Bachelor Thesis Financial Economics

Effect of the COVID-19 virus on the Stock Market

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Abstract

This thesis examines the effect of the COVID-19 virus on the stock returns of S&P 500 companies for three event periods by looking at the Cumulative Abnormal Returns (CARs). The focus is on four variables of interest which are part of the several hypotheses to be tested: industry number, market value, leverage ratio and liquidity ratio. A short-term event study and a CAR-regression analysis are performed. Positive as well as negative effects are observed for the CAR of each industry number. Market value has a positive effect on the CAR. The results show no significant effect for leverage ratio and liquidity ratio.

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1. Introduction

Many countries in the world, including the Netherlands, are suffering from the spread of the COVID-19 virus with all serious consequences. This virus has an impact on the whole population, but the people most hurt by the disease are the high-risk groups like the elderly and other people with weak health. It is inevitable that there will be many victims who suffer physically and mentally, but also the strong economies and the industries within it have to face this problem. For example, there is a lot in the news that we all have to provide financial support for local companies where possible, because these companies are especially struggling in such times of unrest.

This immediately gives rise to the relevance of this research. Research into the COVID-19 virus is now socially relevant because it currently plays a major role in both society and the economy as a whole and will not simply disappear from the streets for the time being. Furthermore, it is scientifically relevant, because research into this type of coronavirus and its economic consequences can demonstrate the strength of economies and give insights to which type of companies with which firm characteristics are mostly affected and have to be better protected.

This topic has aroused interest in me because of the profound consequences on both society and the economy. The research question that will be answered in this report is the following:

What is the effect of the COVID-19 virus on the stock market?

To answer this main question, four hypotheses are tested. These hypotheses are the following:

1. *Some industries are hit harder than others by the economic effects of the COVID-19 virus.*
2. *Smaller firms are affected more by the economic consequences of the COVID-19 virus than bigger firms.*
3. *Firms with a higher leverage ratio suffer more from the economic consequences of the COVID-19 virus than firms with a lower leverage ratio.*
4. *Firms with a higher liquidity ratio will suffer less from the consequences of the COVID-19 virus than firms with a lower liquidity ratio.*

Guided by these hypotheses, the abnormal returns are calculated for three event periods for the firms within the S&P 500 by the use of an event study. These are summed up to get the Cumulative Abnormal Return (CAR). Thereafter, regressions in STATA will be conducted between the CAR from event 1, CAR from event 2, CAR from event 3 and the four variables of interest to test their effect on the CARs. The regressions contain industry fixed effects. The variables of interest are industry code number, market value, leverage ratio and liquidity ratio. Also the control variables market value, percent revenue growth and profitability are included in the regressions to capture the abnormal return effects which are not due by the economic consequences of the COVID-19 virus. The variable market value is not included as control variable in the regression where it is the variable of interest.

There is found evidence that some industries were significantly positively and others significantly negatively affected by the consequences of the COVID-19 virus. It turned out that bigger companies were more positively affected than smaller firms. No conclusion could be drawn about the effect of the leverage ratio and liquidity ratio on the CAR because of missing significant results. The results were the same when using an event window of one day before and after each event instead of two days.

First, there will follow a theoretical framework with deeper explanation of the stated hypotheses with support of academic papers and other articles. After that some underlying information about the COVID-19 virus and other related coronaviruses will be presented. Then the methodology section will follow with a description of the way the results will be obtained. The data section will show were the data is from. Thereafter, the results part describes all the results acquired with the available data. The conclusion will give an answer to the main question by adopting and rejecting the stated hypotheses. After that, the discussion part will consist of limitations of the research and opportunities for further research. Lastly, some appendices are added for further information what is not comprehensive explained in the text parts.

2. Theoretical framework

Chen, Bin, & Chen (2005) did research into abnormal returns during several events in Taiwan. They concluded that events such as political elections, economic policies and cross-strait relationship developments are generally associated with considerable abnormal performance in the stock market. The development of the COVID-19 virus can also be seen as an event with expectedly abnormal performance in the stock market.

For the COVID-19 coronavirus, Baker, Farrokhnia, Meyer, Pagel, & Yannelis (2020) found that initially spending increased sharply, particularly in retail, credit card spending and food items to stockpile needed home goods. As the virus spread and more households stayed home, sharp drops in restaurants, retail, air travel, and public transport in mid to late March were visible. It is therefore with no doubt that every industry experiences the economic effects of the COVID-19 virus to a greater or less extent.

On the one hand are the industries that experience mostly negative effects of the virus. There is for example a lot in the news that firms in the Airline industry have reduced revenues such that some airlines have already collapsed, declared bankruptcy, or suspended operations so far (Slotnick, 2020). Similarly, the Dutch airline KLM threatens to go bankrupt if it does not receive financial support from the state (van der Heide, 2020).

Also, a lot of firms in the sectors for recreation will experience negative effects. The industry for hotels and catering were one of the first industries which had to shut down and others had to deal with strict regulations to stay open and have to survive on their reserves until who knows how long. Maheshwari believes that this already injured industries will have a huge reduction in the number of stores due to the closure (2020).

Entertainment events in Hollywood and around the world are also disrupted, from the theatrical releases of major studio tentpoles to the launch of film festivals and TV conferences. Some events are postponed, others are shut down definitely (Indiewire Staff, 2020).

Auto, Truck & Motorcycle Parts industry had to close the factories until June with as consequence that the production of parts was put on hold (Boudette, 2020). Also, the demand declines for this industry, because these are luxury goods and people spend less money for these goods in times of crises. The same for the industry that focuses on the sale of houses. Therefore negative returns are expected for these sectors.

On the other hand are the firms that can profit from the consequences of the COVID-19 virus. This is mostly due to the fact that a lot of people work from home and others have to stay home because of the rules set by the government so there is more demand for these specific services. The firms that can profit from this are the ones in the industry for electronic payments, cloud computing, video conferencing and collaboration, streaming, gaming and video content platforms, and also the online grocery delivery (Davies, 2020). The software industry has to innovate to develop well-functioning software so that people can successfully work from home.

From the beginning of the coronacrisis we saw that people were hoarding for toilet paper, canned vegetables, soap, paracetamol, water bottles and so on (Hermanides, 2020). Because of the rising demand for these goods positive results are expected for the drug and water industries.

There are many more industries to mention for this research within the S&P 500 and explain why they should benefit or suffer from the economic consequences of the COVID-19 virus, but it makes more sense to describe those in relation to the most interesting results. Otherwise this part would consist of a hundred parts description analysis. This leads to the first hypothesis:
Some industries are hit harder than others by the economic effects of the COVID-19 virus.

According to Sandilands (z.d.), small businesses are often hit harder during an economic recession than bigger businesses, because of the greater impact of reduced cash flow and reduces availability of credit. Also these businesses lack the amount of cash reserves to survive a long disruption in full employment. Another disadvantage of small and medium-sized enterprises is that they are characterized by higher company-specific risk factors, such

as the dependence of a certain customer concentration on a limited spread of activities. Banks will be a bit more reluctant to finance acquisitions, because reaching the forecast has become more uncertain (Consultancy.nl, 2020). Wagner, Zeckhauser, & Ziegler (2018) also found significant results that firms that pay a higher tax amount, which is the case for larger companies, gained from the effects of the election for president. Therefore it is expected that smaller companies are hit harder and show more negative Cumulative Abnormal Returns than bigger firms. This gives rise to the second hypothesis:

Smaller firms are effected more by the economic consequences of the COVID-19 virus than bigger firms.

When looking further in the characteristics of firms there are other characteristics that are important for the extent a company is affected by the economic consequences of the COVID-19 virus. According to Sri Utami (2007), firms with a higher leverage ratio face a higher relative fixed load and therefore are more riskier. Firms with a higher leverage ratio have also endured waves of selling by bondholders as they ratchet down expectations for global growth (Wee & Rockeman, 2020). That is why a higher negative Cumulative Abnormal Return is expected for higher leveraged firms. This gives rise to the third hypothesis:

Firms with a higher leverage ratio suffer more from the economic consequences of the COVID-19 virus than firms with a lower leverage ratio.

Fitch Wire (2020) has uncovered that weaker pricing and volumes due to the corona virus outbreak have cut the cash flow from commodity producers. He also revealed the vulnerabilities of producers with tighter liquidity and lower financial flexibility. Simultaneously, the volatility of capital markets limits access to external sources of liquidity, especially for high-yield (HY) issuers. This may lead to increasing pressure on ratings. As a result, the higher the liquidity ratio the higher positive Cumulative Abnormal Returns are expected to show in this research. Therefore the last hypothesis is the following:

Firms with a higher liquidity ratio will suffer less from the economic consequences of the COVID-19 virus than firms with a lower liquidity ratio.

3. Underlying information about the virus

Several years ago, there were outbreaks of coronaviruses similar to the current COVID-19 virus. For example, there was an outbreak of Severe Acute Respiratory Syndrome or SARS virus in 2002. This is known to affect the lower respiratory tract and has its origin in China. The virus originated from bats and via animals as carriers it has mutated into a virus that damages people (RIVM, 2020).

A decade later, the world was introduced to another form of the coronavirus, which was named Middle East Respiratory Syndrome (MERS), due to an outbreak in several countries in the Middle East and South Korea. The idea here is that the virus originates from bats and has mutated within camels in such a way that it could infect humans.

These two coronaviruses have been widely compared over the years because they are both a form of the coronavirus, but they each have different properties. For example, the common feature of coronaviruses is that they can cause respiratory infections in both humans and animals. Usually this concerns colds. However, the MERS virus is a special type of coronavirus that can present a more serious clinical picture, with very serious respiratory complaints, also known as Acute Respiratory Distress Syndrome (ARDS). The patients suffer from fever, cough, shortness of breath and breathing problems. Because of the serious complaints, these people are hospitalized. In healthy and younger people, the disease leads to a less serious clinical picture in comparison to others (RIVM, 2016).

At the time, and possibly still in some countries, these coronaviruses have had a major impact not only on the health of the citizens, but also on the economy within the countries where the virus was prevalent. For example, each country has taken its own measures that are believed to have the best results for the country, with all the associated consequences. Despite the significant damage done by the former coronaviruses, they have taken their toll in fewer countries than the current COVID-19 virus does now. For example, the SARS virus was prevalent in 23 countries and there were 8,000 cases (World Health Organization, 2012) and the MERS virus came no further than the Middle East.

The mortality rate of the current COVID-19 virus is already 126 thousand deaths on April 14, 2020 (Frijters, 2020). It even rose to 400 thousand on June 7, 2020 with about 110 thousand victims in America (FD, 2020).

The fact that this current coronavirus is existing in many countries spread around the world makes the research interesting for the healthcare sector as well as the developments in the various economies in the world because it affects us all. Although this thesis is about the economic effects of the COVID-19 virus and not about the effects on the human body or society, some background information might give a better understanding about the topic and emphasize the importance of research towards the virus from all possible angles of incidence.

As with the previous coronaviruses, the COVID-19 virus originated from the bats and evolved in pangolins, a scaly mammal that looks like an anteater, before it spread to humans (Readfearn, 2020). The reason for the larger number of infections seen by this new coronavirus is mainly due to the long incubation period (2-14 days) of the virus, which makes it easier to infect people even if you do not yet suffer from the characteristic symptoms (RIVM, 2020a). Furthermore, the physical complaints people have range from mild respiratory complaints with a light cold to severe pneumonia and shortness of breath. Some people lie on the Intensive Care (IC) in the hospital for weeks, because their immune system is weakened by the virus and in several cases even does not allow people to breath on their own. This sparks a lot of concern among the population, especially at high-risk groups, because there is a good chance that they may not be able to recover, if they can be helped at all. Also the news mentions the decease of many nurses and other caregivers in and around the hospitals who tried to take care of the patients at the expense of their own lives. This was mainly due to the fatigue of the healthcare workers and thus a weakened immune system, so that wearing protective clothing was not enough to protect them from getting the disease.

That people are afraid of the virus and the consequences it entails is therefore not unexpected. It is not only visible due to the presence of fewer groups of people on the street, but also reflected in the figures of the shares, people have less confidence in the economy and companies are deteriorating as a result. Possible economic consequences of this lack of confidence are the collapse of both small and large companies, especially if governments fail to provide financial aid to keep them afloat.

4. Methodology

To investigate the reaction of share prices to the COVID-19 virus, a research is being conducted into the Cumulative Abnormal Returns (CAR) of the various companies from the S&P 500 index.

The choice was made to follow this index, because this index is the most followed index worldwide. The index currently contains 505 different companies operating in 100 different sectors.

Figure 1 shows which main sectors with which percentage market capitalization are in the index

(Sing, 2020).
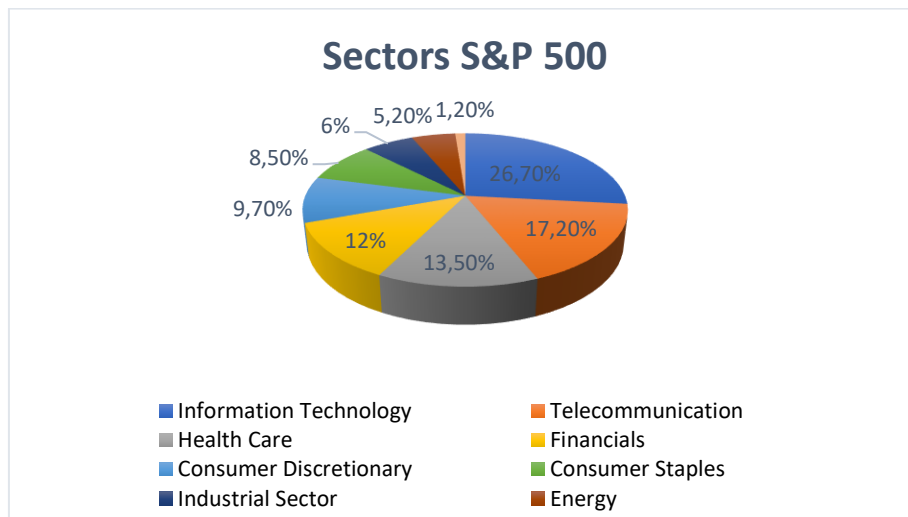
Figure 1. Main sectors within the S&P 500 and percentage market capitalization

The abnormal returns for the companies within the S&P 500 will be conducted by the use of an event study for two days before and two days after each event with a program called Event Study Tool from the Erasmus University. The calculations for the abnormal returns are based on the difference between the real returns and the expected returns in the three event periods.

The expected return for the stocks of each firm within the event periods is based on the event study from the returns in the reference period which is from the past business year until fifty trading days before each event.

The real returns for the event periods are obtained from the Datastream database from the Erasmus University. After the abnormal returns are obtained for each event they are summed up to get the Cumulative Abnormal Returns (CAR).

The chosen event dates including the corresponding situation for the conduction of this research are the following:

➢ **January 9, 2020:** China CDC reported the first COVID-19 incidents. From the 59 cases with pneumonia symptoms there were 15 with the coronavirus as causative agent.

➢ **March 11, 2020**: COVID-19 was declared as a global pandemic by the Director General of the World Health Organization (ecdc, 2020).

➢ **March 25, 2020**: All the European countries and more than 150 countries worldwide were affected by the coronacrisis. Also the same time as the highest level of new jobless claims in the Unites States of America of 6,65 million people. (Long, 2020)

The Event Study Tool is also used for information from each firm within the S&P 500 about the variables industry code, total debt, total assets, cash, market value, revenue and pretax income. These variables have the same name as the information they represent.

The variable industry code number has given a number to each industry, based on the IBES qualification each firm has, to calculate the total industry effect. There is made use of this type of qualification for the industries because estimates based on IBES provide deeper insight and analysis on a product/segment basis (Refinitiv, n.d.). The leverage ratio is calculated based on the total debt divided by the total assets of the firm. Furthermore, the liquidity ratio is calculated by dividing the amount of cash a firm has by the total value of the assets. A variable percent revenue growth is conducted by the taking the percental difference in revenue between January first 2020 and January first 2019.
For the variable market value the natural logarithm is taken to minimalize the amount of outliers. The last variable used in this research is profitability and it contains the ratio pretax income to total assets.

Thereafter, regressions in STATA will be conducted between the CAR from event 1, CAR from event 2, CAR from event 3 and the four variables of interest to test the four hypotheses stated in the introduction with a significance level of under 10 percent for each event date to draw conclusions. These variables of interest are industry code number, market value, leverage ratio and liquidity ratio. Also the control variables market value, percent revenue growth and profitability are included in the regressions to capture the abnormal return effects which are not due by the economic consequences of the COVID-19 virus. For the second regression the control variables were only percent revenue growth and profitability, because market value was the variable of interest for the size hypothesis. These control variables were selected based on the effectiveness they had in the paper about the company stock price reactions to the 2016 election shock with Trump as candidate for president (Wagner, Zeckhauser, & Ziegler, 2018, p. 432).

First, three regressions between the CAR for each event separately, industry code number, and the control variables will be conducted to see whether some industries are affected more than others. Also a graphical overview will show the frequency of the CARs for the firms in the S&P 500 for each event.

Secondly, three regressions between the CAR for each event separately, market value, control variables, and industry code number will be conducted to test whether the size of a company has a significantly positive effect on the degree of the impact of the COVID-19 virus on the firms. The industry code number takes the industry fixed effects into account.

Subsequently, three regressions between the CAR for each event separately, leverage ratio, control variables, and industry code number will be conducted to test whether a higher leverage ratio leads to a higher negative CAR. The industry code number takes the industry fixed effects into account.

Latest, there will be three regressions between the CAR for each event separately, liquidity ratio, control variables, and industry code number to test whether a higher liquidity ratio leads to higher positive CARs. The industry code number takes the industry fixed effects into account.

To see whether the choice for a specific length of the event window has a significantly different impact on the results, there is also conducted research in the exact same way as described above, but then for one day before and after the event. This results will not be discussed in the main text of the thesis, but these results are shown in Appendix B.

5. Data

All the data required for this research originates from the Datastream service offered by Erasmus University in Rotterdam. This is a data source that contains a lot of information about many variables useful to do analyses. From this service, the returns for the companies from the S&P 500 and the market as a whole are taken for the reference period 50 to 250 trading days before the events to conduct an event study. With this event study, the expected returns for 2 days before and 2 days after each event are acquired. Subsequently, the abnormal returns are calculated by taking the difference between the real returns and the obtained expected returns on the days around the events. The Cumulative Abnormal Returns are the summation of the five abnormal returns for each event. The data for the returns used for this research is from the 505 firms within the S&P 500 for the period January 2019 until March 2020.

Also, the information from each firm within the S&P 500 for the variables industry code, total debt, total assets, cash, market value, revenue, and pretax income, which is needed to perform the required regression analyses, is from the same Datastream service. The data for this variables is from January 1, 2020. Except for the variable revenue, that is from January 1, 2020 as well as January 1, 2019 to calculate percental difference in revenue.

As mentioned in the methodology, the industry code is used to give every industry another number. Total debt and total assets are needed for the leverage ratio. For the liquidity ratio, the variables cash and total assets are used. Lastly, the variables pretax income and total assets lead to the variable profitability.

6. Results

This part of the paper contains the results of the analyses for the four hypotheses to be tested for answering the main question. Each part covers a different hypothesis.

6.1 Industry analysis

Table 7 (Appendix B) contains an overview of the coefficients from the OLS regression of all the S&P 500 industries and firm characteristics on the CAR of the three events. The value for the industry Advanced Medical Equipment & Technology is the constant from the regression analysis. When adding the coefficient for the industry of interest to this constant value, the value of the CAR of that industry could be obtained.

Hereafter in this part of the results only the five highest subsequent lowest coefficients for each event are being discussed, because these industries are affected the most and are thereby most interesting to discuss.

6.1.1 Event 1

The histogram in Figure 2 shows that industries are positively as well as negatively affected by the consequences of the coronacrisis. Most of the firms have a CAR value that lies closely around the zero-CAR line, which means that the returns for these firms are almost equal to the expected returns this time of the year. These firms are apparently the least affected by the economic consequences of the coronavirus.

However, the most interesting industries of the research are the industries from which the firms have bars that lie further from the other observations around the zero-CAR point. These are the industries that are more affected than others. For event 1 the amount of positive CARs is approximately equal to the amount of negative CAR values.

The numbers on the x-axis of Figure 2 represent the value of the CARs whereby 0.2 stands for twenty percent and the y-axis shows the frequency each CAR occurs. This is the same for the histograms in the other two events.
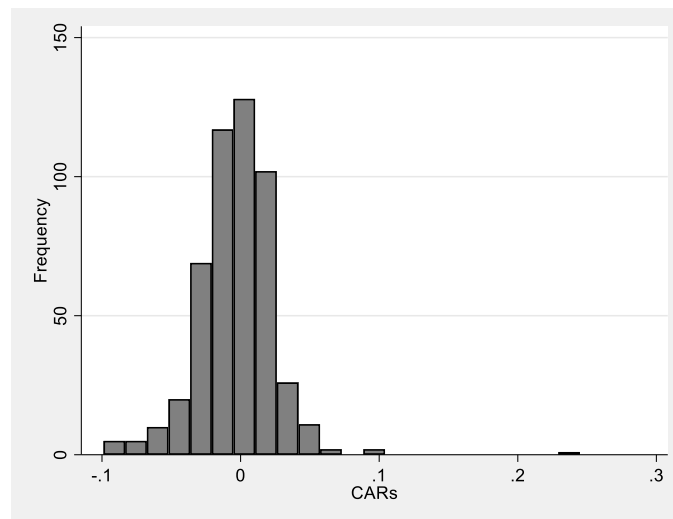
Figure 2. Histogram between the CARs from event 1 and their frequency

Table 1 shows the five industries with the highest subsequent lowest coefficients for the first event which was on January 9 in 2020. There are several coefficients that are not in line with what was to be expected for those industries based on articles and logical reasoning.

Positively affected industries

The first unexpected coefficient is the significantly positive coefficient for the Specialty Mining & Metals industry. According to Swart (2020), the demand for commodities like copper, iron remains low as markets anticipate a lower near-term demand outlook. Except for gold, as this metal benefits from higher levels of uncertainty. Because of this, a negative coefficient for this sector was to be expected. On the other hand are the lower energy prices. These are 20 to 25 percent of direct operating costs in the industry so that companies with unhedged positions in energy could benefit from the pricing regime (see Table 1). If this cost-benefit has the overhand it is not that unexpected that the coefficient of this industry is positive.

Another remarkable value in Table 1 is the significantly positive coefficient from the Miscellaneous Specialty Retailers sector. This sector contains fixed point sale locations (U.S. BUREAU OF LABOR STATISTICS, 2015). During the coronacrisis fewer people buy their supplies in stores, unless it is necessary and not available online, to reduce the risk of being exposed to the virus. Other fixed point locations have been shut down. Because of that, a negative coefficient was to be expected for this sector.

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The other three positive coefficients in Table 1 are indeed in line with the expectations. A lot of people started working from home which would lead people to make more use of online services and telecommunications as a replacement for the face to face conversation that normally happened. That expounds the positive coefficient for the Phones & Handheld Devices industry. These households are also in need of updated computer hardware and the necessary tools to not fall short in the correct supplies to complete their work without flaws. This contributes to the positive coefficient for Appliances, Tools & Housewares, and the Computer Hardware industries.

Negatively affected industries

As is shown in Table 1, the coefficient for the Oil Related Services and Equipment industry is significantly negative. This was expected according to Farmer (2020), because many projects in this sector are shut down worldwide until the coronavirus is under control.

As many others, the Auto, Truck & Motorcycle Parts industry had to close the factories until June with as consequence that the production of parts was put on hold (Boudette, 2020). This could explain the significantly negative coefficient (see Table 1).

Also, the negative coefficient for the department stores industry is not remarkable. Many were shut down and others had to deal with strict regulations to stay open. Maheshwari believes that this already injured industry will have a huge reduction in the number of stores (2020).

Another industry that is negatively affected by the consequences of the coronavirus is the Heavy Machinery & Vehicles industry. According to Jensen (2020), the production is slowed or stopped at many manufacturers and customers don't have the funds to purchase equipment—or in some cases the work to necessitate doing so. This explains the negative coefficient.

It is notable in Table 1 that the coefficient for the Advanced Medical Equipment & Technology industry is negative. There is a lot of research going on into the origin of the COVID-19 virus and how to protect people against it with a vaccine. The coefficient was therefore expected to be positive instead of negative.

Table 1

5 highest positive/negative coefficients from OLS regressions of industries and firm characteristics on the CAR for event 1

Industry	Coefficient(+)		Industry	Coefficient(-)
Specialty Mining & Metals	.0494897** (1.82)		**Oil Related Services and Equipment**	-.0478581*** (-3.28)
Miscellaneous Specialty Retailers	.0391282** (1.97)		**Auto, Truck & Motorcycle Parts**	-.0310496** (-2.28)
Phones & Handheld Devices	.039026 (1.42)		**Department Stores**	-.0225515 (-1.35)
Appliances, Tools & Housewares	.0303871 (1.53)		**Heavy Machinery & Vehicles**	-.0187261 (-1.26)
Computer Hardware	.0308379** (2.25)		**Advanced Medical Equipment & Technology**	-.0179523 (-1.19)

T-statistics based on robust standard errors are shown in parentheses. $*** \ p < 0.01, ** \ p < 0.05, * \ p < 0.1$.

6.1.2 Event 2

Figure 3 shows that there are more firms as outliers that are negatively affected by the results of the coronavirus for the second event in contrast to the first event. This could be because the second event date is further into the crisis period with more regulations and restrictions set by the government or due to financial difficulties.
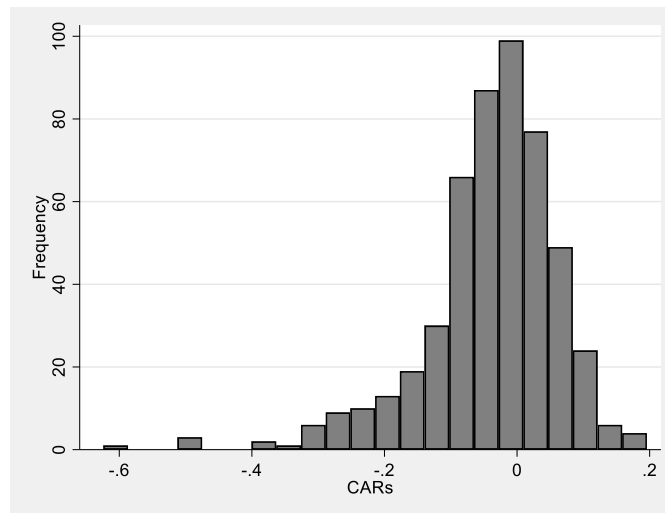
Figure 3. Histogram between the CARs from event 2 and their frequency

Table 2 shows the five industries with the highest subsequent lowest coefficients for the second event which was on March 11 in 2020. Also for this event, there are several coefficients that are not in line with what was to be expected for those industries based on articles and logical reasoning.

Positively affected industries

Because of the coronavirus, making investments is cheaper than before due to the higher risk associated with the investment. That is why people who can miss money probably invest a higher amount than before to gain after these times of crisis. To do this, people are also in need of more financial services to advise which investments are best to put their money in and exchange facilities for securities trading. This is done by brokers and that could explain the significantly positive coefficient of the Investment Banking & Brokerage Services industry (see Table 2).

Other industries like the chemical industry are hit hard by the dual crisis. First the oil price fall and now the outbreak of COVID-19. Each type of chemical witnessed a decline in production. Restrictions on travel have had a direct impact on the demand for petrochemicals. As people travel less and with countries closing their borders, the demand from the transportation and automotive industries has declined.

Despite this, a large number of leading players in the chemical industry have stepped up to produce raw materials for safety products which are necessary against the spread of the

virus. The demand for protective packaging is also on the rise due to the increased need for preventing contamination of food, personal care, and medical products. This has lead companies manufacturing fuel-grade alcohol to make neutral alcohol for hand sanitizer and other disinfectants. Plastic manufacturers for sports gears are making medical shields. Leading players such as Dow, Huntsman and INEOS are ramping up the production of hand sanitizer. Honeywell plans to open a new manufacturing facility to produce protective masks, while Solvay partnered with Boeing to produce face shields in response (GEP, 2020). Therefore a significantly positive coefficient was expected (see Table 2).

More people work from home instead if the office which could have a positive effect on the Appliances, Tools & Housewares industry for the same reasons mentioned for event 1.

What is interesting is the coefficient of the Consumer Publishing industry (see Table 2). Fewer copies are being distributed because of the shortage in distribution, cancellation of events, and the lack of advertisement. Because of this, they miss a lot of revenues. However, the offering of free information about the coronavirus and online services reach new customers (Kalim, 2020). Possibly the second explanation has had a stronger impact on the industry than the first reason and therefore a positive coefficient is not unrealistic.

As with other industries the Software industry has seen drops in revenues, offices closed and meetings interrupted. However, this industry puts a lot of innovative effort in coping with the challenges in web application development. The hardware brands are facing the delay in shipping and B2B tech platforms are spoiled, but the streaming and gaming services are increasing in demand, and online video streaming apps are highly respected. Therefore, there is a mixed effect on the software industry. This along with the fact that people have to work from home and need well-functioning software to perform their work is in line with a significantly positive coefficient shown in Table 2.

Negatively affected industries

The first unexpected coefficient from Table 2 is the significantly negative coefficient for the Gold industry. As mentioned earlier, Swart (2020) stated that gold benefits from higher levels of uncertainty. The coronacrisis provides this uncertainty and therefore a positive coefficient was expected.

Meanwhile, it is not unexpected that the industry for Hotels, Motels & Cruise lines is significantly negatively affected, because this was one of the first industries that had to close down many firms worldwide for an unknown period of time and misses out a lot of revenues although the expenses do not decline.

Also, the significantly negative coefficient for the Homebuilding industry is not surprising. People live in uncertainty about their health and jobs and therefore will not buy a new home, not at all build new ones until their economic situation is more stable.

As mentioned before the coefficient for Oil & Gas Drilling and Oil & Gas Exploration and Production is expected to be significantly negative because many projects in this sector are shut down worldwide until the coronavirus is under control Farmer (2020). This is also shown in Table 2.

Table 2

5 highest positive/negative coefficients from OLS regressions of industries and firm characteristics on the CAR for event 2

Industry	Coefficient(+)	Industry	Coefficient(-)
Investment Banking & Brokerage Services	.1137268*** (2.68)	**Gold**	-.2840675*** (-3.42)
Diversified Chemicals	.1112256 * (1.81)	**Hotels, Motels & Cruise Lines**	-.2625037*** (-6.25)
Appliances, Tools & Housewares	.0960696 (1.58)	**Homebuilding**	-.2468242*** (-5.42)
Consumer Publishing	.0856678 (1.03)	**Oil & Gas Transportation Services**	-.1795948*** (-3.48)
Software	.0753089** (2.44)	**Oil & Gas Exploration and Production**	-.1600775*** (-4.88)

T-statistics based on robust standard errors are shown in parentheses. $*** \ p < 0.01$, $** \ p < 0.05$, $* \ p < 0.1$.

6.1.3 Event 3

Also for the third event, there is made use of a histogram and regression analysis between the CAR and industry. In Figure 4 it is notable that there are more positive outliers than in the other two events.
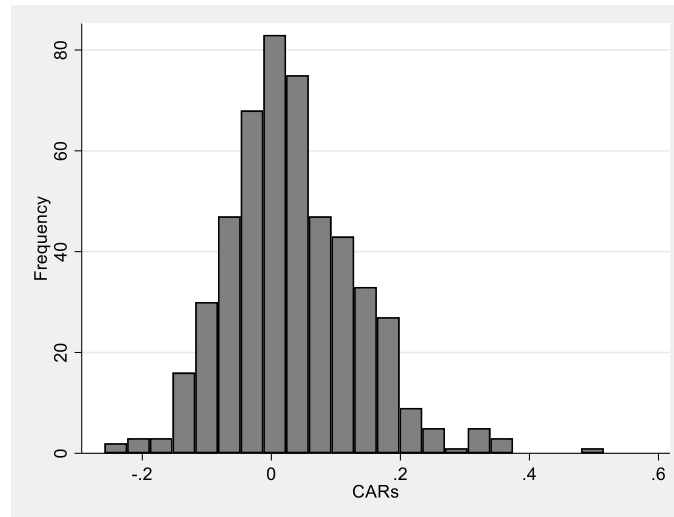
Figure 4. Histogram between the CARs from event 3 and their frequency

Table 3 shows the five industries with the highest and lowest coefficients for the third event which was on March 25 in 2020. Also for this event, there are several coefficients that are not in line with what was to be expected for those industries based on articles and logical reasoning.

Positively affected industries

The coronavirus outbreak is disrupting entertainment events in Hollywood and around the world, from the theatrical releases of major studio tent poles to the launch of film festivals and TV conferences. Some events are postponed, others are shut down definitely. Because of this, a negative coefficient for the Entertainment Production industry was expected instead of a significantly positive coefficient (Indiewire Staff, 2020).

It is not remarkable that the coefficient for Life & Health Insurance is significantly positive (see Table 3). With all the health issues associated with the COVID-19 virus, people want to be better insured just in case they need medical assistance without paying the full price for the service.

Many water utilities around the world have released their continuity plans to ensure the correct continuance of their services, including the treatment, distribution of drinking water and wastewater sanitation. As the coronavirus cases increase in the United States, shoppers were not only stocking up on goods such as toilet paper but also on bottled water. (Smart Water Magazine, 2020). This defines the rise in demand and therefore a significantly positive coefficient for the Water & Related Utilities industry is in line with the expectations (see Table 3).

For this third event in contrast to the second one, the coefficient for the Gold sector is in line with the expectations as mentioned by Swart (2020). Namely that gold benefits from higher levels of uncertainty and should have a positive coefficient.

Air travel has been one of the hardest-hit industries in the early days of the COVID-19 pandemic. As countries around the world have closed their borders, and many states and nations have inserted a lockdown, air travel has declined significantly, with airlines suspending routes, grounding planes, and seeing low load factors on their few remaining flights. Some airlines have already collapsed, declared bankruptcy, or suspended operations so far. For example Flybe, Trans States Airlines, Compass Airlines, and Virgin Australia (Slotnick, 2020). Therefore a positive coefficient in Table 3 for the Airlines industry was far from expected.

Negatively affected industries

The negative coefficient for the Consumer Publishing industry (Table 3) is in line with the earlier mentioned expectations. Fewer copies are being distributed because of the shortage in distribution, cancellation of events, and the lack of advertisement. Because of this, they miss a lot of revenues (Kalim, 2020).

Furthermore, the outbreak of the coronavirus is causing the Electronic Equipment & Parts industry major pain and delays, as suppliers based in China have struggled to keep factories running at full speed. Many of these electronics manufacturers based in the United States or Europe rely on certain components built by suppliers in China (Cain, 2020). Therefore a significantly negative coefficient was not unthinkable.

Just like event 1, the coefficient for the Department Stores industry is in the top 5 negative coefficients for event 3 as well. Many departments were shut down and others had to deal with strict regulations to stay open. Maheshwari believes that this already injured industry will have a huge reduction in the number of stores (2020). This contributes to a significantly negative coefficient (see Table 3).

The coefficient for the Drug Retailers is also in line with the expectations according to Balfour (2020). Generic drug producers who source APIs from China or India faced supply chain issues. Short-term scarcities have affected certain products. Manufacturers of branded pharmaceuticals may see a shift in their demand, both as antiviral use rises and as other chronic conditions are left untreated by patients due to concerns over exposure to COVID-19. This combined with a disruption in product delivery has possibly led to a significantly negative coefficient.

According to Feber, Lingqvist, & Nordigården (2020) the demand in the Paper Packaging industry will rise sharply for packaging for groceries, healthcare products, and e-commerce transportation. At the same time, demand for industrial, luxury, and some B2B-transport packaging could decline. The impact on packaging players will depend on their portfolios and exposures to different regions, end uses for packaging and substrates. If the demand for industrial, luxury, and B2B-transport packaging declines more than the rise in the other products, a negative coefficient for this industry is in line with the information.

Table 3

5 highest positive/negative coefficients from OLS regressions of industries and firm characteristics on the CAR for event 3

Industry	Coefficient(+)	Industry	Coefficient(-)
Entertainment Production	.2397787*** (2.81)	Consumer Publishing	-.1540976* (-1.80)
Life & Health Insurance	.1855687*** (4.80)	Electronic Equipment & Parts	-.102545** (-2.19)
Water & Related Utilities	.1725233** (2.02)	Department Stores	-.1015313* (-1.93)
Gold	.1675966* (1.96)	Drug Retailers	-.0980075* (-1.86)
Airlines	.1672293*** (3.88)	Paper Packaging	-.0825834 (-1.57)

T-statistics based on robust standard errors are shown in parentheses. $*** \ p < 0.01, \ ** \ p < 0.05, \ * \ p < 0.1$.

6.1.4 Joint analysis

Put together the results shown in Tables 1 up to 3, Table 7 and Figures 2 up to 4, there are industries that are (significantly) positively as well as negatively affected by the economic consequences of the COVID-19 virus. That is why the first hypothesis that "Some industries are hit harder than others by the economic effects of the COVID-19 virus" could not be rejected based on the data used in this research.

6.2 Size analysis

To test the effect of the size of a firm on the CAR of each firm a regression is conducted between the CAR from each event, the natural logarithm of variable market value, and the two control variables percent revenue growth and profitability of the firm. Also, the variable industry code number is used to take the industry fixed effects into account. The results of this regression are shown in Table 4.

The coefficient for market value has a negative value for the first and second events, but these values are not significant, so no conclusions can be drawn based on those outcomes (see Table 4).

However, the coefficient for event 3 is significantly positive so that means that firms with a higher market value have higher positive CARs and thus profit more by the consequences of the COVID-19 virus than firms with a lower market value. This is in line with the second stated hypothesis that *"Smaller firms are affected more by the economic consequences of the COVID-19 virus than bigger firms".* Therefore this second null hypothesis cannot be rejected.

Table 4

OLS regressions of market value and control variables on the CAR

	Event 1	Event 2	Event 3
Ln (market value)	-.000323 (-0.36)	-.0009545 (-0.35)	.0055199* (1.95)
Percent revenue growth	.001742 (0.24)	.0254466 (1.17)	.0119135 (0.49)
Profitability	.0023963 (0.12)	.225788*** (3.74)	-.0847393 (-1.49)
Constant	-.003371 (-0.22)	-.0293515 (-0.63)	.0522902 (0.98)
Observations	495	498	498
R-squared	0.2881	0.5130	0.4677
Industry fixed effects	Yes	Yes	Yes

T-statistics based on robust standard errors are shown in parentheses. $*** \ p < 0.01$, $** \ p < 0.05$, $* \ p < 0.1$.

6.3 Leverage ratio analysis

To test the effect of the leverage ratio on the CAR of each firm a regression is conducted between the CAR from each event, the variable leverage ratio, and the three control variables percent revenue growth, profitability of the firm and the natural logarithm of the market value. Also, the variable industry code number is used to take the industry fixed effects into account. The results of this regression are shown in Table 5.

The coefficient for the leverage ratio is positive for the first event, but negative for the second and third one (see Table 5). However, none of the coefficients are significant, so no conclusions can be drawn for the effect of leverage ratio on the CAR. Therefore has the third hypothesis that "*Firms with a higher leverage ratio suffer more from the economic consequences of the COVID-19 virus than firms with a lower ratio*" no conclusion.

Table 5

OLS regressions of leverage ratio and control variables on the CAR

	Event 1	Event 2	Event 3
Leverage ratio	.0000429 (1.04)	-.0000621 (-0.49)	-.000018 (-0.14)
Percent revenue growth	.0020303 (0.28)	.0244281 (1.12)	-.0027679 (-0.12)
Profitability	-.0052316 (-0.25)	.2329338*** (3.66)	-.0043226 (-0.07)
Ln (market value)	-.0008147 (-0.80)	-.0002057 (-0.07)	.0057341* (1.78)
Constant	.0029234 (0.18)	-.0384871 (-0.76)	-.0854851 (-1.64)
Observations	494	497	497
R-squared	0.2902	0.5135	0.0371
Industry fixed effects	Yes	Yes	Yes

T-statistics based on robust standard errors are shown in parentheses. $*** \ p < 0.01, \ ** \ p < 0.05, \ * \ p < 0.1$.

6.4 Liquidity ratio analysis

To test the effect of the liquidity ratio on the CAR of each firm a regression is conducted between the CAR from each event, the variable liquidity ratio, and the three control variables percent revenue growth, profitability of the firm and the natural logarithm of the market value. Also, the variable industry code number is used to take the industry fixed effects into account. The results of this regression are shown in Table 6.

As Table 6 shows, the coefficient for the liquidity ratio is positive for the first and second events, but negative for the third one. However, these coefficients are not significant, so no conclusions can be drawn based on those outcomes. Therefore no statements can be made about the fourth and last hypothesis that *"Firms with a higher liquidity ratio will suffer less from the consequences of the COVID-19 virus than firms with a lower liquidity ratio".*

Table 6

OLS regressions of liquidity ratio and control variables on the CAR

	Event 1	Event 2	Event 3
Liquidity ratio	.0066004 (0.38)	.042528 (0.81)	-.0520976 (-0.97)
Percent revenue growth	.0018556 (0.25)	.0267247 (1.20)	-.0048598 (-0.21)
Profitability	.0001755 (0.01)	.2089914*** (3.28)	.0086541 (0.13)
Ln (market value)	-.0002232 (-0.23)	-.0007746 (-0.26)	.0046391 (1.54)
Constant	-.0053391 (-0.32)	-.0352866 (-0.70)	-.0656185 (-1.27)
Observations	473	476	476
R-squared	0.2861	0.5199	0.4708
Industry fixed effects	Yes	Yes	Yes

T-statistics based on robust standard errors are shown in parentheses. $*** \ p < 0.01, ** \ p < 0.05, * \ p < 0.1$.

7. Conclusion

In this thesis, the effects of several variables of interest on the Cumulative Abnormal Returns for three events during the COVID-19 crisis were analyzed. The aim of the thesis is to see how the market reacts to the developments of the COVID-19 virus in comparison to the normal returns the market sees in the same period. The total data used for this research is from the 505 firms within the S&P 500 for the period of January 2019 until March 2020.

The research question of this thesis is:

What is the effect of the COVID-19 virus on the stock market?

This was investigated using four hypotheses with different variables of interest to determine whether certain properties of companies would lead to a higher or lower CAR.

For each event, there was a regression conducted between the CAR, the variable of interest and the control variables percent revenue growth, profitability and market value. Also the variable industry code number is used to take the industry fixed effects into account. The second hypothesis had only two control variables because the market value was the variable of interest in that hypothesis.

The first hypothesis is that some industries are hit harder than others by the economic effects of the COVID-19 virus. The variable industry code number is in this regression the variable of interest. As shown in the results there were industries (significantly) positively as well as negatively affected by the COVID-19 virus. Therefore the null hypothesis could not be rejected.

The second hypothesis states that smaller firms are more affected by the economic consequences of the COVID-19 virus than bigger firms. This was tested with market value as the variable of interest. The higher the market value, the bigger the size of the company is. The coefficients for market value are negative for the first and second event, but these values are not significant, so no conclusions can be drawn based on those outcomes

However, the coefficient for event 3 is significantly positive so that means that firms with a higher market value have higher positive CARs and thus profit more by the consequences of the COVID-19 virus than firms with a lower market value. This is in line with the second stated hypothesis that *"Smaller firms are more affected by the economic consequences of the COVID-19 virus than bigger firms".* Therefore the second null hypothesis cannot be rejected.

The third hypothesis indicates that firms with a higher leverage ratio suffer more from the economic consequences of the COVID-19 virus than firms with a lower ratio. In this regression, the leverage ratio was the variable of interest. The coefficient for this variable was not significant for all three events, so no conclusions can be drawn for the effect of the leverage ratio on the CAR. Therefore has the third hypothesis, that f*irms with a higher leverage ratio suffer more from the economic consequences of the COVID-19 virus than firms with a lower ratio,* no conclusion.

The last hypothesis states that firms with a higher liquidity ratio will suffer less from the consequences of the COVID-19 virus than firms with a lower liquidity ratio. The liquidity ratio was the variable of interest in this regression. The coefficient for the liquidity ratio is positive for the first and second events, but negative for the third one. However, these coefficients are not significant, so no conclusions can be drawn based on those outcomes. Therefore no statements can be made about the fourth and last hypothesis that *firms with a higher liquidity ratio will suffer less from the consequences of the COVID-19 virus than firms with a lower liquidity ratio.*

Summarized, several effects have been observed for the various companies within the S&P 500 in the form of abnormal returns. Some industries were (significantly) positively affected and others negatively. It turned out that bigger companies were more positively affected by the economic effects of COVID-19 than smaller firms. No conclusion could be drawn about the effect of the leverage ratio and liquidity ratio on the CAR because of missing significant results.

8. Discussion

In the previous section, the findings of this research were discussed and evaluated. This section will discuss the limitations of the research and suggestions for further research.

Some empirical findings were in line with the information found in past articles. But unfortunately insignificant results were also obtained, which could be influenced by some limitations in this study. These may have affected the quality and reliability of the results in this empirical study

This paper focusses on the abnormal returns found for the firms in the S&P 500 index. Although this is the most used index worldwide, other indexes could have given other results and therefore other conclusions. This could be a limitation of the research.

Another limitation could be the following, the research is conducted for three different events in 2020 during the influences of the coronavirus on the economy and society as a whole. These dates were chosen based on the information that was presented about the developments of the virus. It could be the case that there were other more economically interesting events with higher abnormal returns which were not taken into account in this research. Maybe these other dates would have given other or more significant conclusions about the hypotheses.

Also, the time span around the event dates could lead to other results, the two days before and two days after the event could have contained other information not related to the event itself, but were seen as if they were. This could not be the case if there was made use of minus and plus one day instead of two, but then it may be that certain information is disregarded for what should have been included. This remains an uncertain point and could harm the internal validity of the research.

Furthermore, a reference period of a trading year, 250 trading days, until 50 trading days before each event was used to determine the expected returns for the days around each event. Another reference period with more or less trading days could give better and more significant results than the results presented in this thesis.

Another shortage of this research is the possibly omitted-variable bias (OVB). The OVB results in the model attributing the effect of the missing variables to the estimated effects of the included variables. To restrict the bias of the variables of interest, there were control variables added in each regression, namely percent revenue growth, profitability, and market value. Even though these variables have reduced the effect on the CAR attributed to the variable of interest, there could still be other factors that affect the CAR but are not included in the research. The variables of interest could therefore still be upwards or downwards biased.

For follow-up research, one could think of improving the OVB and the internal validity of the research by adding more firm-specific variables as control variables. Also, a variable to acknowledge the appearance of previous coronaviruses in the countries where the firms operate could be of interest. Ru, Yang, & Zou (2020) found that stock markets of countries without prior SARS deaths reacted significantly more negatively to the development of COVID-19 in their own countries. Furthermore, more than three events could be investigated to draw conclusions from the results based on more available data. It is also possible to look at multiple different indexes at the same time to see whether there are still differences between them as to the extent to which companies have been affected by the economic consequences of the coronavirus.

9. Appendix A - Regression Table

Table 7

OLS regressions of industries and firm characteristics on the CAR

Industry	Event 1	Event 2	Event 3
Advertising & Marketing	-.0017621 (-0.11)	.0372858 (0.73)	-.0091331 (-0.17)
Aerospace & Defense	.0008325 (0.08)	-.0614749* (-1.83)	.1105395*** (3.19)
Agricultural Chemicals	.0006347 (0.03)	-.0867487 (-1.43)	-.0247325 (-0.39)
Airlines	-.0017355 (-0.13)	.0001959 (0.00)	.1672293*** (3.88)
Aluminum	-.0693669** (-2.56)	-.1059941 (-1.28)	.1549152* (1.81)
Apparel & Accessories	-.0300565** (-2.35)	-.043151 (-1.10)	-.0416708 (-1.03)
Apparel & Accessories Retailers	.0257482* (1.89)	-.0264436 (-0.63)	.0426709 (0.99)
Appliances, Tools & Housewares	.0303871 (1.53)	.0960696 (1.58)	.0471295 (0.75)
Auto & Truck Manufacturers	-.0195825 (-1.16)	.0355786 (0.69)	.0381063 (0.71)
Auto Vehicles, Parts & Service Retailers	-.0142454 (-1.04)	-.0170943 (-0.41)	.1342326*** (3.12)
Auto, Truck & Motorcycle Parts	-.0310496** (-2.28)	.0434902 (1.04)	.0569561 (1.32)
Banks	-.0068049 (-0.70)	.0343502 (1.16)	-.0134551 (-0.44)
Biotechnology & Medical Research	.0036447 (0.27)	.0162038 (0.39)	-.0339558 (-0.79)
Brewers	.0203097 (0.75)	.0010385 (0.01)	-.0450085 (-0.53)
Broadcasting	-.0022321 (-0.18)	-.0245172 (-0.67)	-.0285634 (-0.76)
Business Support Services	.0127604 (1.09)	.0140778 (0.39)	.0271962 (0.74)
Casinos & Gaming	.0199193 (1.19)	-.0304684 (-0.59)	.0112863 (0.21)
Commercial REITs	.0049261 (0.49)	-.0173769 (-0.57)	.0864646*** (2.73)
Commodity Chemicals	.0141168 (1.21)	-.0506378 (-1.47)	-.0353316 (-1.00)
Communications & Networking	.012795 (1.00)	.0186439 (0.48)	.0208569 (0.52)
Computer & Electronics Retailers	.02642 (0.98)	-.0364094 (-0.44)	.0549648 (0.64)

Computer Hardware	.0308379** (2.25)	.0158019 (0.38)	.0347975 (0.81)
Construction & Engineering	-.0065011 (-0.33)	.009605 (0.16)	.0638111 (1.02)
Construction Materials	-.0136094 (-0.69)	-.0956125 (-1.58)	.1227861** (1.97)
Construction Supplies & Fixtures	.0055685 (0.28)	-.0149377 (-0.25)	.0498778 (0.80)
Consumer Lending	.0029864 (0.20)	.0287387 (0.62)	.1493322*** (3.14)
Consumer Publishing	.0094039 (0.35)	.0856678 (1.03)	-.1540976* (-1.80)
Courier, Postal, Air Freight & Land-based Logistics	.0129859 (0.78)	.0489926 (0.96)	-.0198084 (-0.38)
Department Stores	-.0225515 (-1.35)	-.0671055 (-1.31)	-.1015313* (-1.93)
Discount Stores	-.0034917 (-0.26)	.0180599 (0.43)	-.0368414 (-0.86)
Distillers & Wineries	-.0052768 (-0.27)	-.1433116** (-2.36)	.0837067 (1.34)
Diversified Chemicals	-.0115261 (-0.57)	.1112256* (1.81)	.0038576 (0.06)
Drug Retailers	-.0134587 (-0.80)	.0466773 (0.91)	-.0980075* (-1.86)
Electric Utilities	.0146216 (1.55)	-.0838127*** (-2.90)	.131545*** (4.42)
Electrical Components & Equipment	-.0013476 (-0.12)	.0315378 (0.92)	-.0355328 (-1.01)
Electronic Equipment & Parts	-.0224098 (-1.51)	.0663194 (1.46)	-.102545** (-2.19)
Employment Services	-.0004825 (-0.02)	.0312692 (0.51)	.0605134 (0.96)
Entertainment Production	-.0002803 (-0.01)	-.0491288 (-0.59)	.2397787*** (2.81)
Environmental Services & Equipment	.0143634 (0.72)	-.0384731 (-0.63)	-.033576 (-0.54)
Financial & Commodity Market Operators & Service Providers	-.0125692 (-0.99)	-.0549733 (-1.41)	.075701* (1.88)
Food Processing	.0052654 (0.53)	-.0257442 (-0.84)	.0155798 (0.50)
Food Retail & Distribution	-.0105017 (-0.63)	-.0560217 (-1.09)	.0210957 (0.40)
Footwear	-.0033373 (-0.12)	-.0649173 (-0.78)	.1090782 (1.27)
Gold	-.0150934 (-0.56)	-.2840675*** (-3.42)	.1675966* (1.96)
Ground Freight & Logistics	.028099**	.0032163	.0193825

	(2.32)	(0.09)	(0.51)
Healthcare Facilities & Services	.0119767	-.0435003	.0431113
	(0.93)	(-1.10)	(1.06)
Heavy Machinery & Vehicles	-.0179523	.0240226	.010633
	(-1.19)	(0.52)	(0.22)
Home Furnishings	-.0077437	-.0460247	.1281273**
	(-0.39)	(-0.76)	(2.06)
Home Improvement Products & Services Retailers	.0035082	-.0062111	.1507595**
	(0.17)	(-0.10)	(2.38)
Homebuilding	.0140759	-.2468242***	.16559***
	(0.95)	(-5.42)	(3.53)
Hotels, Motels & Cruise Lines	.0055297	-.2625037***	.1472126***
	(0.40)	(-6.25)	(3.40)
Household Products	.0153842	-.0605786	-.0689661
	(0.78)	(-1.00)	(-1.11)
Industrial Conglomerates	.0032053	.0400457	-.0009973
	(0.21)	(0.87)	(-0.02)
Industrial Machinery & Equipment	.0032301	.0088753	.0068874
	(0.33)	(0.29)	(0.22)
Integrated Telecommunications Services	.0034165	.007247	-.0688853
	(0.17)	(0.12)	(-1.09)
Investment Banking & Brokerage Services	.0313169**	.1137268***	-.0357475
	(2.26)	(2.68)	(-0.82)
Investment Management & Fund Operators	.0154177	.0691034*	-.0209448
	(1.33)	(1.94)	(-0.57)
Iron & Steel	-.0134251	.0600498	-.0348175
	(-0.50)	(0.72)	(-0.41)
IT Services & Consulting	.0161701*	.0061797	.036662
	(1.67)	(0.21)	(1.20)
Leisure & Recreation	.0110172	-.0955342	.0492707
	(0.56)	(-1.57)	(0.79)
Life & Health Insurance	.0102598	-.0322344	.1855687***
	(0.84)	(-0.86)	(4.80)
Managed Healthcare	-.015069	.0429154	.0846678*
	(-1.06)	(0.99)	(1.89)
Medical Equipment, Supplies & Distribution	.0083502	.0235656	.0312077
	(0.84)	(0.78)	(1.00)
Miscellaneous Specialty Retailers	.0391282**	-.1005578*	.0702082
	(1.97)	(-1.65)	(1.12)
Multiline Insurance & Brokers	-.0079685	-.030469	.0271301
	(-0.70)	(-0.88)	(0.76)
Multiline Utilities	.010024	-.0764988**	.1159743***
	(0.82)	(-2.13)	(3.13)
Natural Gas Utilities	.0161954	-.0388701	.1023838
	(0.60)	(-0.47)	(1.20)
Non-Alcoholic Beverages	.0193602	-.0232079	.0429106
	(1.16)	(-0.45)	(0.81)

Non-Paper Containers & Packaging	.0278494* (1.67)	-.0518673 (-1.02)	.0335831 (0.64)
Office Equipment	.0164145 (0.61)	-.1135118 (-1.37)	-.0480777 (-0.56)
Oil & Gas Exploration and Production	-.0072613 (-0.68)	-.1600775*** (-4.88)	-.0114634 (-0.34)
Oil & Gas Refining and Marketing	-.0073689 (-0.60)	-.0903011** (-2.40)	.0255569 (0.66)
Oil & Gas Transportation Services	-.0001625 (-0.01)	-.1795948*** (-3.48)	.0302131 (0.57)
Oil Related Services and Equipment	-.0478581*** (-3.28)	-.1666477*** (-3.74)	-.0156236 (-0.34)
Online Services	.0147248 (1.35)	.0617816* (1.85)	-.0517054 (-1.50)
Paper Packaging	.0073228 (0.44)	.0623202 (1.22)	-.0825834 (-1.57)
Personal Products	.0074607 (0.54)	.0177786 (0.42)	.0458074 (1.06)
Personal Services	.0141545 (0.52)	-.0521087 (-0.63)	.1149169 (1.35)
Pharmaceuticals	.0156811 (1.49)	.0331173 (1.03)	-.0433259 (-1.31)
Phones & Handheld Devices	.039026 (1.42)	.0871806 (1.04)	-.0945074 (-1.09)
Professional Information Services	.0299067** (2.34)	.0310431 (0.79)	.0399054 (0.99)
Property & Casualty Insurance	-.007368 (-0.57)	-.0145862 (-0.37)	.0133115 (0.33)
Real Estate Services	-.0101176 (-0.37)	-.0216503 (-0.26)	.0272266 (0.32)
Reinsurance	-.003128 (-0.12)	-.0982399 (-1.18)	-.0526671 (-0.62)
Residential REITs	.0106893 (0.83)	-.0046961 (-0.12)	.1439943*** (3.55)
Restaurants & Bars	.007011 (0.51)	-.0837964 (-2.00)	.1299027*** (3.01)
Semiconductor Equipment & Testing	.0041664 (0.28)	.0541721 (1.19)	.0354515 (0.76)
Semiconductors	.015692 (1.51)	.0619417* (1.95)	-.0450007 (-1.38)
Software	.0195488* (1.94)	.0753089** (2.44)	-.0381816 (-1.20)
Specialized REITs	.0177621 (1.62)	-.0692908** (-2.06)	.1214775*** (3.51)
Specialty Chemicals	.0145652 (0.54)	.0229532 (0.28)	.0498155 (0.58)
Specialty Mining & Metals	.0494897*	-.0143967	-.0175592

	(1.82)	(-0.17)	(-0.20)
Tobacco	.0209219	.0110527	.0324723
	(1.05)	(0.18)	(0.52)
Toys & Children's Products	.003769	-.0136456	.1289399**
	(0.19)	(-0.22)	(2.06)
Water & Related Utilities	.0251713	-.0470669	.1725233**
	(0.93)	(-0.57)	(2.02)
Wireless Telecommunications Services	-.0107865	.0579362	-.0183501
	(-0.54)	(0.94)	(-0.29)
Percent revenu growth	.001742	.0254466	-.0025253
	(0.24)	(1.17)	(-0.11)
Profitability	.0023963	.225788***	-.0067455
	(0.12)	(3.74)	(-0.11)
Ln (market_value)	.000323	-.0009545	.0055199*
	(-0.36)	(-0.35)	(1.95)
Constant (Advanced Medical Equipment & Technology)	-.003371	-.0293515	-.0828349*
	(-1.12)	(-0.63)	(-1.72)
Observations	495	498	498
R-Squared	0.2881	0.5130	0.4677
Industry fixed effects	Yes	Yes	Yes

T-statistics based on robust standard errors are shown in parentheses. $*** \ p < 0.01$, $** \ p < 0.05$, $* \ p < 0.1$.

10. Appendix B - Results shorter event window
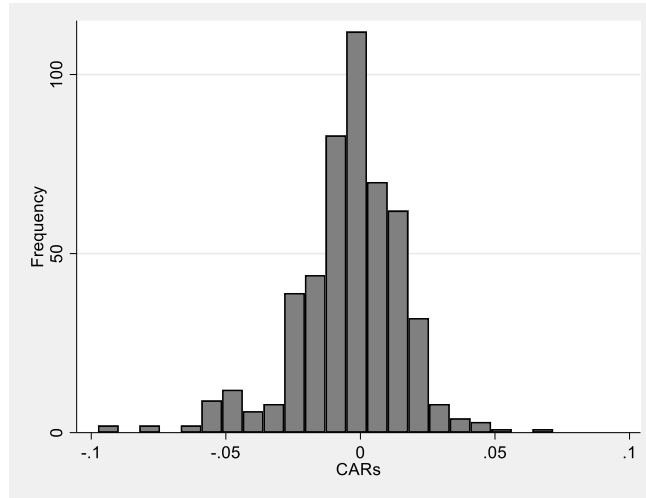
10.1 Industry analysis

Figure 5. Histogram between the CARs from event 1 and their frequency (shorter event window)
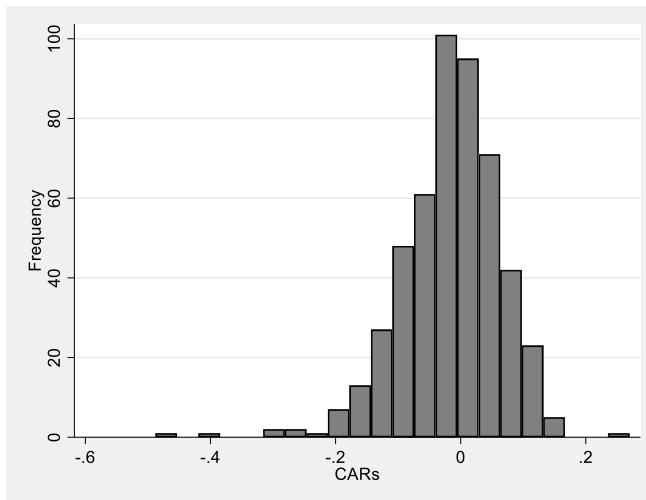

Figure 6. Histogram between the CARs from event 2 and their frequency (shorter event window)
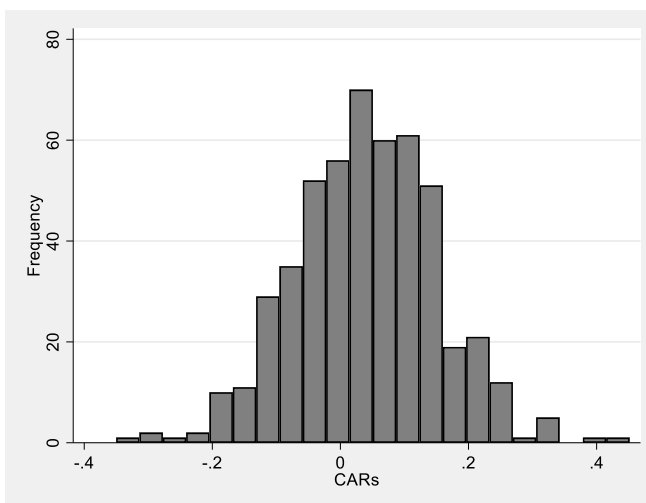

Figure 7. Histogram between the CARs from event 3 and their frequency (shorter event window)

When looking at Figure 5, 6 and 7 there are industries that are positively as well as negatively affected by the consequences of the COVID-19. Table 8 also shows significantly negatively and positively affected industries. In contrast to the results for the event window two days before and after each industry, these results show more significant coefficients for the industries. Therefore the first hypothesis, that *some industries are hit harder than others by the economic effects of the COVID-19 virus*, cannot be rejected. This conclusion is the same for the original results.

Table 8

OLS regressions of industries and firm characteristics on the CAR (shorter event window)

Industry	Event 1	Event 2	Event 3
Advertising & Marketing	-0.0096266 (-0.93)	0.0031746 (0.08)	0.0554912 (1.04)
Aerospace & Defense	-0.0184716*** (-2.71)	-0.0500767* (-1.89)	0.1296297*** (3.69)
Agricultural Chemicals	-0.0215372* (-1.75)	-0.0807068* (-1.68)	0.0135438 (0.21)
Airlines	-0.0071505 (-0.84)	-0.0532909 (-1.62)	0.1448843*** (3.31)
Aluminum	-0.0992958*** (-5.91)	-0.038356 (-0.59)	0.2509627*** (2.9)
Apparel & Accessories	-0.0531731*** (-6.72)	-0.0323638 (-1.05)	-0.026149 (-0.64)
Apparel & Accessories Retailers	0.0038812 (0.46)	0.0152596 (0.46)	0.0718121* (1.65)
Appliances, Tools & Housewares	0.0037333 (0.3)	-0.0059215 (-0.12)	0.0918937 (1.45)
Auto & Truck Manufacturers	-0.0272949*** (-2.6)	0.0379108 (0.93)	0.0792109 (1.46)
Auto Vehicles, Parts & Service Retailers	-0.0152414* (-1.8)	-0.053015 (-1.61)	0.0953828** (2.19)
Auto, Truck & Motorcycle Parts	-0.0361096*** (-4.27)	0.0527235 (1.6)	0.0835952* (1.92)
Banks	-0.0115999* (-1.93)	0.0390248* (1.67)	0.0160699 (0.52)
Biotechnology & Medical Research	-0.0019464 (-0.23)	0.0100901 (0.31)	-0.04177 (-0.96)
Brewers	0.0075812 (0.45)	-0.0270822 (-0.41)	-0.009351 (-0.11)
Broadcasting	-0.0193034*** (-2.62)	-0.0047976 (-0.17)	0.0037185 (0.1)
Business Support Services	-0.0036044 (-0.5)	0.0138312 (0.49)	0.0302659 (0.81)
Casinos & Gaming	-0.0077889 (-0.75)	0.0257126 (0.64)	-0.0190123 (-0.36)

Commercial REITs	-0.0023021 (-0.37)	-0.0394975 (-1.63)	0.1151771*** (3.59)
Commodity Chemicals	-0.0119338* (-1.65)	-0.0111309 (-0.41)	-0.0163117 (-0.45)
Communications & Networking	-0.0076569 (-0.97)	-0.0150216 (-0.49)	0.0108374 (0.27)
Computer & Electronics Retailers	0.0069885 (0.42)	-0.0424723 (-0.65)	-0.0117245 (-0.14)
Computer Hardware	-0.003855 (-0.45)	0.0390941 (1.18)	-0.0110796 (-0.25)
Construction & Engineering	-0.0111432 (-0.91)	-0.0099668 (-0.21)	0.1094892* (1.73)
Construction Materials	-0.0010369 (-0.08)	-0.0719764 (-1.51)	0.1915379*** (3.03)
Construction Supplies & Fixtures	-0.007128 (-0.58)	0.0145811 (0.31)	0.0532118 (0.84)
Consumer Lending	0.002649 (0.28)	-0.0198706 (-0.55)	0.1639041*** (3.4)
Consumer Publishing	-0.0195532 (-1.16)	0.0111774 (0.17)	-0.0552806 (-0.64)
Courier, Postal, Air Freight & Land-based Logistics	-0.0072688 (-0.71)	0.0303644 (0.76)	-0.0803281 (-1.51)
Department Stores	-0.0421048*** (-4.07)	-0.0874072** (-2.17)	-0.0445981 (-0.84)
Discount Stores	-0.0070576 (-0.83)	-0.0472375 (-1.44)	-0.0730916* (-1.67)
Distillers & Wineries	-0.0001747 (-0.01)	-0.1157946** (-2.43)	0.1070023* (1.69)
Diversified Chemicals	-0.0282218** (-2.26)	0.0959245** (1.98)	0.0425535 (0.66)
Drug Retailers	-0.017395* (-1.68)	-0.0183962 (-0.46)	-0.0533037 (-1)
Electric Utilities	0.0027021 (0.46)	-0.1016046*** (-4.47)	0.1619415*** (5.37)
Electrical Components & Equipment	-0.0148016** (-2.13)	0.0350738 (1.3)	-0.0110599 (-0.31)
Electronic Equipment & Parts	-0.0405721*** (-4.42)	0.0418308 (1.17)	-0.1127175** (-2.38)
Employment Services	-0.0093937 (-0.76)	0.0292179 (0.61)	0.1110358* (1.74)
Entertainment Production	-0.0067945 (-0.4)	-0.1445926** (-2.21)	0.0598577 (0.69)
Environmental Services & Equipment	-0.004433 (-0.36)	-0.0913939* (-1.91)	0.0532792 (0.84)
Financial & Commodity Market Operators & Service Providers	-0.014792* (-1.87)	-0.0967599*** (-3.15)	0.1303928*** (3.2)
Food Processing	-0.0073729 (-1.19)	-0.0635083*** (-2.64)	0.0427373 (1.34)
Food Retail & Distribution	-0.0077979 (-0.75)	-0.1121362*** (-2.77)	0.0021631 (0.04)

Footwear	-0.0293045* (-1.74)	-0.025146 (-0.38)	0.1086896 (1.25)
Gold	-0.0306612* (-1.82)	-0.110951* (-1.7)	0.1995075** (2.3)
Ground Freight & Logistics	0.0003346 (0.04)	0.0250185 (0.86)	0.0229288 (0.59)
Healthcare Facilities & Services	0.0031952 (0.4)	-0.079943*** (-2.58)	0.0491379 (1.19)
Heavy Machinery & Vehicles	-0.0238435** (-2.56)	0.0503374 (1.39)	-0.0186276 (-0.39)
Home Furnishings	-0.0172625 (-1.41)	-0.021645 (-0.45)	0.1115972* (1.77)
Home Improvement Products & Services Retailers	-0.0032141 (-0.26)	0.0187032 (0.39)	0.0482234 (0.75)
Homebuilding	-0.0013612 (-0.15)	-0.1644678*** (-4.59)	0.270151*** (5.69)
Hotels, Motels & Cruise Lines	-0.0017971 (-0.21)	-0.1936232*** (-5.86)	0.1632645*** (3.72)
Household Products	-0.000811 (-0.07)	-0.0809562* (-1.7)	-0.0286696 (-0.45)
Industrial Conglomerates	-0.0194286** (-2.08)	0.0260762 (0.72)	0.0196027 (0.41)
Industrial Machinery & Equipment	-0.0105458* (-1.72)	0.0310696 (1.3)	0.0075775 (0.24)
Integrated Telecommunications Services	-0.0008841 (-0.07)	-0.0096424 (-0.2)	-0.0528825 (-0.82)
Investment Banking & Brokerage Services	0.0089368 (1.04)	0.0313523 (0.94)	-0.017245 (-0.39)
Investment Management & Fund Operators	-0.0110703 (-1.54)	0.0051226 (0.18)	0.0005758 (0.02)
Iron & Steel	-0.0317023* (-1.89)	0.0494533 (0.76)	-0.0419311 (-0.48)
IT Services & Consulting	-0.0004038 (-0.07)	0.0141453 (0.6)	0.0148014 (0.48)
Leisure & Recreation	-0.0096224 (-0.78)	-0.1305649*** (-2.73)	0.0567939 (0.9)
Life & Health Insurance	-0.001989 (-0.26)	-0.0436336 (-1.48)	0.1721562*** (4.39)
Managed Healthcare	0.0022862 (0.26)	0.0104414 (0.3)	0.1478262*** (3.25)
Medical Equipment, Supplies & Distribution	0.0015473 (0.25)	0.0118664 (0.5)	0.0637087** (2.01)
Miscellaneous Specialty Retailers	0.0234695* (1.91)	-0.0307579 (-0.64)	0.0531232 (0.84)
Multiline Insurance & Brokers	-0.0095978 (-1.37)	-0.0213789 (-0.78)	0.0157331 (0.43)
Multiline Utilities	-0.00703 (-0.97)	-0.0731098*** (-2.58)	0.1372534*** (3.66)
Natural Gas Utilities	-0.0086314 (-0.51)	-0.0756416 (-1.16)	0.1473732* (1.7)

Non-Alcoholic Beverages	0.0028051 (0.27)	-0.0406406 (-1.01)	0.0215144 (0.4)
Non-Paper Containers & Packaging	0.0144698 (1.4)	-0.0471288 (-1.17)	0.0901143* (1.69)
Office Equipment	0.0017613 (0.1)	-0.00557 (-0.09)	-0.0002673 (0)
Oil & Gas Exploration and Production	-0.0349141*** (-5.26)	0.0309322 (1.2)	0.0256367 (0.75)
Oil & Gas Refining and Marketing	-0.0172649** (-2.27)	-0.0544235* (-1.84)	0.0963321** (2.45)
Oil & Gas Transportation Services	-0.0171449 (-1.64)	-0.0817552** (-2.01)	0.1151348** (2.14)
Oil Related Services and Equipment	-0.0200048** (-2.22)	-0.0538867 (-1.54)	0.0260146 (0.56)
Online Services	-0.0061476 (-0.91)	0.0316366 (1.2)	-0.0990444*** (-2.84)
Paper Packaging	-0.0013627 (-0.13)	0.0031595 (0.08)	-0.0672156 (-1.26)
Personal Products	0.0062623 (0.74)	-0.0626373* (-1.9)	0.0177931 (0.41)
Personal Services	-0.0043732 (-0.26)	-0.1903542*** (-2.92)	0.1845625** (2.13)
Pharmaceuticals	-0.0025717 (-0.39)	-0.0071134 (-0.28)	-0.0545048 (-1.62)
Phones & Handheld Devices	0.0108883 (0.64)	0.064926 (0.98)	-0.1388356 (-1.58)
Professional Information Services	0.005899 (0.74)	0.0454355 (1.48)	0.053361 (1.31)
Property & Casualty Insurance	-0.0036306 (-0.46)	-0.04744 (-1.53)	0.0295287 (0.72)
Real Estate Services	-0.0216589 (-1.29)	0.0300089 (0.46)	0.1129691 (1.31)
Reinsurance	-0.0038702 (-0.23)	-0.1115347* (-1.71)	0.0774822 (0.89)
Residential REITs	0.0079224 (0.99)	-0.0409644 (-1.32)	0.1391978*** (3.39)
Restaurants & Bars	-0.0020967 (-0.25)	-0.0730826** (-2.21)	0.1515399*** (3.46)
Semiconductor Equipment & Testing	-0.0266677*** (-2.9)	0.0199442 (0.56)	-0.0281068 (-0.59)
Semiconductors	-0.0245411*** (-3.82)	0.0501659** (2.01)	-0.1428446*** (-4.31)
Software	0.0003209 (0.05)	0.0225508 (0.93)	-0.068967** (-2.14)
Specialized REITs	0.0073144 (1.07)	-0.1260016*** (-4.76)	0.1509031*** (4.3)
Specialty Chemicals	-0.0055838 (-0.33)	-0.0262995 (-0.4)	0.1421137 (1.64)
Specialty Mining & Metals	-0.0203422 (-1.21)	0.0507926 (0.77)	0.0177325 (0.2)

Tobacco	0.0010762 (0.09)	-0.0486786 (-1.01)	0.0550798 (0.86)
Toys & Children's Products	-0.0157993 (-1.28)	-0.0134241 (-0.28)	-0.0166093 (-0.26)
Water & Related Utilities	0.0139849 (0.83)	-0.1374306** (-2.1)	0.1972928** (2.28)
Wireless Telecommunications Services	-0.0201613 (-1.62)	0.0142199 (0.29)	-0.0140884 (-0.22)
Percent_Revenue_Growth	0,001742 (0,24)	0.0164514 (0.96)	0.0038499 (0.17)
Profitability	0,0023963 (0,12)	0.0952714** (2)	0.0811187 (1.29)
Ln (Market_Value)	-0,000323 (-0,36)	-0.0026501 (-1.23)	0.0081981*** (2.86)
Constant (Advanced Medical Equipment & Technology)	-0,003371 (-0,22)	0.0355748 (0.97)	-0.1327285*** (-2.72)
Observations	497	498	498
R-Squared	0.4704	0.5005	0.5498
Industry fixed effects	Yes	Yes	Yes

T-statistics based on robust standard errors are shown in parentheses. $*** \ p < 0.01, ** \ p < 0.05, * \ p < 0.1$.

10.2 Size analysis

The coefficient for market value has a positive value for the first and third events and a negative value for the second event. However, the values for the first and second event are not significant, so no conclusions can be drawn based on those outcomes (see Table 9).

The coefficient for event three is significantly positive, so that means that firms with a higher market value have higher positive CARs and thus profit more by the consequences of the COVID-19 virus than firms with a lower market value. This is in line with the second stated hypothesis that "*Smaller firms are affected more by the economic consequences of the COVID-19 virus than bigger firms".* Therefore this second null hypothesis cannot be rejected. This conclusion is the same as for the original results, only the results in Table 9 are more significant than the original results.

Table 9

OLS regressions of market value and control variables on the CAR (shorter event window)

	Event 1	Event 2	Event 3
Ln (market value)	0.0007326 (1.32)	-0.0026501 (-1.23)	0.0081981*** (2.86)
Percent revenue growth	0.004429 (1)	0.0164514 (0.96)	0.0038499 (0.17)
Profitability	0.0487625*** (3.98)	0.0952714** (2)	0.0811187 (1.29)
Constant	-0.0113581 (-1.2)	0.0355748 (0.97)	-0.1327285*** (-2.72)
Observations	497	498	498
R-squared	0.4704	0.5005	0.5498
Industry fixed effects	Yes	Yes	Yes

T-statistics based on robust standard errors are shown in parentheses. $*** \ p < 0.01, \ ** \ p < 0.05, \ * \ p < 0.1$.

10.3 Leverage ratio analysis

The coefficient for the leverage ratio is positive for the first and second events, but negative for the third one (see Table 10). However, none of the coefficients are significant, so no conclusions can be drawn for the effect of leverage ratio on the CAR. Therefore has the third hypothesis that "*Firms with a higher leverage ratio suffer more from the economic consequences of the COVID-19 virus than firms with a lower ratio*" no conclusion. This conclusion is the same as for the original results.

Table 10

OLS regressions of leverage ratio and control variables on the CAR (shorter event window)

	Event 1	Event 2	Event 3
Leverage ratio	3.24e-06	.0000882	-.0000248
	(0.13)	(0.88)	(-0.19)
Percent revenue growth	.0041322	.0176306	.003666
	(0.93)	(1.03)	(0.16)
Profitability	.046162***	.0833764*	.0854177
	(3.59)	(1.67)	(1.29)
Ln (market value)	.0007159	-.0036967	.0084824***
	(1.14)	(-1.50)	(2.60)
Constant	-.0109101	.0485325	-.1363557***
	(-1.07)	(1.22)	(-2.59)
Observations	496	497	497
R-squared	0.4709	0.5013	0.5499
Industry fixed effects	Yes	Yes	Yes

T-statistics based on robust standard errors are shown in parentheses. $*** \ p < 0.01$, $** \ p < 0.05$, $* \ p < 0.1$.

10.4 Liquidity ratio analysis

As Table 11 shows, the coefficient for the liquidity ratio is negative for the first and third events, but positive for the second one. However, these coefficients are not significant, so no conclusions can be drawn based on those outcomes. Therefore no statements can be made about the fourth and last hypothesis that *"Firms with a higher liquidity ratio will suffer less from the consequences of the COVID-19 virus than firms with a lower liquidity ratio".* This conclusion is the same as for the original results.

Table 11

OLS regressions of liquidity ratio and control variables on the CAR (shorter event window)

	Event 1	Event 2	Event 3
Liquidity ratio	-.0125091	.044554	-.0895032
	(-1.16)	(1.08)	(-1.64)
Percent revenue growth	.0037885	.0188393	-.000113
	(0.83)	(1.08)	(-0.00)
Profitability	.0527593***	.0832552*	.1061975
	(4.03)	(1.66)	(1.61)
Ln (market value)	.0006223	-.0015016	.0066486**
	(1.03)	(-0.65)	(2.17)
Constant	-.0086747	.0151288	-.1024885*
	(-0.84)	(0.38)	(-1.96)
Observations	475	476	476
R-squared	0.4733	0.5035	0.5569
Industry fixed effects	Yes	Yes	Yes

T-statistics based on robust standard errors are shown in parentheses. $*** \ p < 0.01, ** \ p < 0.05, * \ p < 0.1$.

Appendix C - STATA Do-File

//regressions CAR and variables event 1 for the original results

histogram CAR_Event1, frequency normal

reg CAR_Event1 i.IBES_Industry_number Percent_Revenue_Growth Profitability lnTotal_market_value_2019

reg CAR_Event1 lnTotal_market_value_2019 i.IBES_Industry_number Percent_Revenue_Growth Profitability

reg CAR_Event1 Leverage_ratio_2019 i.IBES_Industry_number Percent_Revenue_Growth Profitability lnTotal_market_value_2019

reg CAR_Event1 Liquidity_ratio i.IBES_Industry_number Percent_Revenue_Growth Profitability lnTotal_market_value_2019

//regressions CAR and variables event 2 for the original results

histogram CAR_Event2, frequency normal

reg CAR_Event2 i.IBES_Industry_number Percent_Revenue_Growth Profitability lnTotal_market_value_2019

reg CAR_Event2 lnTotal_market_value_2019 i.IBES_Industry_number Percent_Revenue_Growth Profitability

reg CAR_Event2 Leverage_ratio_2019 i.IBES_Industry_number Percent_Revenue_Growth Profitability lnTotal_market_value_2019

reg CAR_Event2 Liquidity_ratio i.IBES_Industry_number Percent_Revenue_Growth Profitability lnTotal_market_value_2019

//regressions CAR and variables event 3 for the original results

histogram CAR_Event3, frequency normal

reg CAR_Event3 i.IBES_Industry_number Percent_Revenue_Growth Profitability lnTotal_market_value_2019

reg CAR_Event3 lnTotal_market_value_2019 i.IBES_Industry_number Percent_Revenue_Growth Profitability

reg CAR_Event3 Leverage_ratio_2019 i.IBES_Industry_number Percent_Revenue_Growth Profitability lnTotal_market_value_2019

reg CAR_Event3 Liquidity_ratio i.IBES_Industry_number Percent_Revenue_Growth Profitability lnTotal_market_value_2019

//regressions CAR and variables event 1 for the shorter event window

histogram CAR_Event11, frequency normal

reg CAR_Event11 i.IBES_Industry_number Percent_Revenue_Growth Profitability lnTotal_market_value_2019

reg CAR_Event11 lnTotal_market_value_2019 i.IBES_Industry_number Percent_Revenue_Growth Profitability

reg CAR_Event11 Leverage_ratio_2019 i.IBES_Industry_number Percent_Revenue_Growth Profitability lnTotal_market_value_2019

reg CAR_Event11 Liquidity_ratio i.IBES_Industry_number Percent_Revenue_Growth Profitability lnTotal_market_value_2019

//regressions CAR and variables event 2 for the shorter event window

histogram CAR_Event2, frequency normal

reg CAR_Event21 i.IBES_Industry_number Percent_Revenue_Growth Profitability lnTotal_market_value_2019-.0000427   .0110825

reg CAR_Event21 lnTotal_market_value_2019 i.IBES_Industry_number Percent_Revenue_Growth Profitability

reg CAR_Event21 Leverage_ratio_2019 i.IBES_Industry_number Percent_Revenue_Growth Profitability lnTotal_market_value_2019

reg CAR_Event21 Liquidity_ratio i.IBES_Industry_number Percent_Revenue_Growth Profitability lnTotal_market_value_2019

//regressions CAR and variables event 3 for the shorter event window

histogram CAR_Event3, frequency normal

reg CAR_Event31 i.IBES_Industry_number Percent_Revenue_Growth Profitability lnTotal_market_value_2019

reg CAR_Event31 lnTotal_market_value_2019 i.IBES_Industry_number Percent_Revenue_Growth Profitability

reg CAR_Event31 Leverage_ratio_2019 i.IBES_Industry_number Percent_Revenue_Growth Profitability lnTotal_market_value_2019

reg CAR_Event31 Liquidity_ratio i.IBES_Industry_number Percent_Revenue_Growth Profitability lnTotal_market_value_2019

Appendix D - Bibliography

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