, Sweden and Denmark

In this figure, we show the t-stats related to AARs and CAARs for event 2 for Norway, Sweden and Denmark, from three days before to three days after the event. Event 2 is WHO declaring COVID-19 a pandemic, as described in section 3.1.2. Please refer to section 3.1.4. for the details on how we construct AAR, CAAR and t-stat. We compare the t-stat with a critical value of ±1,98 for Norway and Denmark and ±1,97 for Sweden. All the numbers here are in percentage.

Day	Norway		Sweden		Denmark	
	AAR	t-stat	AAR	t-stat	AAR	t-stat
-3	-4.68	-13.66	-0.90	-6.98	-2.09	-9.62
-2	-12.06	-14.55	-1.07	-6.95	-5.97	-15.69
-1	1.57	3.16	-1.09	-7.23	-0.63	-2.12
0	-5.30	-13.51	-2.23	-15.77	-2.37	-6.18
1	-12.00	-20.54	-0.86	-3.21	-9.93	-19.73
2	4.98	7.71	-16.30	-7.04	1.82	3.13
3	-9.38	-12.85	7.46	24.42	-4.30	-7.22
Event Window	**CAAR**	**t-stat**	**CAAR**	**t-stat**	**CAAR**	**t-stat**
[-3,+3]	-36.87	-9.17	-14.98	-4.33	-23.46	-7.93
[-2,+2]	-22.81	-7.74	-21.54	-7.11	-17.07	-7.96
[-1,+1]	-15.73	-10.68	-4.18	-7.46	-12.92	-10.93
[0,+1]	-17.29	-17.71	-3.09	-7.54	-12.30	-13.88

In figure 9, the 3 days prior to and after the event are included, just like we did for each event above, in section 4.1.1. All countries have a negative CAAR three days prior to the event day, which confirms that there were abnormalities in the markets before the event. At first sight, we can see that Norway and Denmark's CAAR follows a similar pattern through the period, while the CAAR for Sweden looks a lot different, especially the days after the event day. The abnormal return in Norway starts at a lower point than the other two countries, and it also stays below them for the entire period. Sweden has the lowest abnormal return, with a CAAR of -5.28%, followed by Denmark with a CAAR of -11.05%. Norway have the most negative abnormal return, with a CAAR of -20.48%.

As the news were announced by WHO late in the evening on the event day, we mainly focus on the next day. The news resulted in a big drop in both Norway and Denmark, while the Swedish stock market stayed stable on this day. However, there was a big drop on day 2 in Sweden. This delay might be a result of the lack of action from the Swedish government, as they didn't introduce a national lockdown. Denmark announced a lockdown in the evening on the event day and Norway did the same on day 1, which could have influenced their abnormal return. Hence, as they watched other stock markets collapsed, the uncertainty in Sweden rose as well, resulting in a drop the day after.

The confidence intervals are indicating that the abnormal returns are negative with a 95% certainty. The only noticeable observation is day 2 in Sweden. For this day the variation is a lot bigger than for all the other observations. This might be because the biggest drop is on this day for Sweden. However, all t-stats for all countries are significant, and we can therefore reject the null hypothesis for hypotheses (7) and (9). We conclude that the stock returns did not change as much in Norway and Denmark, and that the stock returns did not change as much in Norway and Sweden.

4.2.2. VOLATILITY

Like we did for the events in section 4.1.2., we also compare the volatility in the estimation period to the volatility in the event window for all three countries. In this analysis we only look at the three days in our event window. In this way, we can review whether the event had a direct effect on the stock markets, and if there is a difference in how much the countries were affected. All values for the volatility are annualized.

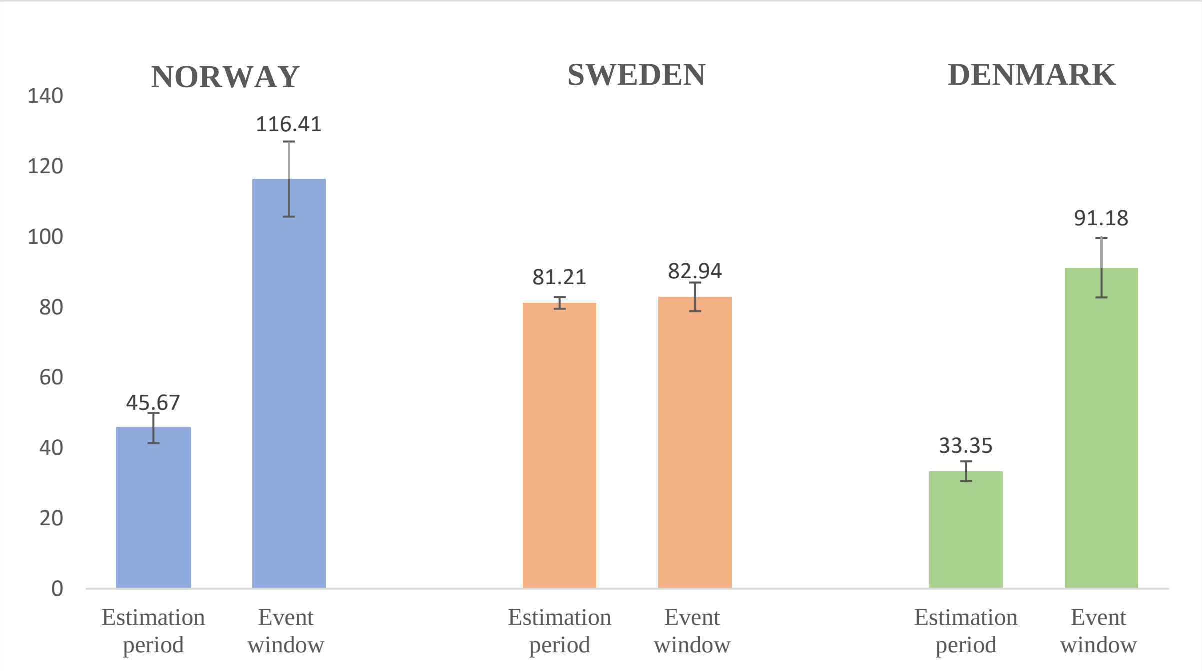

Figure 10: Annualized volatility for Norway, Sweden and Denmark

In this figure, we show the annualized volatility for the estimation period and event window for event 2 for Norway, Sweden and Denmark, from the day before to the day after the event. Event 2 is WHO declaring

COVID-19 a pandemic, as described in section 3.1.2. The estimation period is 2019, as described in section 3.3.1. Please refer to section 3.1.4. for the details on how we construct the annualized volatility. All the numbers here are in percentage.

Table 7: t-stats for annualized volatility for Norway, Sweden and Denmark

In this table, we show t-stat related to average annualized volatility for the estimation period and event window for event 2 for Norway, Sweden and Denmark, from the day before to the day after the event. Event 2 is WHO declaring COVID-19 a pandemic, as described in section 3.1.2. The estimation period is 2019, as described in section 3.3.1. Please refer to section 3.1.4. for the details on how we construct the annualized volatility. To obtain the t-stats we used the "t-test: assuming unequal variances" add-in in Excel.

	t-stat	p-value	Critical value
[Estimation, Norway]	-12.17	0.00	1.97
[Estimation, Sweden]	-1.86	0.06	1.96
[Estimation, Denmark]	-13.01	0.00	1.98
[Norway, Sweden]	8.13	0.00	1.97
[Norway, Denmark]	3.69	0.00	1.97

The difference in the volatility from the estimation period to the event window is 70.74% in Norway, 1.73% in Sweden and 57.83% in Denmark. This is consistent with our results from the CAAR analysis above, as Norway had the most abnormality and Sweden the least. The increase in volatility for Norway and Denmark is significant, though it is not significant for Sweden. Furthermore, the increase in Norway and Denmark is similar, as the numbers in both countries are nearly tripled. The insignificant increase in Sweden's volatility also confirms our assumptions about how each country reacted to the event had an effect on the stock exchange. The confidence intervals have a fairly small spread, and the t-stats for the difference between Norway and the other two countries are significant. We can therefore reject the null hypotheses and conclude that the volatility did not change as much in Norway and Denmark, and that the volatility did not change as much in Norway and Sweden.

4.3. MULTIPLE REGRESSION ANALYSIS

In this section, we will answer the following hypotheses:

(11) Abnormal return in event 1 does depend on the company's profitability before COVID-19.

(12) Abnormal return in event 2 does depend on the company's profitability before COVID-19.

(13) Abnormal return in event 3 does depend on the company's profitability before COVID-19.

(14) Abnormal return in event 1 does depend on the firm size before COVID-19.

(15) Abnormal return in event 2 does depend on the firm size before COVID-19.

(16) Abnormal return in event 3 does depend on the firm size before COVID-19.

(17) Abnormal return in event 1 does depend on the company's trading volume before COVID-19.

(18) Abnormal return in event 2 does depend on the company's trading volume before COVID-19.

(19) Abnormal return in event 3 does depend on the company's trading volume before COVID-19.

(20) Abnormal return in event 1 does depend on the company's growth opportunity before COVID-19.

(21) Abnormal return in event 2 does depend on the company's growth opportunity before COVID-19.

(22) Abnormal return in event 3 does depend on the company's growth opportunity before COVID-19.

(23) Abnormal return in event 1 does depend on the company's tangibility before COVID-19.

(24) Abnormal return in event 2 does depend on the company's tangibility before COVID-19.

(25) Abnormal return in event 3 does depend on the company's tangibility before COVID-19.

(26) Abnormal return in event 1 does depend on where the headquarter of the company is located.

(27) Abnormal return in event 2 does depend on where the headquarter of the company is located.

(28) Abnormal return in event 3 does depend on where the headquarter of the company is located.

Table 8: Regression analysis on abnormal returns of three major events
This table shows the abnormal returns for the variables for regression equation (10) – (12). AR and CAR is measured as described in section 3.1.4. t-statistics are shown in parentheses.
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Variables	**Event 1**		**Event 2**		**Event 3**	
	AR 1	CAR	AR 1	CAR	AR 0	CAR
Profitability	4.67***	7.97***	-0.08	-1.96	0.42	-0.48
	(3.64)	(4.07)	(-0.05)	(-0.75)	(0.63)	(-0.36)
Firm size	0.25	0.18	0.44*	0.38	-0.04	0.16
	(1.56)	(0.74)	(2.17)	(1.20)	(-0.43)	(0.97)
Trading volume	-0.94**	-0.42	-0.98*	-1.96**	0.41*	0.25
	(-2.85)	(-0.83)	(-2.34)	(-2.93)	(2.39)	(0.72)
Growth opportunity	-0.08	-0.28	-0.05	-0.26	-0.09	-0.19
	(-0.69)	(-1.61)	(-0.36)	(-1.12)	(-1.44)	(-1.63)
Tangibility	-2.92^{+}	-4.28^{+}	0.50	0.77	-0.92	-0.77
	(-1.97)	(-1.89)	(0.27)	(0.25)	(-1.18)	(-0.50)
Headquarter	-0.96	-2.29	-0.30	-2.94	-0.68	0.41
	(-0.78)	(-1.22)	(-0.19)	(-1.18)	(-1.06)	(0.32)
Constant	-0.26	-6.46	-9.90^{+}	0.17	-2.58	-9.46*
	(-0.06)	(-1.03)	(-1.89)	(0.02)	(-1.19)	(-2.20)
N	157	157	157	157	157	157
Adjusted R^2	0.15	0.12	0.02	0.04	0.03	0.00

Table 9: Regression analysis on abnormal returns of three major events (sectors)
This table shows the abnormal returns for the sectors for regression equation (13). CAR is measured as described in section 3.1.4. t-statistics are shown in parentheses.
$^{+}p < 0.10$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

Sectors	**Event 1** CAR	**Event 2** CAR	**Event 3** CAR
Basic Materials	-12.20^{**}	-14.82^{**}	0.38
	(-3.30)	(-3.06)	(0.16)
Consumer Discretionary	-11.70^{***}	-15.96^{***}	-1.36
	(-4.48)	(-4.66)	(-0.80)
Consumer Staples	-5.55^{*}	-14.16^{***}	-3.83^{*}
	(-2.13)	(-4.14)	(-2.25)
Energy	-8.59^{***}	-18.27^{***}	-4.54^{***}
	(-5.85)	(-9.50)	(-4.73)
Financials	-7.08^{**}	-18.69^{***}	-2.54^{+}
	(-3.23)	(-6.50)	(-1.77)
Health Care	-18.44^{***}	-15.70^{***}	-7.81^{***}
	(-6.44)	(-4.19)	(-4.18)
Industrials	-9.50^{***}	-11.73^{***}	-2.85^{**}
	(-6.56)	(-6.18)	(-3.01)
Real Estate	-2.98	-15.87^{**}	-3.29
	(-0.74)	(-2.99)	(-1.25)
Technology	-11.16^{***}	-16.94^{***}	-4.23^{**}
	(-4.78)	(-5.54)	(-2.77)
Telecommunication	-7.65	-24.22^{**}	0.23
	(-1.20)	(-2.89)	(0.05)
Utilities	-7.86	-10.55	-8.39
	(-0.87)	(-0.89)	(-1.42)
N	157	157	157
Adjusted R^2	0.53	0.61	0.27

4.3.1. EVENT 1

For event 1, we look at the effect on the stock market on day 1, since this was the first day the market was able to absorb the news. As this event occurred quite early in the pandemic, in addition to the fact that WHO had not even declared it a world pandemic yet, we do not expect a lot of significant effects. Nevertheless, some uncertainty would be likely, as the virus now had spread to Norway.

As we can see from table 8, only profitability and trading volume are significant. Profitability has a coefficient of 4.67%. This means that if the profitability of the company was high before COVID-19, they will have less negative return. This is significant at a 0.1% level. We can therefore reject our null hypothesis, and conclude that for event 1, abnormal return does depend on the company's profitability before COVID-19. This variable is also significant on a 0.1% level using CAR as a dependent variable. In this case, it has an even greater impact on the abnormal return, as the coefficient is 7.97%. This is consistent with the literature from Zingales (1998), Fotopoulos and Louri (2000), Bunn & Redwood (2003), Bridges and Guariglia (2008), Bellone et al. (2008) and Huynh et al. (2010) that firms with higher profitability are more likely to perform better.

Trading volume has a coefficient of -0.94%. The average trading volume is a measure for the overall interest for the company before COVID-19. In this case, if the trading volume is high, the company will have more negative abnormal return. The variable is significant at a 1% level, and we therefore reject our null hypothesis. We conclude that for event 1, abnormal return does depend on the company's trading volume before COVID-19. This finding is consistent with the literature from Bremer and Hiraki (1999), Lee et al. (2003) and Lowrey (2020).

Tangibility is significant on a 10% level, and has a coefficient of -4.28%. Though, this is not adequate to reject the null hypothesis. We also fail to reject our remaining variables, which means that for event 1, abnormal return does not depend on the firm size before COVID-19, the company's growth opportunity before COVID-19, the company's tangibility before COVID-19 or where the headquarter of the company is located.

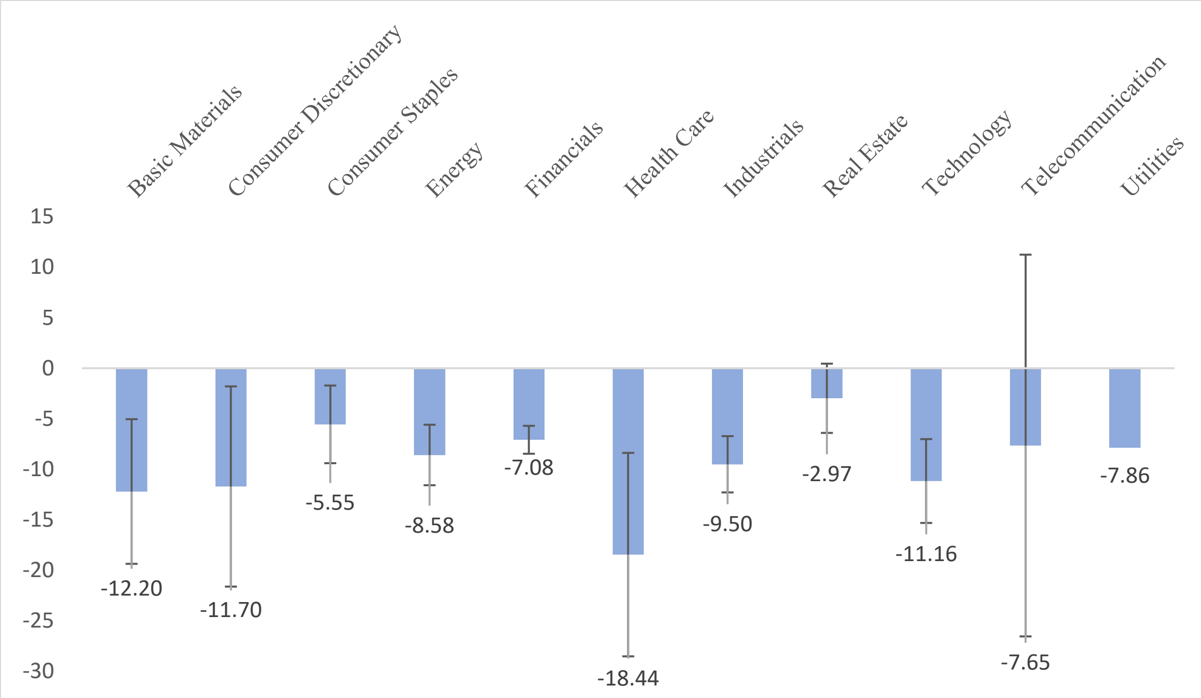

Figure 11: CAR (%) for each sector in event 1

In this figure, we show cumulative abnormal returns (CARs) for the first event. Event 1 is the first confirmed COVID-19 case in Norway, as described in section 3.1.1. Please refer to section 3.1.4. for the details on how we construct CAR. All the numbers here are in percentage.

In this event, consumer discretionary, energy, health care, industrials and technology are all significant on a 0.1% level. Basic materials and financials are significant on a 1% level, while consumer staples is significant on a 5% level. By looking at all the confidence intervals for these significant sectors, we can say that the abnormal return is negative with a certainty of 95%. The news about the virus was still relatively new during this event, and we didn't know how contagious it was or how it would affect the country. As this uncertainty was starting to settle, it is natural that all sectors have some abnormal return during event 1.

The health care sector had the most abnormal return of -18.44%, followed by basic materials with -12.20%, and consumer discretionary with -11.70%. In other countries, like Italy, we could see how fast the virus spread, and that it now was out of control, which created fear. This created an expectation that the virus could also eventually hit our healthcare system hard. The virus had already caused a significant number of deaths in other parts of the world, and as a result, people were advised not to travel out of their countries. As the consumer discretionary sector includes travel and leisure, it is quite logical that the abnormal return was affected. This is consistent with the study by both Harbison (2003) and Sparaco (2001). Also, shipment delays might have had an impact on the basic materials sector.

Real estate, telecommunications and utilities are not significant. As discussed above, neither telecommunications nor utilities contain enough companies to be significant. Real estate, on the other hand, do, and it might be because this event occurred early in the pandemic. People didn't expect that the virus world result in a crisis this early, and the first case would not affect the real estate industry.

4.3.2. EVENT 2

For event 2, our focus is on the day after the event day, as the news was announced right before the stock markets closed. The effect will therefore occur on day 1. This event is a worldwide event, and as discussed in section 4.1.1., the event that had the most impact on the Norwegian stock exchange out of our three events. Despite this, the shock effect from the announcement might have resulted in less significant variables, as the entire stock market crashed, and most companies were affected independently of various factors.

As we can see in the regression above, only firm size and trading volume are significant. The coefficient for the firm size variable is 0.44%, which means that if the firm size increases, there will be less negative abnormal return. This is significant at a 5% level and we therefore reject our null hypothesis, and conclude that, for event 2, abnormal return does depend on the firm size before COVID-19. Though, the variable is no longer significant when using CAR as a dependent variable. This finding contradicts with the literature by Lee, Chen and Ning (2017) and Halkos and Tzeremes (2007). On the other hand, it is consistent with the literature by Lai et al. (2016) that bigger companies are more resilient to recessions.

Trading volume has a coefficient of -0.98%, and is significant at a 5% level. This means that if the company's trading volume before COVID-19 was high, they will have more negatively abnormal return. For CAR, trading volume is significant at a 1% level. We reject our null hypothesis, and conclude that for event 2, abnormal return does depend on the company's trading volume before COVID-19. As discussed in section 4.3.1., this finding is consistent with the existing literature.

However, the remaining variables are not significant. We therefore fail to reject the majority of our null hypotheses for event 2. This may be a result of the entire stock market crashing, which means that most variables will not be able to make a difference in the impact on the return. Briefly, this means that abnormal return in event 2 does not depend on the company's profitability before COVID-19, the company's growth opportunity before COVID-19, the company's tangibility before COVID-19, or where the headquarter of the company is located.

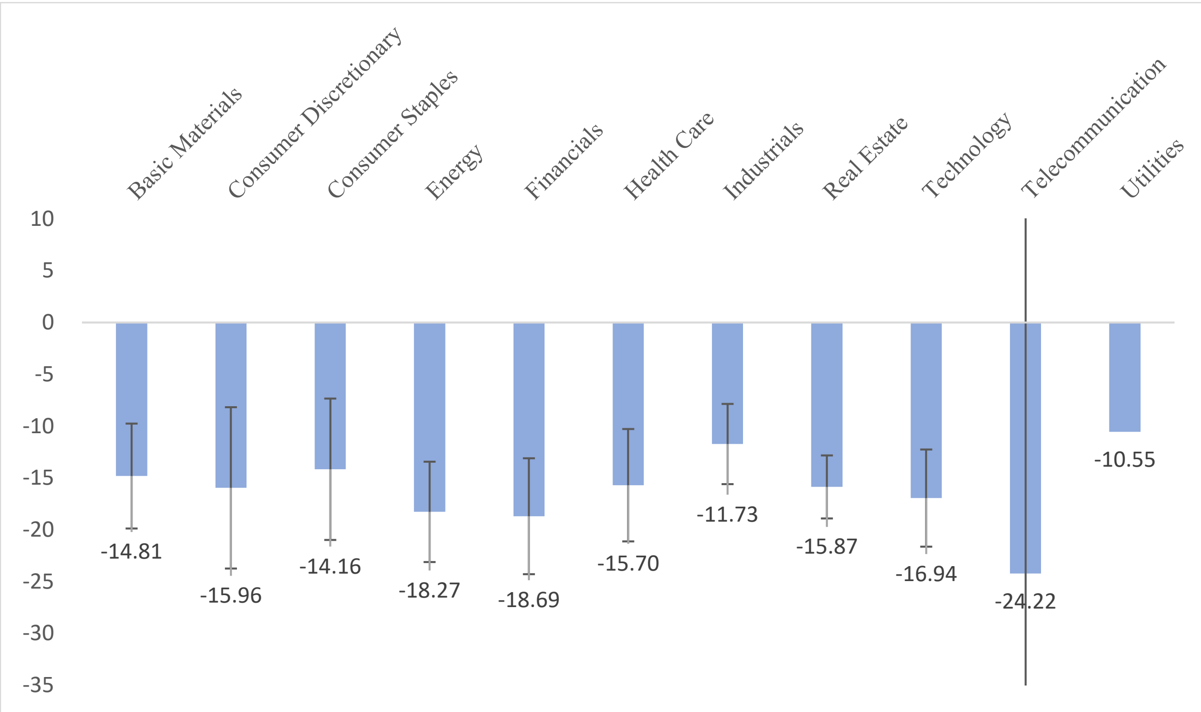

Figure 12: CAR (%) for each sector in event 2

In this figure, we show cumulative abnormal returns (CARs) for the second event. Event 2 is WHO declaring COVID-19 a pandemic, as described in section 3.1.2. Please refer to section 3.1.4. for the details on how we construct CAR. All the numbers here are in percentage.

For event 2, consumer discretionary, consumer staples, energy, financials, health care, industrials and technology are all significant on a 0.1% level, while basic materials, real estate and telecommunication are significant on a 1% level. As the utilities sector only contains one company, it is not significant. Though, by looking at the confidence level for the telecommunications sector, we cannot determine that the return is negative by a certainty of 95%. This is most likely the case as this variable only contains two companies. All the significant variables have a high value of abnormal return, and they all (except for the telecommunication sector) vary between -11.73% and -18.69%. This confirms that event 2 caused an overall crash in the stock market, regardless of the sectors.

4.3.3. EVENT 3

For event 3, we look at the effect on the stock market on the event day. The reason for this is that the market was already able to absorb the news on this day, because the press conference was held long before the stock exchange closed. Despite this, we do not expect a lot of factors to be significant, as this event happened when the economic uncertainty had calmed down, even if the pandemic was still raging. This event occurred when the world was in a global crisis, but the event itself cannot be classified as a crisis, as it was not an unexpected event. The number of cases were steadily growing, and the government had warned about "the second wave" for a while. Even if we didn't know exactly when it would happen, we did know it was going to hit us one day, as it had already hit most other countries in Europe.

As we can see from the regression above, only trading volume is significant. For this event, the abnormal return is not affected by any of the other factors that are included in our regression. The trading volume variable has a coefficient of 0.41%, which means that the companies with a higher trading volume will have less negative abnormal return. This is significant at a 5% level. We can therefore reject the hypothesis regarding the company's trading volume and conclude that for event 3, the abnormal return does depend on the company's trading volume before COVID-19. Though, this is a short term effect, as it is no longer significant when using CAR as the dependent variable.

This finding contradicts with the literature by Bremer and Hiraki (1999) and Lee et al. (2003). The reason for this may be that the economic uncertainty during this event is significantly lower. During events 1 and 2, investors traded in a state of shock, and people wanted to secure themselves financially. This did not apply to the same extent to event 3. This also reinforces the idea that this event itself is not a crisis, as it was to a greater extend expected. We can also see this from figure 7 where the abnormal return is less negative than for the other events.

For all the other variables, we fail to reject the null hypotheses and conclude that neither of these factors influenced the abnormal return for event 3.

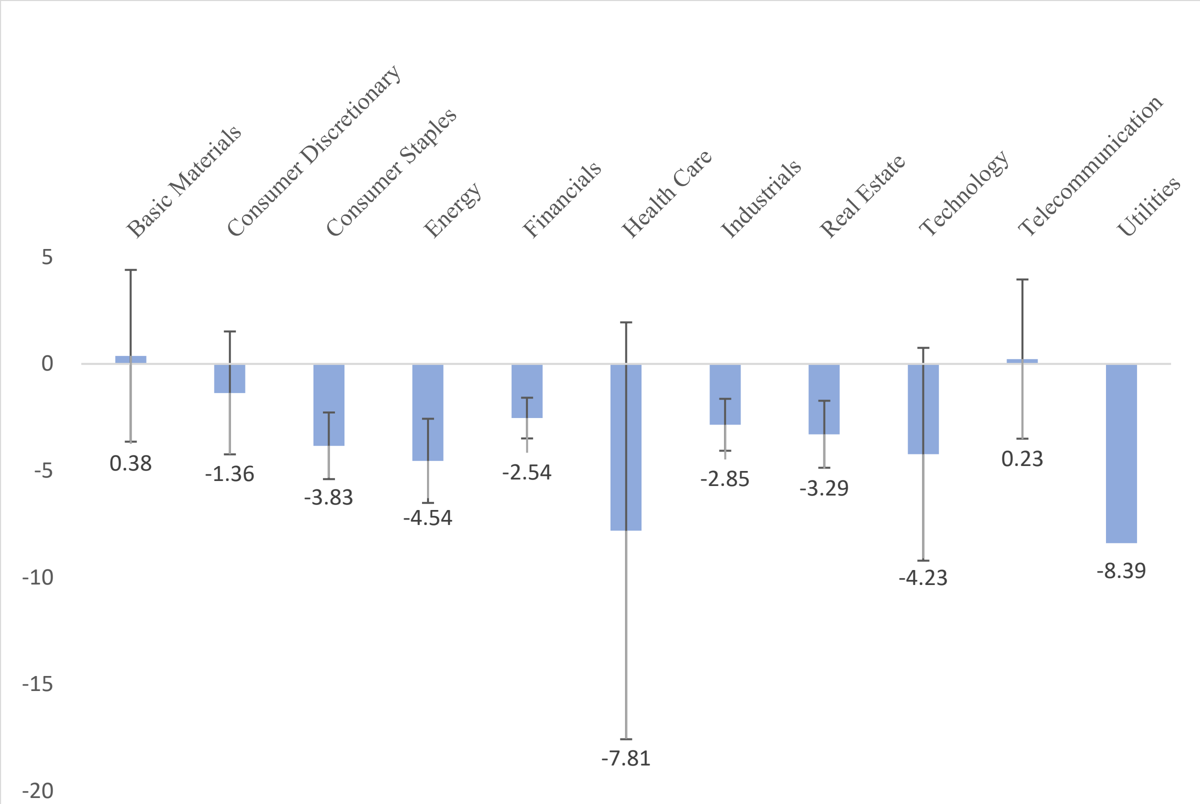

Figure 13: CAR (%) for each sector in event 3

In this figure, we show cumulative abnormal returns (CARs) for the third event. Event 3 is the Norwegian government's press conference regarding the second COVID-19 wave, as described in section 3.1.3. Please refer to section 3.1.4. for the details on how we construct CAR. All the numbers here are in percentage.

In event 3, there are more differences in what sectors that were affected. Energy and health care are significant on a 0.1% level, industrials and technology are significant on a 1% level, while the consumer staples sector is significant on 5% level. The financials sector is significant on a 10% level. All the coefficients in event 3 are much lower than in event 2, and lower than in event 1 as well. This is the same result as we saw in figure 7.

Consumer staples has a coefficient of -3.83% and is significant at a 5% level. From the figure above, we can see that the confidence interval is below zero. Therefore, we know with a 95% certainty that the abnormal return is negative. Although people's need for necessities has not changed much in this pandemic, this sector has been significantly affected. Exports have been reduced due to less cross-border trade. In addition, trade in Norway has increased due to the border with Sweden and Denmark being closed. Therefore, the affection is not quite big, but it is still significant and negative.

Energy has a coefficient of -4.54% and is significant at a 0.1% level. The confidence interval for this sector is also below zero. Therefore, the abnormal return is, with a 95% certainty, negative. As we discussed earlier, the demand for energy decreased a lot during the pandemic. Due to the lockdown situation, the need for oil and gas is reduced significantly. OPEC agreed to make a cut in oil production, as they wanted to push for stability (Reed & Krauss, 2020). This may have influenced the return in event 3. Even if there was a greater reaction in event 1 and 2, there was still some abnormalities later in the year as well.

Health care has a coefficient of -7.83% and is significant at a 0.1% level in the regression. However, from the confidence interval we cannot conclude that the abnormal return is negative at a 95% level. This means that from the regression it seems like it is significant, though from the figure it is not. Therefore, we cannot draw a conclusion that the health care sector is significant. Our assumption for event 3 in the health care sector was that the vaccine race would reduce the negative abnormal return. Though, in figure 13 we can see that this sector was the most affected sector, which contradicts with our assumptions. If we look at the number of hospital admissions in Norway, we see that this rate started to increase towards the end of October (Helsedirektoratet, 2021). That's also why the government declared that we were in "the second wave" of the pandemic. This may have affected the insecurity, especially when it comes to the health care sector. There may be uncertainty as to whether the hospitals can be overcrowded, in addition to the fact that non-COVID-19 related operations and productions may be downgraded again. Like we see in the figure above, the other sectors were affected to a smaller extent. This indicates that most investors have learned from earlier in the pandemic that, despite a contagion boom, they must not trade in shock. They witnessed how fast the stock market improved from the last drop, which helped them stay calm.

Industrials has a coefficient of -2.85%, and is significant at a 1% level. The associated confidence interval is below zero, which indicates that with a 95% certainty, the abnormal return is negative. We expect that this sector will have some abnormalities, because of an overall lower demand, especially for companies that sell to industries like the hotel industry. Thus, the abnormality is not quite big, which means that this industry has regained some of their market losses, even though it is still significant and negative.

Technology has a coefficient of -4.23% and is significant at a 1% level. Technology is a sector that was highly affected by COVID-19, in both directions. The need for new technology and more innovative solutions draws the return in a positive direction, while the problems related to the delay of shipments of electronic goods and the uncertainty in the market draws the return in the opposite direction. However, the confidence intervals in this sector also spreads from a positive to a negative range. We can therefore not say that there is a 95% certainty that this coefficient is negative, which means that the spread is large and some firms did have a positive return.

Financials has a coefficient of -2.54%. Despite that the confidence interval is below zero, the variable is only significant at a 10% level. This means that even though it is not quite significant, it did have an impact to a certain extent.

4.3.4. HEADQUARTERS

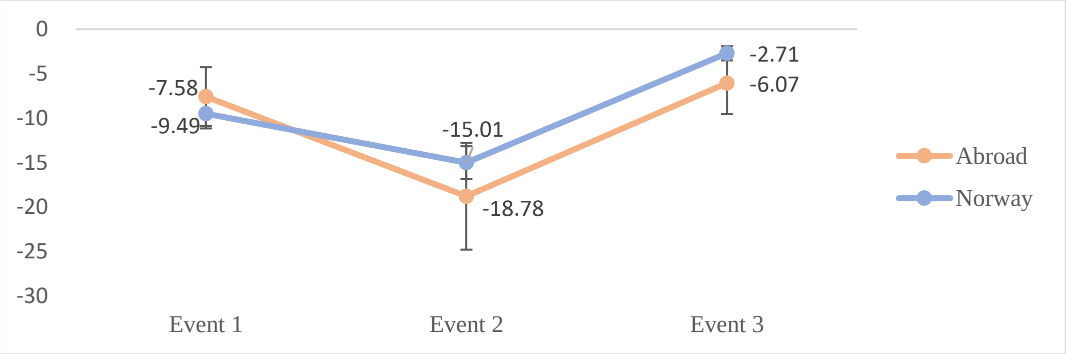

Figure 14: CAAR (%) for the headquarters in three major events

In this figure, we plot the cumulative abnormal returns (CAARs) for the event window for each event. The three major events are the first confirmed COVID-19 case in Norway, WHO declaring COVID-19 a pandemic, and the Norwegian government's press conference regarding the second COVID-19 wave, as described in section 3.1.1. – 3.1.3. Please refer to section 3.1.4. for the details on how we construct CAAR. All the numbers here are in percentage.

Table 10: t-stats for the headquarters in three major events

In this figure, we show the t-stats related to CAARs for the event window for each event. The three major events are the first confirmed COVID-19 case in Norway, WHO declaring COVID-19 a pandemic, and the Norwegian government's press conference regarding the second COVID-19 wave, as described in section 3.1.1. – 3.1.3. Please refer to section 3.1.4. for the details on how we construct CAAR and t-stat. We compare the t-stat with a critical value of ±1.98 for Norway and ±2.04 for abroad. All the numbers here are in percentage.

Day	Abroad		Norway	
	CAAR	t-stat	CAAR	t-stat
Event 1	-7.58	-4.68	-9.49	-11.29
Event 2	-18.78	-6.39	-15.01	-16.11
Event 3	-6.07	-3.56	-2.71	-6.73

As displayed in table 8, headquarter is not a significant variable in either of the three regressions. The reason for this might be that only 30 out of the 157 companies are headquartered abroad. Also, the term “abroad” includes several different countries that has handled the situation differently. Despite that the variable is not significant, we created the figure above to get a closer look at the effect. As all t-stats are significant and the confidence intervals for all observations are negative, we can conclude that the abnormal returns are negative by a certainty of 95%. Though, there is an overall greater spread in the confidence intervals for the companies that are headquartered abroad.

In event 1, we can see that there is more negative abnormal return for the companies headquartered in Norway, while for the two other events, the companies with headquarter abroad have more negative abnormal return. This might be because the first (and the third) event only apply to Norway, as this was when the first infected case in Norway was confirmed. For the last event, Norway handled the situation better than most other countries. Even though event 3 only applies to Norway, the companies abroad generally had more abnormalities in the stock markets. Regarding event 2, our assumption that the companies with headquarter abroad would have more abnormal return, is confirmed.

From figure 14, we found that there is a difference related to where the headquarter is located, but this effect is not significant. We therefore fail to reject our null hypothesis that abnormal return does not depend on where the headquarter of the company is located.

4.3.5. DISCUSSION OF RESULTS

In this section we will discuss our main findings from table 8 and 9. In addition to this, we will compare the results from the different events, to see whether there is a certain connection between any of the variables. Finally, we will compare the sectors in each event, and analyze whether any sectors outperformed others, or if some had significantly worse abnormal return than the rest. In figure 15 below, we have excluded telecommunication and utilities as they are not representative.

First of all, the only variable that is significant for all three events is trading volume. For events 1, 2 and 3, the coefficient is respectively -0.94%, -0.98% and 0.41%. This means that in the beginning of the pandemic, the companies with a higher trading volume had more negative abnormal return, while later in the pandemic the opposite applies. Investors typically sell their shares in a crisis (Lowrey, 2020). As the third event wasn't unexpected, it cannot be defined as a crisis, which makes this finding consistent with our assumptions. The finding from the beginning of the pandemic is consistent with the literature by Bremer and Hiraki (1999) and Lee et al. (2003).

Profitability is only significant in the first event, and the coefficient for this event is 4.67%. More profitable companies were less negatively affected by event 1. This is consistent with the literature by Zingales (1998), Fotopoulos and Louri (2000), Bunn and Redwood (2003), Bridges and Guariglia (2008), Bellone et al. (2008) and Huynh et al. (2010). When the first case was confirmed in Norway, the crisis hadn't yet fully occurred. This indicates that for smaller events, the profitability can be crucial for the abnormal return. Though, during a crisis, it might not be relevant for how the company is affected.

Firm size is only significant in event 2, and the coefficient for this event is 0.44%. Bigger companies are more stable and are less affected than smaller companies. This is consistent with the literature by Lai et al. (2016), that smaller companies are less resilient to recessions. As event 2 is the only event that, by itself, can be defined as a crisis, it makes sense that the firm size had a positive and significant effect on this event.

The growth opportunity value is not significant for either of the three events. This means that the growth opportunity doesn't have an impact on how a company reacts to a crisis. Though, as we discussed above, the size of the company affected the abnormal return in event 2. The growth opportunity of a company does not tell us anything about how big, established or stable the company is. A small company might have the same growth opportunity as a bigger company. Anyhow, the growth opportunity is insignificant in a crisis like COVID-19.

Tangibility usually does not matter in the everyday operations. Though, in a crisis, if a company can obtain cash fast, it would be logical that they can handle the situation better. For event 1, the variable is significant at a 10% level, which means that to a certain extent, it did have an impact on this event. In fact, event 1 only resulted in a smaller drop on the stock exchange. In event 2, barely any of the factors have an impact on the abnormal return as the stock markets crashed. This could indicate that, for a smaller crisis, tangibility could be relevant. Anyway, from our regressions, tangibility is not significant for either of the three events. This is consistent with the literature by Miller and Modigliani (1958). They argued that a company's choice of capital structure will not affect its value.

Adjusted R^2 is a measure on how well terms fit the model. Event 1 has the highest adjusted R^2, which means that this is the best fitted model. This makes sense as it has more significant variables than in event 2 and 3. Event 3 has slightly better adjusted R^2 than event 2. As discussed above, event 2 caused a major crash in the stock market and most companies were affected regardless of the different factors. When we include several variables that doesn't affect the abnormal return, the adjusted R^2 will decrease. That is the reason why the value is this low.

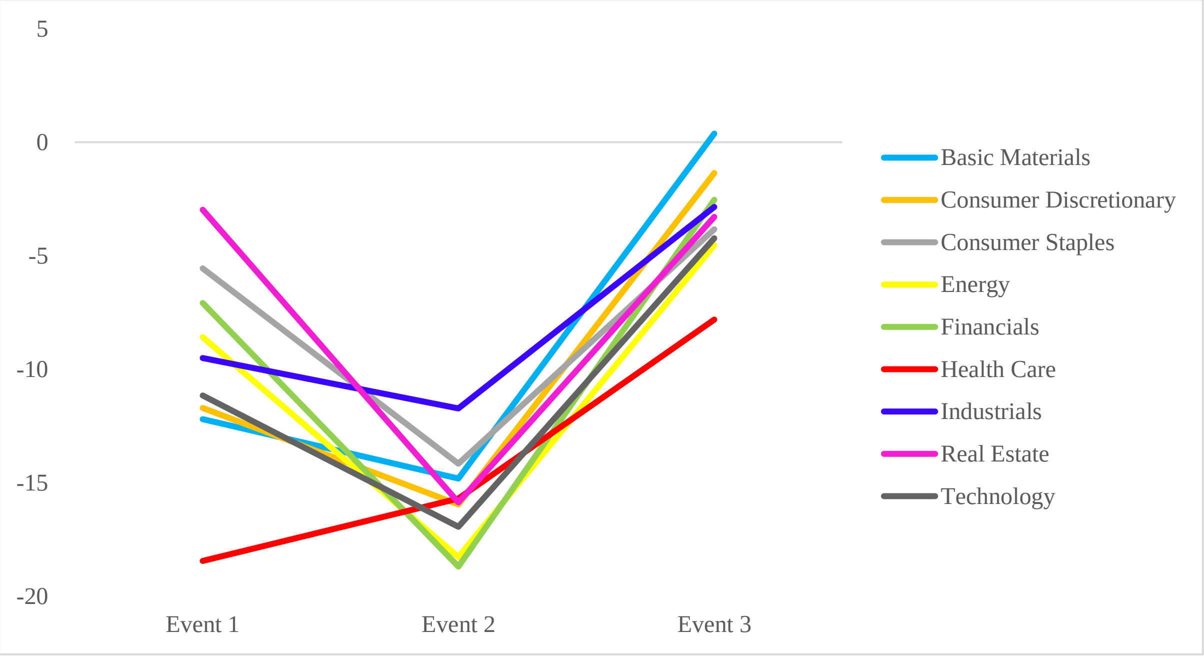

Figure 15: Comparing CAR (%) in each sector for three major events

In this figure, we plot cumulative abnormal returns (CARs) for the event window for each event. The three major events are the first confirmed COVID-19 case in Norway, WHO declaring COVID-19 a pandemic, and the Norwegian government's press conference regarding the second COVID-19 wave, as described in section 3.1.1. – 3.1.3. Please refer to section 3.1.4. for the details on how we construct CAR. All the numbers here are in percentage.

In this figure we compare the cumulative abnormal return for all the relevant sectors for all three events and look at each sectors development. Health care was the sector that started off the worst. It has evolved in a positive direction but is still the sector that performed the worst in event 3. In event 2, financials and energy have the poorest results, with technology close by.

The sectors that performed the best overall is industrials and consumer staples. Industrials is stable in event 1 and 2 and is therefore the one that had the best result in event 2. Consumer staples had the highest return in event 1 (except for real estate, which is not significant in event 1), and the second highest in event 2. In event 3, some of the sectors are not significant, but all the sectors that are significant are clustered between 0 and -5, except for health care. The only sectors that are significant in the regressions for all three events are consumer staples, energy, health care, industrials and technology.

Basic materials

Basic materials performed poorly in event 1, but it is relatively stable from event 1 to event 2. The reason for the bad outcome in the beginning of the pandemic may be because of shipment delays and that many big projects was paused (Alam et al., 2020), which led to a decrease in the demand. This result confirms our assumption that the outcome would be most influential in the beginning of the pandemic. The uncertainty, and therefore the demand, recovered quickly, which is reflected in event 3. The last event shows a positive abnormal return, but this coefficient is not significant.

Consumer discretionary

The consumer discretionary sector was highly affected in event 1 and had a relatively small decrease to event 2. A lot of uncertainty led to reduced spending. No one knew how this crisis would develop, and the fear of unemployment may have played a key role here. This is consistent with Wang (2013) that major international events have an impact on airlines share price. During the outbreak of SARS, passenger traffic was declined by 5.6%, causing a significant number of dismissals (Harbison, 2003). The 9/11 terrorist attack resulted in a drop of 36.2% in passenger traffic of European airlines (Sparaco, 2001). We also know that there has been a significantly decrease in the air traffic due to closed boarders and high infection rates abroad. In event 3 the results were better, despite that it was still not recommended to travel out of the country. People were no longer as concerned about their financial situation and were more inclined to spend money on non-essential goods. However, the coefficient in event 3 is not significant.

Consumer staples

This sector contains all the essential goods. As a result, the consumer staples sector was not highly affected in event 1. During event 2, there was a lot of panic buying and hoarding, but also the export was reduced. Hence, this affected return in a negative direction. Nevertheless, this sector is as explained above, one of the sectors that overall performed the best, especially in event 1 and 2. Event 3 was not affected as much because the boarders to Sweden was closed, which means that everyone who was previously buying food and alcohol in Sweden now had to do this in Norway.

Energy

The energy sector was one of those who were hit the hardest by the pandemic, particularly in event 2 and 3. There is a lot of international trading included in the energy sector, which was highly affected. In addition, the demand for energy, like oil, decreased, and the oil price fell. Overall, the need for energy, especially in industry, was declined. As Rajvikram and Shafiullah (2020) argued, this pandemic has affected the national energy demand pattern.

Financials

At the beginning of the pandemic, it seemed as if the situation would turn into a financial crisis like the one in 2008. Therefore, the demand for loans was reduced in event 1 and 2. People spent less money than they usually do, both because they had to stay more at home, and because they were more careful in general. The need for consumer loans and credit cards wasn’t as high as in normal times. In event 3, the abnormal return was clearly better. The economic uncertainty was at a much lower level, and the demand for mortgages was high due to the historically low interest rates. However, in event 3 this sector is only significant at a 10% level.

Health care

This sector has performed poorly overall and is significant in the long run. As discussed above, health care has the most abnormal return in event 1 and then increases evenly over the two remaining events. This was the most crucial sector. A reason for this might be that in other countries, like Italy, we could see how fast the virus spread, and that it now was out of control, which led to fear. This created an expectation that the virus could also eventually hit our healthcare system hard. The virus had already caused a significant number of deaths in other parts of the world. Too high infection rates is a great threat to the hospitals, as they will be overcrowded. Chen, Chen, Tang and Whuang (2009) discovered an increase in the share price in this sector during SARS, which contradicts with our results. Nevertheless, SARS was not a pandemic, in addition to the fact that during the outbreak of COVID-19, there was a lack of resources in the health sector, both in terms of equipment and employees. Al-Avadhi, Alsaifi, Al-Avadhi and Al Hamadi (2020) found that the pharmaceutical sector outperformed other sectors during COVID-19 in China. This did not happen in Norway, especially not in a short-term perspective. Pharmacies might have done better, but the health care sector consist of more subsectors that have performed worse. As time has passed, the health sector has improved and the infection in Norway has not completely gone out of control, but the return is still worst in this sector in event 3. This may be due to the fact that people not longer become as ill. Everyone takes precautions and practices social distancing. In addition, due to this, the demand for non-COVID-19-related medicines and pharmacies has declined. This leads to a more negative AR for several of the companies in the health care sector.

Industrials

This was overall one of the best sectors. Event 1 performed relatively poor, because of reduced demand in the beginning of the pandemic. Sunde (2020) pointed out that there are big differences between firms in this sector. The firms that sell products to people’s everyday life, such as outdoor life, will do very well, while those who sell to industries like the aviation and the hotel industry will struggle more. Overall, this sector has performed better than we expected, especially in event 2 and 3.

Real estate

This sector is only significant in event 2, and here the abnormal return was poor. The uncertainty in the housing market has probably played a major role in this event. No one knew if it would be profitable to buy or sell real estates at that time. Wong (2008) found that the housing market in Hong Kong did not strongly affect the SARS epidemic, which contradicts our findings. Nevertheless, we have seen that the housing market improved rapidly, and in event 3, it is at a much higher level. Though, the coefficient is not significant in event 3.

Technology

The technology sector has performed poorly through all three events and is one of the sectors that was the most affected by COVID-19. During event 1 and 2, the demand for technology wasn't as high as it was later in the pandemic. Also, shipment delays might have had an impact on this sector. The lockdown situation resulted in both homeschooling and home office for most people. This should have an influence on the third event, as the demand for software and technology equipment was increased by that time. In fact, the abnormal return was a lot less negative in event 3, though there were more abnormal return than for most other sectors. This is consistent with Stuart Carlaw's (2020) research, that COVID-19 will have a long-term influence on biometric firms, related technology developers and investors.

Adjusted R^2 is much higher in the regressions for the sectors than for the different factors, as these contains several significant variables. In event 1, the adjusted R^2 is 0.53, in event 2, it is 0.61, while in event 3, it is 0.27. Event 2 is the best fitted model, which is not surprising as this is the only event where all variables are significant. The R^2 in event 3 is a lot lower. This is because less sectors were significantly affected by this event.

5. CONCLUSION

The main objective of this thesis was to examine the stock returns reactions due to three major events during COVID-19. In order to achieve this, we conducted an event study, comparing Norway to Sweden and Denmark to see if the reactions were consistent with similar countries. The three major events were conductively the first confirmed COVID-19 case in Norway, WHO declaring COVID-19 a pandemic, and the Norwegian government's press conference regarding "the second COVID-19 wave". We also investigated what factors in the companies' that had an impact on abnormal return. The different variables we included in our regressions, were profitability, firm size, trading volume, growth opportunity, tangibility and headquarter, and we also ran an additional regression for the sectors. We obtained all necessary data from Thomson Reuters and created two separate data sets. Then we created several figures and ran the different regressions in Stata.

First of all, we found that event 2 had the greatest impact on the return, followed by event 1. This was as expected, as event 2 was an international and crucial event. Though, event 3 didn't have as much impact on the stock returns, it was a significant event. We can interpret this as investors learned from the first events, and thus the uncertainty was reduced. This finding was reinforced by the analysis of the volatility.

Comparing Norway to Sweden and Denmark in event 2, we found that Norway was hit the hardest, followed by Denmark. The stock market in Denmark also had a similar pattern to Norway. The fact that Sweden wasn't as affected, might be connected to their strategy approach as they had a less strict strategy. This finding was also reinforced by the analysis of the volatility.

From the regression analysis, we found that trading volume was the only factor that was significant for all three events. In the beginning of the pandemic, it had a negative impact on the abnormal return, while in event 3, a higher trading volume resulted in less abnormalities. The profitability had an effect on the return in event 1, meaning that the more profitable companies were less affected by event 1. In event 2, bigger companies were less affected. A company's growth opportunity and tangibility did not have an effect on abnormal return in any of the events.

The headquarter variable was not significant in our regressions, though from our additional analysis, we did find that it had an effect to a certain extent. The companies located in Norway performed a little better compared to those abroad. As for the sectors, consumer staples, energy, industrials and technology were significant for all three events. Overall, the industrials- and consumer staples sectors performed better than the other sectors, while health care, financials and energy had the poorest results.

From our analyses, we conclude that COVID-19 did impact Norway more than Sweden and Denmark. Also, it affected all events, though in varying degrees, as event 2 was hit harder. This proves that even a smaller announcement contained relevant information that created a reaction in the stock returns. As event 3 did not affect the stock market to the same extent, it can indicate that the investors gained knowledge from the outbreak of the pandemic. It is important that we also can benefit from a crisis like COVID-19. As Churchill once said, "Never let a good crisis go to waste."

5.1. LIMITATIONS & FUTURE RESEARCH

COVID-19 had a great impact on the stock exchanges around the world, which creates several interesting issues on this topic. The outbreak of the pandemic is a relatively recent happening, and we still have not seen the end during our research. The amount of previous similar research is very limited and only a few studies have been done to understand the impact, especially for the Scandinavian countries – Norway, Sweden and Denmark. In our thesis, our main focus has been on Norway, but for comparison, we have also looked at Sweden and Denmark. Due to access limitations, we only investigated all listed companies that has sufficient data for all three countries. Excluding unlisted companies lead to some extent to sample selection bias, as our sample is non-random. Also, the industry level research on COVID-19 is very limited.

When we first started our research, the pandemic was still raging to a large extent, and therefore we did not have the opportunity to study the long-term effects or how different countries recovered from the pandemic. To limit our thesis, we investigated three major events during COVID-19. In this way, we focused on what happened just when the stock market crashed; not how it developed and what happened in the long run. It would also be interesting to research how the stock market recovered after each drop, and to investigate why it improved that quickly. Another idea is to examine the similarities with other crises, and whether one can find out how investors should act in a crisis and react to possible future pandemics.

5.2. IMPLICATIONS

From this research, there are several findings that different people can benefit from. As an investor, the main idea is to keep calm during a crisis. The uncertainty will eventually stabilize. Politicians should not spread unnecessary fear among the population. Distributing crisis packages will create an expectation that things will work out, and as a result, the uncertainty decreases. Also, it seems that stricter rules will make an even greater reaction on the stock markets. Therefore, if this is our only focus, it would be more profitable to implement a strategy similar to Sweden. Though, we do not know how this effect perform in the long run.

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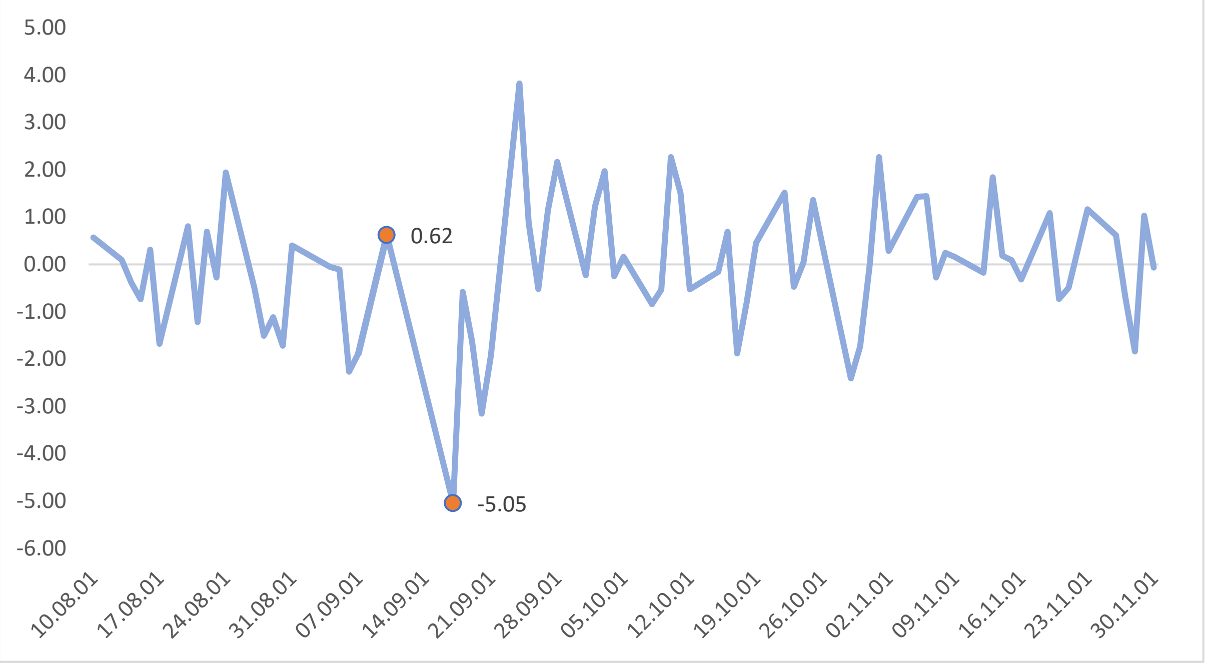
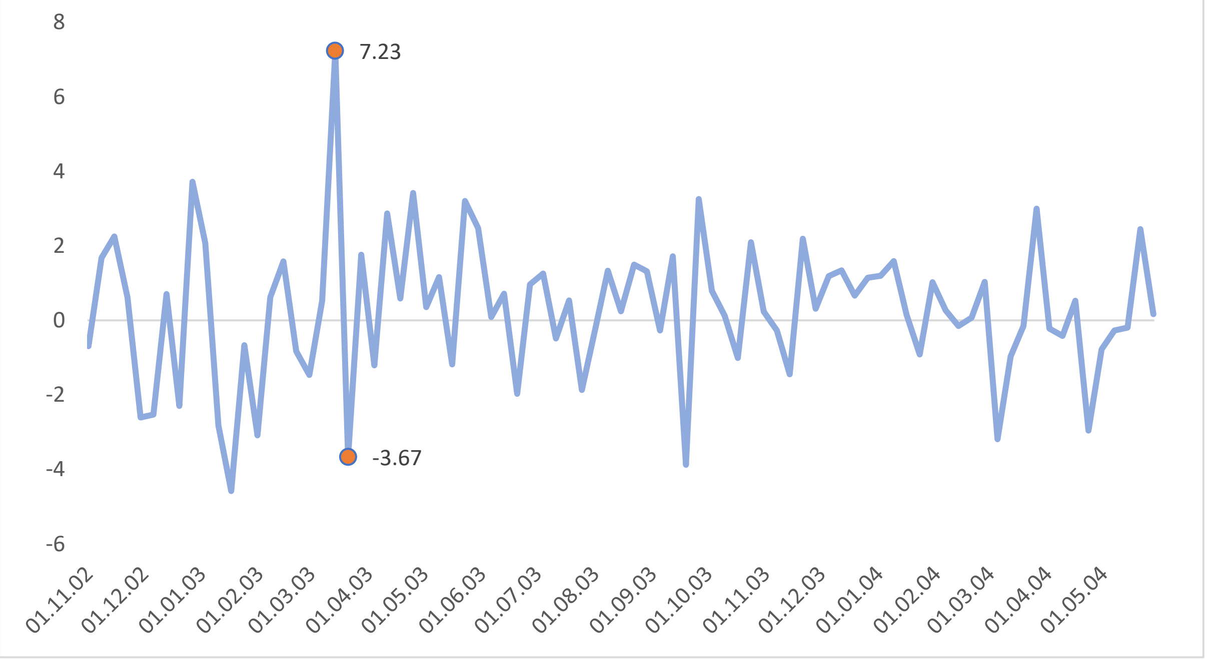
7. APPENDIX

7.1. FIGURES OF CRISES



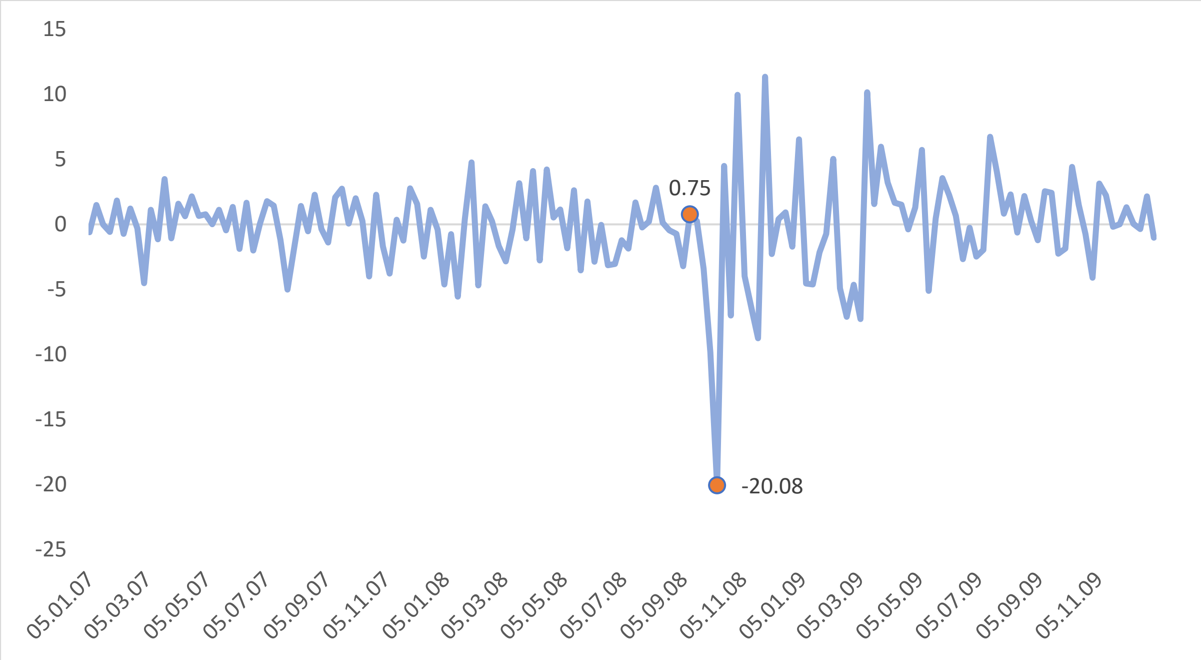
9/11 Terror attack: daily return on the S&P 500.

September 10 and 17, 2001 are highlighted. Numbers are in percentage.



SARS: weekly return on the S&P 500.

March 11 and 13, 2003 are highlighted. Numbers are in percentage.



Financial crisis: weekly return on the S&P 500.

September 14 and 16, 2008 are highlighted. Numbers are in percentage.

7.2. ALL FIRMS NORWAY

FIRMS	SECTORS	CAR EVENT 1	CAR EVENT 2	CAR EVENT 3
BORD.OL	Basic Materials	-7.22	-15.13	-3.22
ELEE.OL	Basic Materials	-21.71	-9.35	1.75
ELK.OL	Basic Materials	-11.23	-17.2	2.61
NHY.OL	Basic Materials	-6.21	-13.19	6.23
REC.OL	Basic Materials	-19.63	-22.86	-3.61
YAR.OL	Basic Materials	-7.19	-11.17	-1.48
ADEV.OL	Consumer Discretionary	-3.11	-14.84	-1.48
ARRI.OL	Consumer Discretionary	-15.18	-0.23	4.93
EURS.OL	Consumer Discretionary	-8.87	-9.83	-4.95
FJORD.OL	Consumer Discretionary	1.19	-6.89	-0.24

GAMO.OL	Consumer Discretionary	-9.19	-27.93	-0.2
KID.OL	Consumer Discretionary	-5.54	-17.87	-6.14
KOA.OL	Consumer Discretionary	-13.92	-35.57	-9.7
NORR.OL	Consumer Discretionary	-53.42	-38.48	-1.13
POLS.OL	Consumer Discretionary	-9.7	-4.73	2.1
SASNOK.OL	Consumer Discretionary	-25.96	-6.59	6.37
SSG.OL	Consumer Discretionary	-3.85	-10.82	-3.77
XXLA.OL	Consumer Discretionary	7.12	-17.7	-2.08
ARCUS.OL	Consumer Staples	-2.44	-6.24	-4.23
ATLH.OL	Consumer Staples	-14.94	-23.59	-7.26
AUSS.OL	Consumer Staples	-2.39	-13.54	-3.72
BAKKA.OL	Consumer Staples	-14.33	-17.49	-5.98
GRIA.OL	Consumer Staples	-6.71	-17.48	-3.26
HOFS.OL	Consumer Staples	7.02	5.55	-1.11
LSG.OL	Consumer Staples	-0.64	-14.64	-4.39
MOWI.OL	Consumer Staples	-7.05	-10.94	-5.55
NORY.OL	Consumer Staples	-4.3	-14.03	-4.71
ORK.OL	Consumer Staples	-3.34	-5.47	-3.23
SALM.OL	Consumer Staples	-7.24	-13.02	-4.79
SALMON.OL	Consumer Staples	-10.29	-39.02	2.22
AKAS.OL	Energy	-3.22	-28.43	0.05
AKERBP.OL	Energy	-6.08	-28.54	-1.21
AKES.OL	Energy	-6.21	-20.53	-1.61
ARCHER.OL	Energy	-13.85	-47.5	7.18
AWDR.OL	Energy	-6.79	-61.93	5.17
BDRILL.OL	Energy	-17.77	-11.65	-11.31

BWO.OL	Energy	-14.22	-26.34	-5.36
DNO.OL	Energy	-11.84	-26.94	2.8
DOF.OL	Energy	-2.61	-29.96	-13.52
EIOF.OL	Energy	-5.25	-12.5	-3.17
EMGS.OL	Energy	-4.34	-9.72	5.03
EQNR.OL	Energy	-4.47	-12.91	-3.97
HAVI.OL	Energy	-2.47	-1.27	-1.1
IOX.OL	Energy	-25.06	-33.63	-3.32
MGNR.OL	Energy	-0.27	-20.26	-7.72
MSEIS.OL	Energy	-10.17	-23.06	-7.03
NEL.OL	Energy	-18.55	-15.78	-6.58
NODL.OL	Energy	-43.06	-24.51	-16.47
NOR.OL	Energy	-10.7	-1.48	-4.5
ODFJ.OL	Energy	-7.82	-29.28	-5.94
OTS.OL	Energy	-6.39	1.25	-2.7
PANN.OL	Energy	-5.57	-27.21	-1.09
PGS.OL	Energy	-13.11	-25.71	3.43
PLCS.OL	Energy	-18.9	-24.53	-9.02
POSF.OL	Energy	-8.17	3.73	-5.25
QEC.OL	Energy	-9.19	-12.39	0.13
RAKP.OL	Energy	-8.73	-22.22	-4.44
REACH.OL	Energy	1.3	-24.55	-6.68
SBX.OL	Energy	-1.65	-30.24	-5.39
SCANA.OL	Energy	0.36	1.25	-8.06
SCATC.OL	Energy	-7.92	-20.35	-6.3
SDRL.OL	Energy	-18.71	-6.84	-2.39
SDSD.OL	Energy	-9.43	-0.07	1.35
SHLF.OL	Energy	-5.97	-26.6	-8.65
SIOFF.OL	Energy	9.18	10.15	-16.13
SOFF.OL	Energy	9.71	6.52	-21.12
SUBC.OL	Energy	-10.69	-17.42	-2.99
TGS.OL	Energy	-7.6	-12.87	-4.54

ACR.OL	Financials	-13.07	-43.86	-0.27
AFK.OL	Financials	-6.02	-12.82	-2.06
AKER.OL	Financials	-7.55	-30.47	-4.45
ASC.OL	Financials	-2.33	-15.83	-2.6
B2H.OL	Financials	-8.46	-30.16	-0.11
DNB.OL	Financials	-5.97	-11.85	-3.32
GJES.OL	Financials	-4.98	-14.31	-3.83
INFRNT.OL	Financials	-6.67	-9.59	-5.84
INSN.OL	Financials	-4	-2.99	-5.2
KOMA.OL	Financials	-8.26	-28.63	-1.93
NOFI.OL	Financials	-6.44	-12.09	0.25
PARB.OL	Financials	-6.84	-17.92	-3.68
PROTCT.OL	Financials	-9.75	-20.19	-0.11
SBANK.OL	Financials	-2.9	-14.34	-2.79
SRBANK.OL	Financials	-9.02	-26.16	-3.96
STB.OL	Financials	-9.52	-24.94	-2.15
TREU.OL	Financials	-8.59	-1.64	-1.07
ARCZ.OL	Health Care	-3.77	-9.04	-45.47
BGBIO.OL	Health Care	-20.26	-20.11	-1.06
CRAT.OL	Health Care	-7.45	-11.89	-6.58
MEDS.OL	Health Care	-10.45	-7.06	-4.47
NAVA.OL	Health Care	-8.54	-15.81	-4.5
NORN.OL	Health Care	-41.28	-17.64	-5.92
PCIB.OL	Health Care	-42.09	-27.76	-1.93
PHO.OL	Health Care	-24.97	-26.48	-9.39
TRVX.OL	Health Care	-19.66	-15.44	2.29
VISTIN.OL	Health Care	-5.96	-5.78	-1.1
AFGU.OL	Industrials	-1.45	-8.35	-1.35
AKVA.OL	Industrials	-2.99	-18.37	-1.85
AMEP.OL	Industrials	-6.27	-21.12	-6.98
AQUA.OL	Industrials	-4.93	-10.01	-3.18
AVANCE.OL	Industrials	-0.3	-29.72	-3.96

BELS.OL	Industrials	-2.11	-2.38	-0.51
BON.OL	Industrials	-12	-11.05	-5.31
BOR.OL	Industrials	-19.79	-22.25	-0.57
BWLPG.OL	Industrials	-3.67	-16.83	-3.46
ENDUR.OL	Industrials	-9.59	12.19	1.41
FLNG.OL	Industrials	-6.62	-7.87	1.59
FRO.OL	Industrials	-4.58	16.78	-5.07
GOD.OL	Industrials	-19.61	-2.45	-9.61
GOGL.OL	Industrials	-5.2	-0.86	-2.35
HEX.OL	Industrials	-16.01	-19.35	-6.94
HOEG.OL	Industrials	-13.29	-16.64	-2.87
HYARD.OL	Industrials	-3.03	-9.1	-12.07
IDEX.OL	Industrials	-40.15	-28.75	-8.56
JINH.OL	Industrials	-1.66	-5.91	-0.98
KITR.OL	Industrials	-11.24	-20.45	-8.04
KOG.OL	Industrials	-5.18	-10.86	1.87
MPCC.OL	Industrials	-5.85	-9.6	-4.93
MULI.OL	Industrials	-9.91	-6.06	-1.28
NEXT.OL	Industrials	-21.02	-26.17	-2.25
NKR.OL	Industrials	14.23	-8.87	-11.11
NRC.OL	Industrials	-10.67	-13.4	-3.84
NTSA.OL	Industrials	-1.37	-19.03	-1.29
OCY.OL	Industrials	-7.07	-36.81	1.2
ODF.OL	Industrials	-15.04	4.74	1.03
ODFB.OL	Industrials	-19.88	-3.85	3.75
OET.OL	Industrials	-15.45	2.6	-0.68
SNI.OL	Industrials	-7.7	-5.26	1.44
THIN.OL	Industrials	-18.38	-21.02	-5.53
TOM.OL	Industrials	-9.13	-13.47	-3.92
VEI.OL	Industrials	-7.25	-16.29	-3.47
VOW.OL	Industrials	-17.16	-35.48	-3.17
WALWIL.OL	Industrials	-12.55	-20.22	0.37

WWI.OL	Industrials	-8.37	1.91	-0.03
WWIB.OL	Industrials	-8.4	2.32	1.34
ENTRA.OL	Real Estate	-5.49	-14.66	-3.52
NPRO.OL	Real Estate	-0.34	-16.18	-4.35
OLT.OL	Real Estate	-5.51	-15.35	-4.61
SELV.OL	Real Estate	-3.76	-13.32	-1.77
SOLON.OL	Real Estate	0.22	-19.83	-2.22
ASETEK.OL	Technology	-15.05	-12.33	-11.2
ATEA.OL	Technology	-5.9	-9.71	-11.31
BOUVET.OL	Technology	-11.11	-21.24	-2.75
CONI.OL	Technology	-9.6	-14.38	-11.24
CRAYON.OL	Technology	-18.08	-31.86	-6.96
ITER.OL	Technology	-6.37	-16.77	-0.39
NOD.OL	Technology	-11.8	-11	-9.05
OTELLO.OL	Technology	-8.84	-25.91	25.27
POLG.OL	Technology	-33.64	-28.94	-11.53
SBSTA.OL	Technology	-5.99	-10.62	-3.51
SBSTB.OL	Technology	-6.49	-7.29	-3.53
STRONG.OL	Technology	-7.47	-22.06	-7.06
TECE.OL	Technology	-16.16	-26.27	-4.68
WSTEP.OL	Technology	-3.69	-10.28	-2.7
ZAL.OL	Technology	-7.24	-5.46	-2.81
NAPA.OL	Telecommunications	-12.04	-40.43	1.09
TEL.OL	Telecommunications	-3.26	-8.01	-0.64
FKRAFT.OL	Utilities	-7.86	-10.55	-8.39

7.3. ALL FIRMS SWEDEN

FIRM	**CAR**
ITABb.ST	-17
CLNKb.ST	-15.06
MOMENT.ST	-34.51
LUC.ST	-17.96
ARIONSdb.ST	-15.37

PACT.ST	-15.11
TRAD.ST	-16.67
NENTa.ST	-14.49
BUFAB.ST	-13.34
IRLABa.ST	-30.1
ENQ.ST	-33.73
BULTEN.ST	-20.7
TRIANb.ST	-9.69
NELLY.ST	-23.27
MEKO.ST	-12.37
RNBS.ST	-23.01
BOLJ.ST	-6.871
EPISb.ST	-16.23
XANOb.ST	-10.99
JOSE.ST	-15.69
BRAV.ST	-19.99
STZEb.ST	-30.68
ELTEL.ST	-2.32
MTGb.ST	-17.32
HOLMa.ST	-4.78
BALCO.ST	-30.84
OP.ST	-29.71
B3.ST	-5.91
NYFO.ST	-1.17
AOIC.ST	-3.21
GARO.ST	0.99
VITb.ST	0.15
LAGRb.ST	2.39
SHOTE.ST	-7.06
CALTX.ST	-0.78
KINVa.ST	-3.73
DEDIC.ST	-7.37

LIMET.ST	-0.28
TIGOsdb.ST	-3.59
BETCO.ST	-0.21
BONEX.ST	1.7
HMb.ST	-2.79
JM.ST	-1.67
LUMIN.ST	-3.67
TETY.ST	-0.48
CLASb.ST	-0.78
FAG.ST	-0.07
ODD.ST	-11.65
CANTA.ST	-6.69
PENGb.ST	-0.36
BRGb.ST	1.52
HANZA.ST	-6.63
IBTb.ST	-0.99
SINCH.ST	-2.06
MAHAa.ST	-7.01
XSPRAY.ST	-4.5
PREVb.ST	4.98
BOL.ST	-5.87
SAGAa.ST	-0.83
AMBEA.ST	-0.09
HTRO.ST	5.63
BORG.ST	0.54
BILIa.ST	-6.58
NIBEb.ST	-1.97
SSABb.ST	-3.71
RAILG.ST	-4.13
VBGb.ST	-3.2
DUST.ST	-4.54
AQ.ST	-1.13

SSABa.ST	-6.24
BMAX.ST	-2.87
IPCOR.ST	-7.1
PANDXb.ST	-2.16
ALIG.ST	-0.34
ANOT.ST	-14.47
FEOIb.ST	-4.61
HUMAN.ST	-0.56
IMMNOV.ST	-1.81
BONAVb.ST	-0.47
SWEDa.ST	-3.41
NCCb.ST	0.19
WISE.ST	0
NETIb.ST	1.34
MTRS.ST	-1.9192
CRADb.ST	1.1691
MYCR.ST	1.494
SWECa.ST	0.7343
TRELb.ST	-4.995
SEBa.ST	-2.0423
BILL.ST	-0.841
SAGAb.ST	-1.2719
ELEC.ST	-3.6767
LIAB.ST	-3.3704
IARb.ST	-2.4826
TRACb.ST	-4.6818
EVOG.ST	-4.1339
NCAB.ST	1.9779
DORO.ST	-1.4527
NDASE.ST	-3.8926
SWECb.ST	5.1697
SCAa.ST	-2.5607

ENDO.ST	-24.1766
WIHL.ST	-2.9885
ATIC.ST	1.9995
BINV.ST	-11.94
STEa.ST	-6.67
SHBb.ST	-1.43
BERGb.ST	-3.16
HUSQb.ST	-3.59
BESQ.ST	-0.97
SECUb.ST	-2.76
LATOb.ST	4.53
RROS.ST	-7.41
SAABb.ST	-1.57
CATE.ST	-0.78
BEIJb.ST	-2.41
REJLb.ST	-3.86
NOBINA.ST	-2.79
KINDsdb.ST	-4.42
BURE.ST	0.56
ACADE.ST	-3.33
NOBI.ST	-2.02
HUSQa.ST	-3.53
SKAb.ST	-3.7
SKFa.ST	-7.55
INSTAL.ST	-0.33
CONIC.ST	-5.1
LUNE.ST	-7.4
COOR.ST	-2.88
LOOMIS.ST	-2.43
VOLVb.ST	-2.1
SKISb.ST	-4.64
SEBc.ST	-2.68

SHBa.ST	-1.36
MVIRb.ST	-0.9
AFb.ST	-2.69
SINT.ST	-4.01
BHGF.ST	-8.78
SOBIV.ST	-6.61
PROB.ST	-1.94
PREC.ST	1.55
VNEsdb.ST	-8.27
SAGAd.ST	-3.07
MCOVb.ST	-0.42
SKFb.ST	-7.48
VICOR.ST	-7.12
FNMA.ST	-4.51
HEXAb.ST	-0.3
INWI.ST	0.17
RAYb.ST	-7.06
KINVb.ST	-3.33
ETRN.ST	-1.59
TIETOS.ST	-1.23
OASM.ST	-14.19
INDT.ST	-2.4
GRANG.ST	-0.27
BEGR.ST	-7.96
LEOV.ST	-2.55
NOTE.ST	-0.65
DUNI.ST	-1.49
PEABb.ST	-3.68
NMAN.ST	-4.32
BALDb.ST	-3.32
EKTAb.ST	-1.2
DURCb.ST	-3.04

HPOLb.ST	-4.03
MEABb.ST	-1.73
CLOEb.ST	-1.8
FPIP.ST	-2.25
SCAb.ST	-1.23
STZEa.ST	3.45
DOMETIC.ST	-4.21
ASSAb.ST	-2.52
ATCOa.ST	-5.2
ELANb.ST	-0.24
INVEb.ST	-2.57
TELIA.ST	-1.89
VOLVa.ST	-1.79
ALFA.ST	-3.36
STEr.ST	-3
INVEa.ST	-2.22
BELE.ST	0.71
GHP.ST	0.82
EWRK.ST	-3.66
ABB.ST	-1.02
RECIb.ST	-0.93
ARJOb.ST	-2.4
HOLMb.ST	0.37
ALIVsdb.ST	-0.49
NEWAb.ST	-2.15
ORTIb.ST	-16.75
FABG.ST	-2.66
ONCO.ST	-4.04
EPIRa.ST	-1.74
ELUXb.ST	-1.96
GETIb.ST	-0.93
BIOAb.ST	0.99

KARO.ST	-0.06
SAS.ST	-10
DIOS.ST	-2.73
SAND.ST	-4.33
EAST9.ST	-3.56
NP3.ST	-4.59
RESURS.ST	-1.31
LIFCOb.ST	-6.32
ICAA.ST	-0.25
SRNKEb.ST	-8.39
AXFO.ST	-0.74
AAK.ST	-0.65
ENEA.ST	-9.52
KLOVb.ST	-0.86
ESSITYb.ST	0.55
THULE.ST	-1.75
MSONb.ST	-4.69
SENS.ST	-2.63
KDEV.ST	-7.36
BRINb.ST	2.24
BACTIb.ST	1.61
CBTTb.ST	-5.19
HUFVa.ST	-2.82
TEL2b.ST	-1.58
SWMA.ST	-3.42
WALLb.ST	-1.52
NGSG.ST	0.95
INDUc.ST	-1.25
FEEL.ST	-1.76
ATRLJb.ST	-3.4
IMMUN.ST	-8.84
ELOSSb.ST	-1.02

INTRUM.ST	-5.7
CVTEC.ST	-2.7
HEBAb.ST	0.44
INDUa.ST	-0.79
CAMX.ST	7.4
CAST.ST	-3.28
NOKIA.ST	-4.77
SBBb.ST	-1.64
BOUL.ST	0.77
COREb.ST	0.44
MULQ.ST	-2.54
CEVI.ST	-8.05
ACTI.ST	-26.95
KABEb.ST	-0.83
SECTb.ST	-9.96
ARP.ST	-1.07
QLINEA.ST	3.37
GREENL.ST	-0.22
OEMb.ST	-1.52
MIDWb.ST	-0.95
STEFb.ST	-0.74
LUNG.ST	-0.16
SCST.ST	2.64
AZN.ST	-2.26
RATOb.ST	-3.42
EOLUb.ST	-10.38
ERICb.ST	-1.7
MEDCAP.ST	-2.9
HOFI.ST	-6.36
HLDX.ST	-1.78
CATb.ST	-4.2
LUNDb.ST	-1.42

MAGNO.ST	-11.41
SANION.ST	-7.28
ALIFb.ST	-9.44
ZETA.ST	-6.21
PLAZb.ST	-1.44
ANODb.ST	-2.79
AVANZ.ST	-3.08
XVIVO.ST	-4.18
CCORb.ST	1.08
FPARa.ST	-2.93
SVEDb.ST	-6.96
ABLI.ST	-6.84
MIPS.ST	-11.48
SOFb.ST	-3.21
EGTX.ST	-4.83
HNSA.ST	0.25
KLED.ST	-2.87
BTSb.ST	-5.64
CTTS.ST	-5.7
EMPIRb.ST	-8.31
BETSb.ST	-9.27
ERICa.ST	-1.5
STRAX.ST	-17.02
BIOGb.ST	-2.38
VOLO.ST	-2.18
ATORX.ST	-3.4
ENRO.ST	18.27
IRRAS.ST	-5.23
ATTE.ST	-0.65
BEIAb.ST	0.35
BOOZT.ST	-3.63
VITR.ST	0.25

MMGRb.ST	0.7
TROAX.ST	-1.11
LAMMb.ST	-5.85
NTEKb.ST	-3.63
SEMC.ST	-0.78
TOBII.ST	-4.71
SVIK.ST	-1.02
BIOT.ST	-1.48
ORX.ST	-11.81
NOLAb.ST	-0.66
SYSR.ST	-2.92
CATME.ST	1.1
STWK.ST	-23.59
XBRANE.ST	-2.03
FINGb.ST	-7.26
COLLE.ST	-1.77
VSSABb.ST	1.43
NILb.ST	-3.57
IVSO.ST	-5.55
PRICb.ST	-1.46
TFBANK.ST	-4.25
G5EN.ST	-3.53
CATa.ST	-2.96
ORTIa.ST	2.28
EPIRb.ST	-2.28
POOLb.ST	0.11
ELUXa.ST	-3.03
ESSITYa.ST	0.28
ATCOb.ST	-4.98
FMMb.ST	0.98
TEL2a.ST	-1.8
BONAVa.ST	-0.85

ISY.ST	0.7		**PROFb.ST**	-2.17
ARISE.ST	-6.39		**KNOW.ST**	-2.19
HMSN.ST	-0.16		**KLOVa.ST**	0.3
ORES.ST	-1.81		**ADDTb.ST**	-6.02
NCCa.ST	0.22		**SBBd.ST**	-1.55
MTGa.ST	-1.08		**MBPH.ST**	-10.24
RATOa.ST	-3.42		**MSABb.ST**	-2.47

7.4. ALL FIRMS DENMARK

FIRM	CAR
NOVOb.CO	-9.33
ORSTED.CO	-17.5
VWS.CO	-15.25
DSV.CO	-6.24
MAERSKb.CO	-7.78
MAERSKa.CO	-7.85
NDADK.CO	-19.39
COLOb.CO	-5.19
GMAB.CO	-18.17
CARLb.CO	-15.09
CARLa.CO	-12.01
DANSKE.CO	-14.82
NZYMb.CO	-9.93
GN.CO	-19.97
CHRH.CO	-3.38
AMBUb.CO	-17.67
DEMANT.CO	-20.55

PNDORA.CO	-23.31
TRYG.CO	-14.31
LUN.CO	-17.89
ROCKb.CO	-16.47
ROCKa.CO	-14.08
KBHL.CO	-13.25
G4S.CO	-40.69
SIM.CO	-16.3
RBREW.CO	-29.69
NETCG.CO	-14.06
ALKb.CO	-11.51
TOP.CO	-16.42
ISS.CO	-12.61
OSSR.CO	-13.5
JYSK.CO	-7.88
RILBA.CO	-14.75
DFDS.CO	-12.6
SCHO.CO	-14.69

BAVA.CO	-27.81
JDAN.CO	-17.24
STOGR.CO	-14.36
FLS.CO	-20.04
CHEMM.CO	-19.46
NKT.CO	-19.95
ALMB.CO	-15.67
SAS.CO	-10
ZELA.CO	-33.66
DRLCO.CO	-27.42
SYDB.CO	-15.01
SPNO.CO	-12.92
PAALb.CO	-20.92
NTGNT.CO	-19.13
UIE.CO	-16.64
DNORD.CO	-7.66
BO.CO	-0.5
CBRAIN.CO	-19.82
SPGP.CO	-20.71
TIV.CO	-12.13
NLFSK.CO	-12.16
TRMDa.CO	8.18
HARTb.CO	-12.55
VJBA.CO	-12.65
MATAS.CO	-13.73
SOLARb.CO	-13.54
ORPHA.CO	-11.57
HHDC.CO	-29.84
NNIT.CO	-21.09

NORTHM.CO	-14.27
FLUGb.CO	-13.52
JUTBK.CO	-14.14
LASP.CO	-2.3
SPKSJF.CO	-6.02
BIOPOR.CO	-27.72
COLUM.CO	-14.42
RTX.CO	-15.79
DABA.CO	-9.3
BNORDIK.CO	-9.18
TCM.CO	-9.07
MTHH.CO	-9.12
GABR.CO	-17.05
GRLA.CO	-4.86
PRIMOF.CO	-4.66
DJUR.CO	-13.14
SANI.CO	0.9
PARKEN.CO	-8.51
SKJE.CO	-9.79
FYNBK.CO	-7.93
KRE.CO	-12.61
LOLB.CO	0.01
FFARMS.CO	-8.11
LUXORb.CO	-1.86
NRDF.CO	-10.28
STRINVS.CO	2.3
HARBb.CO	-4.04
FED.CO	-6.2
TOTA.CO	-6.61

CPHCAPST.CO	-2.74		**SIGR.CO**	-12.27
MNBA.CO	-0.42		**MIGAb.CO**	-5.97
RBLNb.CO	-11.5		**CEMAT.CO**	-2.91
BIF.CO	-13.59		**EACI.CO**	-1.47
AGFEb.CO	-21.41		**NEWCAP.CO**	1.12
AGATE.CO	-13.38		**ROVS.CO**	-20.94
BOLIGA.CO	-5.72		**AAB.CO**	-2.24
SKAKO.CO	-3.41		**IMAIL.CO**	-11.9
NORDIC.CO	-29.8		**BLVISa.CO**	-22
HVID.CO	-4.65		**ATLA.CO**	-25.91
PSNRDCa.CO	-12.1		**VIPRO.CO**	-16.98
DANT.CO	-7.64			

7.5. EXCLUDED FIRMS

FIRMS	**COUNTRY**
CADLR.OL	Norway
EMAO.OL^I20	Norway
NOL.OL	Norway
NORBIT.OL	Norway
ULTIMO.OL	Norway
BEWI.OL	Norway
PEXIP.OL	Norway
LINKM.OL	Norway
HAFNIA.OL	Norway
202B.OL	Norway
OKEA.OL	Norway
BWEE.OL	Norway
SATSA.OL	Norway
NSKOG.OL	Norway
TIETOO.OL	Norway
TEAM.OL^J20	Norway
GYL.OL	Norway
PETO.OL	Norway

QFR.OL	Norway
BYGG.OL	Norway
WILS.OL	Norway
RISH.OL	Norway
KMCP.OL	Norway
VVL.OL	Norway
FG.ST	Sweden
QLIRO.ST	Sweden
JOMA.ST	Sweden
NWHD.ST	Sweden
NENTb.ST	Sweden
KARNO.ST	Sweden
8TRS.ST	Sweden
EQTAB.ST	Sweden
KFASTb.ST	Sweden
K2Ab.ST	Sweden
VNV.ST	Sweden
EPROb.ST	Sweden
FPARd.ST	Sweden
WBGRb.ST	Sweden
GPGR.ST	Sweden
READ.ST	Sweden
SAVE.ST	Sweden
ANNEb.ST	Sweden
NPAPER.ST	Sweden
ADAPT.ST	Sweden
GIGSEK.ST	Sweden
ACELP.ST	Sweden
MIDWa.ST	Sweden
MSONa.ST	Sweden
COREa.ST	Sweden
ATVEXAb.ST	Sweden
CNCJOb.ST	Sweden
HANDI.ST	Sweden
GYLDa.CO	Denmark
GERHSP.CO	Denmark
NTRb.CO	Denmark
KLEEb.CO	Denmark
GYLDb.CO	Denmark

GREENM.CO	Denmark
SIF.CO	Denmark
GJ.CO	Denmark
RIASb.CO	Denmark
SBS.CO	Denmark

7.6. STATA DO-FILE

```
*Rename variables
rename EBITDATotalAssets EBITDA_tot_ass
rename MarketValueforCompany market_value
rename TotalReturnbefore tot_return
rename Averagevolume avg_volume
rename Sectors sectors
rename Headquarter headquarter
rename PriceToBookValuePerShareD pb_value
rename Tangibilitysharestotalassets tangibility

*Convert to numeric
encode sectors, generate(sectors_N)
encode headquarter, generate(headquarter_N)

*Convert headquarter to dummy
gen headquarter_d = (headquarter_N==1)

*Variables Manager
label define headquarter1 0 "Norway" 1 "Abroad"
label values headquarter_d headquarter1

*Create variable id for sectors
label define headquarter 0 "Norway" 1 "Abroad"
label value headquarter_d

*Generating logarithms
gen ln_market_value=ln(market_value+1)
gen ln_avg_volume=ln(avg_volume+1)
```

```
*Regression tables
reg AR1 EBITDA_tot_ass ln_market_value ln_avg_volume pb_value
tangibility headquarter_d
qui reg AR1 EBITDA_tot_ass ln_market_value ln_avg_volume pb_value
tangibility headquarter_d
qui eststo model1
reg CAR EBITDA_tot_ass ln_market_value ln_avg_volume pb_value
tangibility headquarter_d
qui reg CAR EBITDA_tot_ass ln_market_value ln_avg_volume pb_value
tangibility headquarter_d
qui eststo model2
esttab using event1.rtf

reg CAR ibn.sectors_N, noconstant
qui reg CAR ibn.sectors_N, noconstant
qui eststo model1
esttab using event1sectors.rtf

*Repeat all steps for all events (use AR0 for event 3)
```