The effect of COVID-19 on stock prices

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Abstract

This thesis investigates the impact of the COVID-19 pandemic on the economy by looking at the stock prices of firms and country indexes from China, Germany, Italy, the Netherlands, Spain and the United states. The first quarter reports of companies are included in the analysis to cover the transparency and openness of companies in a pandemic. Additionally, the corona rule strictness of countries is taken into account to investigate the impact of the country decisions. Based on the results it can be concluded that most firms experienced the biggest economic negative shocks in the first quarter and started to recover in the second quarter already, even though the firm outlooks for the rest of the year remain unsure. The aviation industry appears to be negatively affected, relative to the banking sector, based on stock price returns. While the energy, food and beverage, health care, personal and household goods, technology and telecommunications industry had a positive performance compared to the banking industry.

Keywords: Stock pricing, firm performance, event study

JEL Classification: G19, I15

Preface and acknowledgements

This master thesis is the final work of my degree, master Financial Economics, at the Erasmus University Rotterdam. Based on the current situation and the big economic impacts which are predicted to come from this event I became interested in researching the effect of COVID-19 on the economy. As my interests are in financial economics and accounting I included the transparency of firms first quarter reports and annual reports to include the effect of financial reporting of firms.

I would like to thank my supervisor of the university, dr. J.C.M. Kil, for the guidance during the process of writing the master thesis and providing me with very useful feedback. Also, my supervisor at PwC, Joris Diepstraten, for the great supervision and ideas during the process. Last, I would like to thank my second assessor, dr. J. Lemmen, for being the second reader.

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Chapter 1: Introduction

On the 1st of December 2019 patient zero suffered the first symptoms of the COVID-19 virus (Mhalla, 2020) in the Chinese city Wuhan, Hubei Province (Surveillances, 2020). Due to human-to-human transmission of the virus other inhabitants of this large city quickly became infected (Li et al., 2020). The virus spread rapidly within China, and across countries. Three months later, on the 12th of March, the World Health Organization (WHO) declared the outbreak of COVID-19 a pandemic defined by Oxford University as "an epidemic occurring worldwide, or over a very wide area, crossing international boundaries and usually affecting a large number of people" (Porta, 2014). The COVID-19 virus is already more severe than the previous two corona viruses (SARS and MERS) in the past 18 years (Peeri et al., 2020). The Severe Acute Respiratory Syndrome (SARS), Middle East Respiratory Syndrome (MERS) and SARS coronavirus 2 (SARS-CoV-2) all emerged from animal to human contact. Both SARS viruses originate from China's exotic food markets, where animals live closely together. However, the COVID-19 is not comparable to SARS as it is shown to be more contagious (Fernandez, 2020). To date there is still a lot of uncertainty on the virus.

The virus did not only impact the international health, but also influenced the economy. Flattening the infection curve and protecting the international wealth by introducing a lockdown results in a steeper macroeconomic recession curve (Gourinchas, 2020), which is a hard tradeoff, and imposes large costs (Atkeson, 2020). Companies offering "stay-at-home" products and services performed better than usual or are not as much affected. JP Morgan gives Amazon, Chegg, Chewy, Netflix, Peleton and Spotify a buy rating during the corona crisis because of their improved performance (Business Insider, 2020). However, more companies are negatively affected by the crisis and even fear going bankrupt. Companies are obligated to take measures to enable their employees to work from home or otherwise risk having to shut their companies down for a while. Stopping production disrupts the global trade and supply chains, making production even harder for the companies that are still operating (Ayittey et al., 2020; Maital & Barzani, 2020). It is estimated that the retail, tourism and hospitality sectors to be the most impacted by the crisis.

It becomes clear that the global crisis is caused by global supply chains when looking at the world oil industry (Mhalla, 2020). Since China is one of the biggest importers and consumers of oil a drop of oil demand became visible at the end of January. Additionally, the enormous amount of cancelled flights combined with decreased travelling due to stay-at-home orders, negatively impacts the oil industry (Fadlon, 2020; Selmi et al., 2020). The decreased demand, increased supply, and the limited storage options for oil led to a drop in the oil prices. The International Energy Agency (IEA) warned in their January Monthly report the consequences of the coronavirus and the effect that the lockdown will have on oil demand, and revised its growth forecast for this year downwards.

Likewise, the aviation industry has a hard time. Flights helped the virus to spread more easily across countries (Lau et al., 2020). Therefore, many flights are cancelled or cannot proceed due to closed

airports with the goal of stopping the spread of the corona virus (Mhalla, 2020). The International Air Transport Association (IATA) predicted that airlines could suffer up to a loss of 113 billion dollars as a result of COVID-19 (2020). The unexpected wave in cancellations and demand drop affects the aviation industry and those employed (Nicola et al., 2020).

Despite the new situation, many researchers have speculated on the impacts of the virus on the stock market and economy. Dividends were lowered and stock markets dropped in countries where governments implemented the lockdown (Gormsen & Koijen, 2020). A sharp decline in stock returns all over the world as a result of COVID-19 can be seen on the short term, this thesis tries to shed light on how these evolve on the longer term.

This thesis investigates the effect of the corona virus on the economy by looking at the abnormal returns of stock prices of firm shares and country indexes. First of all, literature research is carried out on the first quarter and annual reports of firms to evaluate the openness of firms regarding the pandemic and how this impacts the firm. Based on the country indexes the effects are analysed. Secondly, this thesis involves research on industry differences based on OLS regressions of the abnormal returns on stock prices. Lastly, for every country the strictness of COVID-19 rules is studied and according to this review countries are ranked based on how they handle the pandemic. Using an OLS regression of abnormal returns on ranking, no significant influence of the ranking could be found. During all the regressions, the time period dummy was involved. The variable implies a difference in returns of the first and second quarter of 2020, however, unlike expected, the firms had already lower returns in the first quarter and according to abnormal returns seemed to be recovering in the second quarter. Which indicates that the market was hit more heavily in the first quarter than in the second quarter.

This thesis is structured as follows. Chapter 2 looks at research carried out on similar topics. In the third chapter the data is discussed and methodology explained. Chapter 5 concludes the results of the analysis. Last, chapter 6 for discussion and limitations.

Chapter 2: Literature review

2.1 Consequences of outbreaks

Every epidemic or pandemic is different, therefore it is hard to estimate the impact such an outbreak will have on the economy a priori. The costs imposed on individual households and society differ. Direct and indirect costs, and the long- and short-term effects vary considerably across global disease outbreaks (Lewis, 2001). The impact of an epidemic, with chance to become a pandemic, is influenced by time period as centuries ago countries were more self-sufficient in producing their needs and people did not travel as much. These days, it is easier for a disease to spread rapidly across countries due to increased travelling and better-connected economic supply chains. Other factors influencing the impact of a disease are the nature of the disease, the socioeconomic groups affected by the disease, and the duration of the epidemic, or pandemic (Bell & Lewis, 2005).

2.2 Previous epidemics and pandemics

The most impactful diseases for society, until now, were the Back Death, the influenza epidemic of 1918-1919, HIV/AIDS and SARS. Only the HIV/AIDS outbreak grew from an epidemic into a pandemic.

Many centuries ago, between 1347 and 1351, the Black Death was a plague affecting the European economy, society, politics and civilization (Schamiloglu (2018). The mortality rate of this plague was estimated from 30 to 60 percent of the European population (Alchon, 2003). These rates differed significantly across different countries and cities. At the moment of the plague the population was nonimmune to the Black Death and already weakened due to malnutrition and earlier occurred diseases affecting their health (Bell & Lewis, 2005; Curtin & Curtin, 1989). Labor shortages in other villages and towns expanded employment opportunities (Genicot, 1966; Hirschleifer, 1987). According to Clark (2003), the wages rose during this time, however, the return on capital declined. In the 17th century the first effects of modern growth were shown, however, these appeared to be unrelated to the plague. Thus, the Black Death caused a lot of deaths, but, did not significantly affect the economy on the long term.

The next remarkable disease outbreak was the influenza epidemic, also known as H1N1 virus, consisting of three periods during 1918 and 1919. The second wave during the fall of 1918 caused the most victims of the influenza epidemic, also known as the Spanish flu. The virus spread across the globe and killed at least 40 million people (Brainerd & Siegler, 2003). The most remarkable was the type of victims of the virus, as men and women ranging from young to middle-aged adults had a higher mortality rate compared to other population groups. This epidemic resulted in a "W"-shaped curve mortality curve, where normally an epidemic shows a "U"-shaped curve of mortality (Eickhoff et al., 1961; Simonsen et al., 1998; Taubenberger & Morens, 2006). A "U"-shaped curve is more common during diseases as the most vulnerable groups are the very young or older population groups. The

extraordinary "W"-shape of the Spanish flu can be explained by the immunity deficiency among the population younger than 30 years, as they have not been exposed to H1-viruses before (Mamelund, 2011). Older adults are more likely to be exposed to this type of viruses compared to young adults, which explains the difference in mortality rates. Likewise, geography explains the immunity of a population, isolated areas in the Arctic and Pacific were more vulnerable for the influenza epidemic. However, the mortality rates in isolated population can be explained by other factors like a falling level of basic care available.

The third large virus outbreak was discovered in the early 1970s in central Africa, known as the HIV virus (Bell & Lewis, 2005). As the infection progresses, the disease will result in AIDS and later becomes fatal. This virus does not spread as fast as others, however, after two decades the virus became a pandemic and reached a large group of victims. A total of 75 million people were estimated to have been infected with the HIV virus, of which 38 million were still living at the moment the data was recorded (UNAIDS, 2019). This virus is hard to control and will probably continue to exist and infect people, however, infection rates are declining every year. Most of the social and economic impact of HIV and AIDS can be seen in African (i.e. developing) countries (Danziger, 1994). The economic impact of AIDS can be divided in different categories, as households, agriculture, firms and other economic sectors[1] are affected by the disease (Bollinger et al., 1999). Households will be affected by the loss in income of the HIV/AIDS patient, the increase in medical expenses and family and friends who sacrifice their time, thus work or education, to take care of the patient experience a loss in income likewise. Eventually the disease may lead to death, causing a permanent loss in income. Bollinger et al. (1999) found that rural households lost a larger percentage of their income compared to urban households. Especially in developing countries the agriculture sector suffers the largest economic impact as the largest share of the labor force works in this sector. Three different tradeoffs were faced by the government, which are applicable to the coronavirus as well. The first is treating AIDS versus preventing AIDS, the second is treating AIDS versus treating other illnesses, and last spending for health care versus spending for other objectives. A tradeoff is faced between keeping a healthy population and keep the workforce productive for economic development.

Lastly, the Severe Acute Respiratory Syndrome (SARS) outbreak is an infectious disease that can be transmitted via human to human contact (Stöhr, 2003). The disease emerged at the end of 2002 in Guangdong province of China, after which it quickly spread across Australia, Brazil, Canada, Hong Kong, South Africa, Spain and the USA (Farquharson & Baguley, 2003). The outbreak was declared over by July 2003 (Keogh-Brown & Smith, 2008). The travel and tourism industry was affected the most heavily, and industries in which people come together in larger groups such as restaurants, cinemas and retail establishments (Smith, 2006). The economic impact is hard to estimate, even on an interval scale, and these numbers are only used to support media messages during that time. It is safe to say

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[1] The health, transport, mining, education and water sectors are part of the economic sectors.

there were short-term negative effects on the economy which are visible on the long-term. However, the exact costs of the public health crisis are unclear. It can be seen as a good lesson on the occurrence of emergency situations and that government budgets should be adjusted so that unexpected public health crises in the future can be tackled in a more efficient way (Fan, 2003).

As can be seen from previous epidemics, the exact economic impact remains hard to estimate even though the events are not recent. This is because the outcome of epidemics or pandemics cannot be compared to a scenario without the impact of the disease outbreak. Companies are unable to estimate what would have been their economic state if they were not affected.

2.3 COVID-19

Since the coronavirus pandemic started in the Chinese city Wuhan, the Chinese economy was the first to show impacts of the virus. Short term effects became visible, however, the long-term effects remain unknown. Mainly because the future is unsure, McKibbin and Fernando (2020) established a model in which seven different scenarios are possible. The first three described scenarios are already ruled out, as these describe COVID-19 as an epidemic which stayed within China. This would have limited the GDP loss to China mostly, in the worst case a 6 percent loss[2]. However, spillover effects for other countries vary from minus 0.2% to minus 0.7% loss in GDP. The following three scenarios[3] are pandemics all to different degrees of severity. In these scenarios the GDP of China is slightly more affected compared to the first three scenarios[4], however, the GDP of other countries is more heavily affected. In the fourth scenario[5] GDP loss ranges from 0.7 to 2.5 percent, in the fifth scenario[6] from 1.4 to 5.7, and the sixth scenario[7] GDP loss is ranging from 2.4 percent to 9.9 percent. The last, and worst, scenario is that a milder version of this pandemic is going to last and reoccur each year in the indefinite future[8]. This scenario results in a GDP loss ranging from 0.9% to 2.2%. The heaviest degree of the temporary pandemic, scenario six, shows the largest loss in GDP for all countries in these seven scenarios.

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[2] GDP loss in 2020 in deviation from baseline, the normal circumstances without COVID-19.

[3] S01: China is temporarily slightly affected with an attack rate of 1.0% for which in 2.0% of the cases this is fatal. S02: China is temporarily mildly affected with an attack rate of 10% of which in 2.5% of the cases this is fatal. S03: China is temporarily heavily affected with an attack rate of 30% of which in 3.0% of the cases this is fatal.

[4] S04: -1.6%, S05: -3.6%, S06: -6.2% loss in GDP of China.

[5] S04: China is temporarily slightly affected with an attack rate of 10% and infects other parts of the world via travelling or trade contact. The fatality rate in China is 2.0%.

[6] S05: : China is temporarily mildly affected with an attack rate of 20% and infects other parts of the world via travelling or trade contact. The fatality rate in China is 2.5%.

[7] S06: China is temporarily mildly affected with an attack rate of 30% and infects other parts of the world via travelling or trade contact. The fatality rate in China is 3.0%.

[8] S07: China is permanently affected with an attack rate of 10% and infects other parts of the world via travelling or trade contact. The fatality rate in China is 2.0%.

The economic impact of the virus can be divided in direct and indirect costs (Gong et al, 2020). The direct effects relate to increased health care costs and no income in sectors which are closed[9]. The direct effects may cause negative externalities, and, firms or consumers not directly affected by the virus can change behavior. Individuals and firms make their decisions based on the available information at the time, with the goal of maximizing their profit or utility. These effects cause a chain reaction in the economy and is hard to explain in deep detail.

The main economic impact of COVID-19, until now, was seen in hospitals. An increased amount of sick people were hospitalized. Some on corona departments, others at the intensive care (IC). Many hospitals had difficulties handling the amount of patients and even changed departments to corona departments (Liu et al., 2020). The amount of intensive care spots had to be scaled up in a lot of countries, and Wuhan, China, built an extra hospital aimed at treating COVID-19 patients (Zhang et al., 2020; Wang et al., 2020). Other hospital patients and treatments were hindered by the increasing attention for the coronavirus in the hospital. Treatments were rescheduled to later dates to reduce the risk of infection and have the care workers available for treating coronavirus patients. Health care costs have increased significantly due to care workers having to work more than usual, upscaling of hospitals and necessary equipment needed for treating the coronavirus patients.

At the firm level, COVID-19 has impacted both demand and supply (Gopinath, 2020). Disruptions in the production of businesses have decreased the supply, and reluctance of consumers and businesses to spend money lowers the demand. Firms dependent on supply chains who are still operating themselves may be obligated to reduce or stop production as they are unable to get the parts they need. China and the US are two heavily infected countries and account for a large part of the manufacturing and exports in the world[10] (Baldwin & Tomiura, 2020). Firms can be obligated to reduce production, as the production circumstances are not considered safe for the rules implemented by government[11]. For example, two different production shifts can be made so a safe working space is created, but this hinders the speed of production.

Depending on the industries that firms operate in the coronavirus has a diverse impact. The tourism industry, including aviation, hotels, tourist attractions et cetera., almost completely closed. International travel was prohibited to stop the spread of the virus. Holidays were cancelled and therefore the tourism industry was left without consumers. Hotels and aviation companies barely had any consumers of its services leading to large losses, especially in countries dependent on tourist income

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[9] These consequences may differ per country due to different lock down rules imposed. Examples are closed restaurants, hairdressers, gyms, sex industries, clubs, hotels, theme parks, et cetera.

[10] The US accounts for 24% of GDP, 16% of manufacturing, 8% of exports and 8% of manufactured exports globally. China accounts for 16% of GDP, 29% of manufacturing, 13% of exports and 18% of manufactured exports globally.

[11] Rules requiring people to keep 1 to 2 meters, dependent on country, distance during all times except if people are considered to be one household.

(Kasare, 2020; Kumar, 2020). A large part of the workers of these industries had reductions in income or lost their jobs.

Other industries which might be forgotten are gambling industry, sports industry and the sex industry. Even though these industries might not seem as important for everyone, a lot of consumers and workers were limited due to restrictions in these industries. Gamblers lose the ability to go to the casino and the companies facilitating the gambling lose profits as they are dependent on their visitors. However, this gave rise to online gambling and gaming (Nicola et al., 2020). The sports industry, including large matches in stadiums and television, but also local sport clubs and gyms were limited in their activities. They came up with creative ideas to continue serving their club visitors via online lessons for example. However, this is not generally accepted by all club members and therefore not all clubs are able to get the profits of membership payments, depending on their decision to handle the membership terms. Having members pay even though they are not able to use the facilitations might result in losing club members, but no income for the clubs might be fatal for continuing operation after the crisis. Workers in the sex industry are likewise prohibited to continue working due to the corona rules. They lose their source of income during the lockdown.

These are only a small part of all the infected industries. Catering industries are dependent on people going out for dinner or drinks. As this was not possible they came up with creative ideas to continue operating, however the profits are not nearly as close to profits in the normal situation. This was not possible for all industries, hairdressers and beauty salons had no other option to continue operating, and these are only a small part of all the infected industries.

All of these scenarios cause lower economic growth due to which companies have less resources to invest in their company. Some companies that have to limit expenses during COVID-19 fire workers as this is an effective way to reduce costs. Likewise, less job offers are on the market due to companies struggling to operate their business. Not in all cases firms will fire workers, but they might have to cut loans of their workers to keep them employed. Additionally, cleaning costs in companies in some industries increase. More cleaning of used equipment, area and sanitation has to be done, everything is disinfected more than usual. And to make companies coronavirus friendly a large amount of them had to purchase goods like plexiglass, plastic foil, and extra disinfection facilities to continue or resume operation.

At the individual level the economic impact can be different from what firms experience. However, it still makes a lot of impact Gong et al. (2020). The infected individuals face the financial impact of the medical costs and the reduction in income. However, being unable to work for a period of time, morbidity, is not as extreme as mortality, as the lives of these families is disrupted due to the fatal virus (McKibbin & Fernando, 2020).

Due to the unknown duration of the COVID-19 outbreak the complete economic impact is hard to estimate. This thesis investigates the impact it will have on different sectors and which countries will be most affected.

2.4 Hypotheses

The main goal of this thesis is to investigate the economic impact COVID-19 has. The research question is stated as follows:

What is the effect of the coronavirus on stock prices, and how does it differ with transparency and across various sectors and countries?

As this is a general question, the effect will be investigated by focusing on smaller ways to define the openness of companies and the effect of COVID-19 on the stock market. By focusing on first quarter reports and the stock market performance of firms.

The first hypothesis aims to provide an insight into the openness of countries, and firms specifically, about the impact of the corona virus. Listed firms are required to publish their financial reports (AFM, 2020). However, they determine themselves the extent to which they are willing to open up about the state of their firm. Based on the accessibility, amount of information and way they publish this information, they give insights into the prognosis of the firm. At the end of 2019 and beginning of 2020 China was the first economy to be affected by the corona virus. During the first quarter of 2020, other countries in Asia and other continents became infected by COVID-19. As companies report the occurred events in their reports, the pandemic is one which is mentioned in almost every companies' first quarter report. Based on events, they speculate and formulate the outlook for the next period. However, not every firm might be open about the situation, which can signal information about the firm. The voluntary disclosure and transparency of firms is considered more important in the current era, the information economy (Madhani, 2008). According to Madhani transparency and openness of firms is awarded with significant advantages[12]. Likewise, lack of transparency might have negative impact on the firm. This creates uncertainty for stakeholders, and investors and creditors experience information risk as a result of this uncertainty. The transparency, or absence of it, in financial reports of companies can signal valuable information to investors. Lack of signaled information can give investors the idea that unfavorable information is held back by the firm. Even though the firm does not publish a lot of information in the report, this can signal other knowledge.

H1: Firms will openly predict lower returns in their first quarter reports (due to corona) compared to last year's first quarter report.

Not all firms will experience the same effects due to the corona virus. The impact is dependent on the type of industry the firm operates in due to the sector difference and the reliability on a global supply chain (Ivanov, 2020; Carlsson-Szlezak et al., 2020; Adams-Prassl et al., 2020). Travel and

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[12] Benefits of financial openness are increased management credibility, long-term investors due to trust, higher trading volume, decreased volatility, smaller bid-ask spread, higher institutional ownership, more analyst following, lower cost of capital and easier access, improved investment community relations and higher share prices (Madhani, 2008).

tourism, including aviation, industries have had to stop their products and services during the pandemic and face the cancelled tickets, events and other products by offering a refund or voucher, or in some cases consumers lose their purchase. Likewise, manufacturing companies have a harder time continuing to operate as manufacturing companies are often dependent on other suppliers in the supply chain. When one company shuts down production due to the lockdown, other companies will be affected by this. Contrarily, online and stay-at-home products could more easily continue to operate and might even experience increased revenue due to more sales. However, health insurances and health care appear to be very important during these times and had to specialize in different types of care[13] due to the public health emergency. Health workers are heavily affected by the coronavirus compared to the situation before the crisis. The firm constituents of the indexes, based on their industry, will show diverse reactions to the COVID-19 pandemic.

H2: The reaction to the corona virus is experienced most heavily in aviation and manufacturing industries, while, the technology sector is positively affected by the pandemic.

Likewise, a difference should be observed between countries. Some countries are more heavily affected by the corona virus, or tackle the virus more effectively. Countries implement different rules concerning the lockdown and have different timings of these rules. Therefore, the last hypothesis tackles the difference between the performance of countries based on the way they deal with the pandemic.

H3: The stricter the rules countries implement to combat COVID-19, the higher the losses countries will experience.

Based on these three hypotheses, this thesis aims to answer the research question and provide insights into the impact of the novel corona virus on the stock prices and transparency of firms.

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[13] Hospital workers had to specialize in Intensive Care (IC) work and it is shown that geriatric care should receive attention due to the large amount of elderly dying as a consequence of COVID-19 (Mazumder et al., 2020).

Chapter 3: Data and methodology

3.1 General data

In this thesis data on six different countries will be used; China, the Netherlands, Italy, Spain, Germany and the United States. The countries considered are heavily impacted by the virus or have shown to deal with the virus in a positive way. Every country has a different reaction to corona and implemented the lockdown at different times. In Appendix 3.1 the event dates for each country can be found.

For every country the most representative index is chosen (*Appendix 3.2*). For each of these representative indexes, the companies included in the indexes are used for the analysis based on the most recent constituents of the indexes (Appendix 3.3 to 3.8). Based on the number of firms in each index a total of 210 companies are investigated.

The companies are placed in categories of industries so the impact across industries can be assessed. There are a total of 19 different industries. In the banking sector the highest number of firms can be seen (32 firms), and the tourism, media and clothing industry are represented by the lowest number of firms (3 each) (Appendix 3.9). Especially in the Chinese and Italian indexes the biggest share of the constituents are represented by banks. Graph 3.1 to 3.7 shows the distribution per industry for all six countries.

3.2 Hypothesis 1

For the analysis of the first hypothesis the first quarter reports of 2020 and 2019 are retrieved for every company in the six indexes. Companies are evaluated on their transparency based on nine questions which can be found in Appendix 3.10 The transparency of the first quarter reports, taking into account the normal standards of the first quarter reports of a company based on the previous year, is evaluated by answering the proposed questions.

For China the first quarter reports of 2019 and 2020 are evaluated, and additionally the annual report of 2019. The annual report is used as this report covers the events occurred from September 2019 till December 2019. During this period COVID-19 appeared and started affecting the global health. The annual reports of the Chinese firms are evaluated based on the questionnaire in Appendix 3.11. This questionnaire focusses on the existence and openness in their reports by looking at the amount of information on COVID-19 and how the company deals with the pandemic. The retrieved information is visualized to find irregularities between countries. Visualization is done by looking at ratios of how much of the report discusses the virus and in what form the company predicts the impacts.

Using an OLS regression, the second quarters of 2019 and 2020 are compared. The stock prices in the second quarter of 2019 and 2020[14] are retrieved from Yahoo Finance. The returns (r_P) of the

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[14] The samples range from 1st of April to 30th of June in both 2019 and 2020.

stock prices (P) are calculated and the abnormal return (r_a) is retrieved by subtracting the risk free rate (r_f)[15].

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

$$r_a = r_P - r_f$$

Both he first and second quarter of 2019 and 2020 are separated in the OLS regression by using a dummy variable to account for the different time periods. The two time periods are investigated separately to account for differences between the first and second quarter.

$$AR_{it} = constant + \beta_1\ Time\ period_{it} + \beta_2\ Country\ dummy_{it} + \varepsilon_{it}$$

3.3 Hypothesis 2

For the second hypothesis an OLS regression is established with the dependent variable excess return. The stock prices for every firm included in the six country indexes are retrieved[16]. Every firm has a different sample period depending on the country index they are constituent of (*Appendix 3.3 to 3.8*). Based on the different implementation dates for the lockdown per country the event date is set as $t = 0$. The number of days till the last day of June is calculated, represented by $t + d$. The exact same amount of days before the event date is taken, $t - d$. Therefore, every country has its own sample period $[t - d, t + d]$. In Appendix 3.12 the sample period per country can be found. An OLS regression is estimated during this period, and another sample period starting one month before the event date and ending one month after the event date, to look at the short term effect. For every index constituent the growth rate (r_P) is estimated from the stock prices (P).

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

Based on the risk free rate (r_f)[17] the abnormal return (r_a) of the growth rate of stock prices is calculated.

$$r_a = r_P - r_f$$

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[15] The risk free rate is based on the 10 Year U.S. Treasury note average of the observations of YCharts, CNBC and MarketWatch at the beginning of 2019 and 2020 (*Table 3.1*). This is an annual rate which is transformed into a daily rate by using the formula $(1 + r_a)^{\frac{1}{trading\ days}}$. For every country the U.S. risk free rate is used as global investments are possible.

[16] Data on stock prices per firm are retrieved from Yahoo Finance (2020).

[17] The risk free rate is based on the 10 Year U.S. Treasury note average of the observations of YCharts, CNBC and MarketWatch at the beginning of 2020 (*Table 3.1*). This is an annual rate which is transformed into a daily rate by using the formula $(1 + r_a)^{\frac{1}{trading\ days}}$. For every country the U.S. risk free rate is used as global investments are possible.

There are various independent variables predicting the stock returns, the first predictor is made up by the industry differences. The firms included in the index consist of 19 different industry categories. A set of 18 dummy variables is constructed to account for every industry, where the banking sector represents the reference industry. With an OLS regression, with the excess return as the dependent variable. the betas of the industry dummy variables are estimated.

In this regression a control variable is made for the time period, where the value of 0 accounts for the period before lockdown and 1 the period after lockdown. A dummy variable divides the period in before the lockdown date and after the lockdown date, which is dependent on the lockdown implementation dates of the country (*Appendix 3.1*).

To account for country fixed effects the six countries, based on firm performance of firms located in those countries, are represented in the regression by five dummy variables for China, Germany, Italy, Spain and the United States where the Netherlands represents the reference country. Controlling for country fixed effects is an important aspect to consider as this is a very influential factor explaining differences across stock markets (Madura et al., 1997).

The solvency of a firm is taken into account by including an assets to liabilities ratio. This is an important factors as it shows the capacity of a firm to pay its expenses and debt as they come due (Tamari, 1996). The number of assets and liabilities per firm are derived from Compustat database[18] and are transformed into a ratio (A/L).

Finally, the market capitalization per firm is taken into account to find out whether the impact of corona differs depending on the size of the firm. The market capitalizations per firm are divided into two categories, which can be seen in Graph 3.8. These are regressed by using a dummy variable with the large market capitalization and small market capitalization. The total regression that will be regressed looks as follows.

$$AR_{it} = constant + \beta_1\ Time\ period_{it} + \beta_2\ Industry\ dummy_{it} + \beta_3\ Country\ dummy_{it} + \beta_4\ A/L + \beta_5\ Market\ capitalization_{it} + \varepsilon_{it}$$

3.4 Hypothesis 3

The last hypothesis, focused on the differences between countries based on country indexes, has the abnormal returns of the indexes as the dependent variable. The OLS regression is based on the same periods as hypothesis 2, the longer period which varies per country depending on the lockdown implementation date (*Appendix 3.12*) and likewise the short term period of one month before the lockdown implementation and one month after the lockdown implementation (Appendix 3.1). From the

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[18] A few firms were not available on Compustat and were derived via the Bloomberg database.

index price (P) the return (r_i) of the indexes is calculated and the abnormal return (r_a) is retrieved by subtracting the risk free rate (r_f)[19].

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

$$r_a = r_i - r_f$$

For each country the imposed rules are set up on a timeline and combined with the corresponding index to see the effect of imposed rules and actions of governments. Every country imposes different rules according to their own beliefs and preferences in society during the pandemic.[20] Based on tertiary literature research (University Library Georgia State University, 2020) the strictness of the imposed rules are ranked such that they can be included in the regression as an independent variable. The ranking of the countries based on the imposed rules and strictness can be found in the results section.

$$AR_{it} = constant + \beta_1\, Time\ period_{it} + \beta_2\, Ranking\ dummy_{it} + \varepsilon_{it}$$

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[19] The risk free rate is based on the 10 Year U.S. Treasury note average of the observations of YCharts, CNBC and MarketWatch at the beginning of 2020 (*Table 3.1*). This is an annual rate which is transformed into a daily rate by using the formula $(1 + r_a)^{\frac{1}{trading\ days}}$. For every country the U.S. risk free rate is used as global investments are possible.

[20] Different rules implemented by different countries; complete lockdown, 1,5 meters distance, 2 weeks in quarantine after entering a country, closing borders, maximum number of people for public gatherings, only public transport travelling for vital jobs, et cetera.

Chapter 4: Results

The results are discussed per hypothesis. In section 4.1 the transparency of financial reports, first quarter reports and annual reports, of firms are discussed and combined with the findings in performance differences between the first quarter of 2019 and 2020. The second section touches upon the effect of different industries and control factors on the abnormal returns faced during COVID-19 by firms. Section 4.3 reviews the abnormal returns of indexes and links this to the strictness of countries in setting guidelines.

4.1 Financial reporting of firms

In the following two sections the transparency and index performance of firms is analysed. The transparency of the firms is evaluated in combination with the stock performance of the companies.

4.1.1 Transparency

In Appendix 4.1 to 4.6 the outcomes of the literature study can be seen. Not all firms openly published their first quarter reports, especially in the XIN9 index only 19 of the 50 firms published their reports[21]. In the published Q1 reports was noteworthy that "corona" or "COVID" is barely mentioned. The same holds for the annual reports[22], it seems that some firms are neglecting the pandemic on purpose. The low ratio of number of times pandemic was mentioned to the total number of pages for both report types are very low, 0.326 (Q1) and 0.036 (Y).

In Germany most countries have Q1 reports available (29 of 30) and mentioned the pandemic (28 of 30). The ratio is compared to China much higher with 0.995. Most of the firms mention in their reports that they take measures to ensure safety and protect the health of employees and customers.

The FTSE MIB of Italy has 34 out of 40 Q1 reports available, and a ratio of 0.567 times the pandemic is mentioned to number of pages. Even though this ratio is lower than that of Germany, most firms mention in their reports they take measures to operate safely. Additionally, some of the firms have donated supplies to the Italian hospitals during their high corona peak as they lacked the necessary equipment to treat COVID-19 patients. The fear of a second wave is present appears in some of the reports, like the one of Ferrari.

The firms of the Dutch index AEX have only 19 out of 25 Q1 reports. The other firms report semi-annually and therefore do not cover the corona period. The ratio in the firms is the highest of all countries with 1.098. Firms report they take into account the pandemic and change their operations accordingly. Unilever supports its own partners to prevent firms from going bankrupt.

All of the firms in Spain have published their Q1 reports of which all firms, in total 35, mention the impact of corona and consequences for the economy. Most of the firms, like Viscofan and Santander,

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[21] The other 31 firm were impossible to find or inaccessible for other countries.
[22] Due to the earlier event date of the lockdown and infection in China the annual reports are investigated similar to the first quarter reports.

appear to have established goals on which they focus to ensure safety and continue to operate business. Some of the firms are optimistic and speculate that the worst part of the crisis is over.

A total of 28 of the 30 constituent firms of the DJI have published their first quarter reports, and all mention "corona" or "COVID". Some firms speculate the worst part of the pandemic was already over at the moment of the Q1 report publication and predict a positive outlook for the rest of 2020. Which is considered very optimistic as this country became infected later than the other countries.

Concluding from the reports of the index constituents, Spain and Italy appear to be the most open in their reports and show which actions they have taken during the pandemic. They are followed by the Netherlands and Germany, as these countries take into account the virus, but, some firms ignore the impact and still have very positive predictions. The United States and China come last based on their transparency. Even though not a lot of Chinese reports can be studied, most of them do not show they are affected by the crisis. The United States shows very optimistic reports stating that the pandemic had reached its peak at the time of publication, however, three months later the number of infected people keeps rising and does not yet seem to be at its peak (NPR, 2020).

4.1.2 Index performance

To evaluate whether firms have significantly lower returns in the second quarter due to COVID-19, a regression of abnormal returns of indexes of this year is compared to last year. A regression of abnormal returns on the indexes of the six countries during the first and second quarter of 2019 and 2020 is performed.

In the first two regressions for the first quarter results in 2019 and 2020, the dummy variable for time period shows that there is a 0.65% significant lower abnormal return in 2020 compared to 2019 (*Table 4.*1). When accounting for the country indexes it appears there is not significant difference between the country indexes (*Table 4.2*).

			Number of obs		714	
			F(1,712)		11.34	
			Prob > F		0.0008	
			R-squared		0.0157	
			Root MSE		0.0258	
AR	Coef.	Robust Std. Err.	T	P>|t|	95% Conf. Interval	
Time period	-.0065	.0019	-3.37	0.001	-.0103	-.0027
constant	.0017	.0014	1.22	0.223	-.0010	.0044

Table 4.1: Linear regression of abnormal return on time period dummy first quarter 2019 and 2020

When analysing the second quarter of 2019 and 2020 the dummy accounting for the time period is significant on the 90% confidence level (*Table 4.3*). The time period dummy has a positive value, meaning that the abnormal returns of 2020 compared to the second quarter abnormal returns of 2019 of 0.24%. This can be explained by the fact that even though the coronavirus affected the stock returns,

this mainly happened in the first quarter. In the second quarter the stock prices started rising back to their normal levels and therefore abnormal returns have increased. When including the country indexes in the regression all variables become insignificant (*Table 4.4*). Thus, there is no significant difference between the country indexes in the second quarter.

			Number of obs		726	
			F(1,724)		2.69	
			Prob > F		0.1013	
			R-squared		0.0037	
			Root MSE		0.0195	
AR	**Coef.**	**Robust Std. Err.**	**T**	**P>|t|**	**95% Conf. Interval**	
Time period	.0024	.0015	1.64	0.100	-.0005	.0052
constant	-.0001	.0010	-0.08	0.933	-.0021	.0019

Table 4.3: Linear regression of abnormal return on time period dummy second quarter 2019 and 2020

4.2 Industry differences

As this is a different sample compared to the first section, the correlation between the variables is tested. Table 4.5 shows that the correlation is not high between any of the variables, as the highest correlation is 0.707 between the Market Capitalization (MC) variable and country dummy China (CHI) for the dataset for the longer sample period[23]. This can be explained by the fact that of the 50 firms in total included in the XIN9, 49 were considered to be part of the large market capitalization firms. The correlations between the variables are not considered large enough to cause multicollinearity.

4.2.1 Long term effect

First, the effect of the lockdown implementation is tested. Table 4.6 shows that after the lockdown implementation, firms experience a significant 0.3% higher abnormal return compared to before the event. Without other control variables than the time period, there are a total of three significant industries; food and beverage, health care and technology (*Table 4.7*). They appear to experience a positive rise relative to the banking sector according to expectations. These three sectors are likely to experience more profit in theory as consumers started bulking food, the hospitals and other pharmacy companies experience an increased amount of demand due to COVID-19 and the technology sectors are more intensively used due to working at home and having more time to test new technology at home. When testing the country differences, none of the countries appear to have a significant different effect relative to the Netherlands (*Table 4.8*).

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[23] Only the correlation is tested in from the complete dataset as the correlation of the observations of the short term regression follows a similar correlation. This can be explained by the fact that they are partially the same observations, however, the short term OLS regression uses fewer observations due to its shorter sample period.

			Number of obs	33,760		
			F(1,33758)	5.26		
			Prob > F	0.0000		
			R-squared	0.0024		
			Root MSE	0.0334		
AR	Coef.	Robust Std. Err.	T	P>|t|	95% Conf. Interval	
Time period	.0028	.0004	7.76	0.000	.0021	.0035
Automobiles	-.0002	.0012	-0.17	0.863	-.0026	.0022
Aviation	-.0016	.0016	-0.98	0.329	-.0047	.0016
Basic resources	.0000	.0013	0.02	0.984	-.0024	.0025
Chemicals	.0001	.0011	0.78	0.436	-.0013	.0031
Clothing	.0010	.0020	0.52	0.601	-.0029	.0050
Energy	.0011	.0007	1.58	0.114	-.0003	.0025
Food and beverage	.0014	.0007	2.10	0.035	.0001	.0028
Health care	.0019	.0007	2.63	0.009	.0005	.0033
Industrial goods and services	.0001	.0008	1.17	0.240	-.0006	.0025
Insurance	.0000	.0008	-0.01	0.991	-.0016	.0016
Logistics	.0008	.0013	0.64	0.520	-.0017	.0034
Media	.0006	.0013	0.48	0.630	-.0020	.0033
Oil and gas	-.0004	.0008	-0.50	-.619	-.0021	.0012
Personal and household goods	.0008	.0008	1.04	0.297	-.0007	.0024
Real estate	.0005	.0011	0.51	0.612	-.0016	.0027
Technology	.0023	.0007	3.21	0.001	.0009	.0036
Telecommunications	.0007	.0008	0.90	0.370	-.0008	.0024
Tourism	.0006	.0018	0.33	0.739	-.0029	.0040
Constant	-.0024	.0005	-5.17	0.000	-.0033	-.0015

Table 4.7: Linear regression of abnormal return on time period dummy and industry dummies (LT)

The assets to liabilities ratio and market capitalization both have a significant impact on the abnormal returns. A larger assets to liabilities ratio can explain this because when a country has more assets on hand, it will be better in handling unexpected costs in an economic shock compared to a firm having a low asset to liability ratio (*Table 4.9*). An increase of 1 in the assets to liabilities ratio ensures a 0.03% rise in the abnormal returns. The market capitalization of a firm shows that larger firms are better able to handle an economic shock compared to small firms and have as a result a 0.09% significantly higher abnormal return.

			Number of obs		33,760	
			F(1,33758)		30.16	
			Prob > F		0.0000	
			R-squared		0.0021	
			Root MSE		0.0334	
AR	**Coef.**	**Robust Std. Err.**	**T**	**P>|t|**	**95% Conf. Interval**	
Time period	.0028	.0004	7.81	0.000	.0021	.0035
Assets to liabilities ratio	.0003	.0001	2.21	0.027	.0000	.0006
Market capitalization	.0009	.0004	2.44	0.015	.0002	.0016
constant	-.0026	.0003	-7.96	0.000	-.0032	-.0019

Table 4.9: Linear regression of abnormal return on time period dummy and assets to liabilities ratio and market capitalization dummy (LT)

The last regression combines all of the variables discussed in the separate regressions (*Table 4.10*). The variables which are considered significant are the time period dummy, energy, health care and technology. Respectively the industry dummies have a higher abnormal return relative to the banking sectors of 0.15%, 0.20% and 0.22%.

			Number of obs	33,760		
			F(1,33758)	5.19		
			Prob > F	0.0000		
			R-squared	0.0027		
			Root MSE	0.0334		

AR	Coef.	Robust Std. Err.	T	P>|t|	95% Conf. Interval	
Time period	.0028	.0004	7.84	0.000	.0021	.0035
Automobiles	-.0001	.0012	-0.08	0.940	-.0026	.0023
Aviation	-.0011	.0016	-0.64	0.521	-.0043	.0022
Basic resources	.0003	.0013	0.02	0.843	-.0024	.0029
Chemicals	.0012	.0013	0.96	0.338	-.0013	.0037
Clothing	.0015	.0020	0.74	0.458	-.0025	.0055
Energy	.0015	.0008	1.96	0.049	-.0000	.0030
Food and beverage	.0012	.0007	1.61	0.108	-.0003	.0027
Health care	.0020	.0009	2.35	0.019	.0003	.0037
Industrial goods and services	.0001	.0008	1.45	0.148	-.0004	.0028
Insurance	.0001	.0008	0.09	0.930	-.0016	.0017
Logistics	.0009	.0013	0.68	0.498	-.0017	.0034
Media	.0009	.0015	0.63	0.530	-.0020	.0037
Oil and gas	-.0002	.0008	-0.27	0.0785	-.0020	.0015
Personal and household goods	.0010	.0009	1.19	0.233	-.0007	.0028
Real estate	.0006	.0011	0.57	0.571	-.0015	.0027
Technology	.0022	.0008	2.75	0.006	.0006	.0037
Telecommunications	.0009	.0009	1.08	0.280	-.0008	.0026
Tourism	.0008	.0018	0.47	0.640	-.0027	.0040
China	.0007	.0009	0.79	0.429	-.0010	.0025
Germany	-.0002	.0010	-0.17	0.865	-.0021	.0017
Italy	-.0001	.0009	-.012	0.906	-.0017	.0015
Spain	-.0006	.0008	-.074	0.462	-.0023	.0010
United States	-.0002	.0009	-0.21	0.836	-.0020	.0016
Assets to liabilities ratio	.0000	.0002	0.10	0.920	-.0003	.0003
Market capitalization	.0002	.0008	0.21	0.830	-.0014	.0017
Constant	-.0024	.0005	-5.17	0.000	-.0033	-.0015

Table 4.10: Linear regression of abnormal return on time period dummy and industry dummies and assets to liabilities variable and market capitalization dummy (LT)

4.2.2 Short term effect

The same OLS regressions are performed as for the longer sample period. In Table 4.11, it can be seen that after the implementation of the lockdown the abnormal returns significantly increased by 0.88%. For the industry dummies, on the 95% significance level the aviation, food and beverage, health care, technology and telecommunications industry are considered significant (*Table 4.12*). Except for aviation the other sectors have a significant positive effect on abnormal returns relative to the banking sector. The aviation industry has a 0.70% decrease in abnormal return compared to the banking industry. The personal and household goods industry is significant on the 90% significance level and has a positive effect of 0.42% on abnormal returns relative to the banking sector. In Table 4.13 the abnormal returns are regressed on the country dummies. China has a significant positive impact of 0.85% on the abnormal returns compared to the Netherlands. This can be explained by the fact that China has already had the biggest impact of COVID-19 and is recovering already by ending the lockdown earlier than the Netherlands. The United states is significant on the 90% significance level and has a 0.36% higher abnormal returns relative to the Netherlands. The higher abnormal returns of the United States can be explained by the fact that the U.S. remained operating longer and the lockdown was less strict as many firms remained open or reopened quickly. When looking at the impact of the assets to liability ratio and market capitalization, which are both highly significant, they both appear to have a positive impact on the abnormal returns similar to the longer sample period (*Table 4.14*).

The last short term sample period regression combines all factors discussed above (*Table 4.15*). Energy, food and beverage, health care, personal and household goods, technology, telecommunications and the dummy variable for China are significant on the 95% significance level. All of the industries which are significant have a positive impact on the abnormal returns compared to the banking sector. This can be explained by the fact that all of these goods, except for energy, are increasingly used due to the lockdown. The positive effect of China relative to the Netherlands on abnormal returns can be explained by the date of the lockdown period. As China experienced the lockdown at the moment the rest of the world was unaffected the impact on their economy might be considered less heavily.

			Number of obs		8,690	
			F(1,33758)		10.40	
			Prob > F		0.0000	
			R-squared		0.0187	
			Root MSE		0.0473	
AR	**Coef.**	**Robust Std. Err.**	**T**	**P>|t|**	**95% Conf. Interval**	
Time period	.0093	.0010	9.52	0.000	.0074	.0112
Automobiles	.0036	.0036	1.00	0.319	-.0035	.0106
Aviation	-.0045	.0044	-1.02	0.306	-.0130	.0041
Basic resources	.0006	.0037	0.17	0.865	-.0066	.0079
Chemicals	.0059	.0035	1.72	0.086	-.0008	.0127
Clothing	.0059	.0061	0.96	0.336	-.0061	.0178
Energy	.0044	.0022	1.98	0.048	.0000	.0088
Food and beverage	.0051	.0021	2.44	0.015	.0010	.0093
Health care	.0074	.0024	3.09	0.002	.0027	.0120
Industrial goods and services	.0037	.0023	1.60	0.111	-.0008	.0082
Insurance	.0016	.0025	00.63	0.527	-.0033	.0065
Logistics	.0038	.0040	-.96	0.336	-.0040	.0116
Media	.0060	.0042	1.43	0.153	-.0022	.0142
Oil and gas	.0029	.0026	1.10	0.273	-.0022	.0080
Personal and household goods	.0054	.0025	2.14	0.033	.0004	.0103
Real estate	.0036	.0023	1.52	0.128	-.0010	.0082
Technology	.0064	.0023	2.75	0.006	.0018	.0109
Telecommunications	.0062	.0024	2.59	0.010	.0015	.0109
Tourism	-.0011	.0049	-.024	0.814	-.0107	.0084
China	.0091	.0026	3.53	0.00	.0040	.0141
Germany	.0010	.0022	0.46	0.645	-.0033	.0053
Italy	.0020	.0022	0.89	0.373	-.0024	.0063
Spain	-.0004	.0023	-0.18	0.857	-.0050	.0042
United States	.0033	.0027	1.22	0.224	-.0019	.0085
Assets to liabilities ratio	.0001	.00047	0.13	0.898	-.0009	.0010
Market capitalization	.0005	.0024	0.22	0.823	-.0041	.0051
Constant	-.0160	.0023	-7.10	0.000	-.0205	-.0116

Table 4.15: Linear regression of abnormal return on time period dummy and industry dummies and assets to liabilities variable and market capitalization dummy (ST)

4.3 Country differences

The last hypothesis is answered by combining the ranking of the countries based on their lockdown decisions and strategy with the stock price performance of the country indexes.

4.3.1 Country ranking

In Appendix 4.7 to 4.12 the overview of all countries' lockdown timelines are established and a short overview is given regarding the situations in the country. Based on this information, a ranking of countries is established which evaluates the intelligence of the lockdown decisions (Appendix 4.13).

The country considered to be handling the coronavirus in the best way is Germany, several articles point out their efficient health care system (Jung et al., 2020). Germany is followed by the Netherlands, even though it may be argued that the lockdown rules were too loose the country remained operating in as many industries as possible. Italy and Spain follow up, however, Spain is ranked worse due to later second lockdowns in some areas. Fifth is China, as their lockdown rules were good, but, they implemented the rules too late even though they knew the virus was spreading. The United States is ranked last as the number of infected people keeps rising rapidly and they let each state decide the precise rules of the lockdown independently. As a result, the COVID-19 infections are not yet decreasing.

4.3.2 Index regression

The regression of Table 4.16 regresses abnormal returns on the ranking of the countries while accounting for the implementation of the lockdown period by using a dummy variable to account for these two periods. The ranking is done by using dummy variables relative to Germany, the country which is ranked the highest. There appear to be no differences between countries based on their rankings. The only significant variable is the dummy account for the time period, comparing the difference between before and after lockdown. The abnormal returns after the lockdown implementation date are 0.38% higher than before the lockdown.

			Number of obs		919	
			F(6,912)		0.81	
			Prob > F		0.5602	
			R-squared		0.0053	
			Root MSE		0.0279	
AR	**Coef.**	**Robust Std. Err.**	**T**	**P>|t|**	**95% Conf. Interval**	
Time period	.0038	.0018	2.08	0.038	.0002	.007
AEX	.0001	.0034	0.02	0.980	-.0066	.0067
FTSE MIB	-.0007	.0034	-0.20	0.845	-.0072	.0059
IBEX	-.0011	.0034	-0.34	0.734	-.0078	.0055
XIN9	-.0015	.0031	-0.49	0.624	-.0076	.0046
DJI	.0001	.0034	0.03	0.974	-.0065	.0067
constant	-.0023	.0026	-0.89	.0371	-.0075	.0028

Table 4.16: Linear regression of abnormal return on time period dummy and country ranking

Chapter 5: Conclusion

After analysing the results it can be concluded that the countries differ in their transparency. Especially China is less open in their reports, or do not even publish their reports at all. Countries like Spain and Italy show to be supportive and helpful towards other industries that are having a hard time. The transparency of countries cannot be linked to a different performance of country indexes based on their abnormal returns. However, when comparing the results of the first and second quarter of 2019 and 2020, there are significant differences. The first quarter of 2020 appeared to have significantly lower returns compared to the first quarter of 2019. Contradictory to predictions, the second quarter of 2020 has significantly higher returns compared to 2019. It can be argued that the negative stock price impact of COVID-19 impacted the firms already at the end of the first quarter and firms are starting to recover in the second quarter.

All firms react differently to the pandemic, depending on which industry they operate in. Especially when looking at the short term effect. The aviation experienced a decrease in the firm performance, compared to the banking sector, while the energy, food and beverage, health care, personal and household goods, technology and telecommunications industries had significant positive dummy variables, compared to the performance of the banking industry. The time period variable appeared to have a significant positive effect on the period after the lockdown implementation, implying that the most extreme losses might have appeared earlier than the exact lockdown day due to speculation of traders in the market.

The differences in strictness of implementing the country rules does not significantly influence abnormal returns of the indexes. However, the time period dummy shows to be significant and concludes that the returns are significantly higher in the second quarter.

What effect the coronavirus will have on the economy exactly remains unsure. However, in some industries like aviation and technology significant differences are concluded[24]. The most significant result which can be concluded from all regressions in this thesis shows that the biggest impact can be seen in the first quarter of 2020, which is also argued by Bretscher et al. (2020). However, the impact of COVID-19 on the long term remains open for discussion.

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[24] Significant negative abnormal returns of the aviation industry relative to the banking sector. Significant positive abnormal returns of the technology industry relative to the banking sector.

Chapter 6: Discussion and limitations

The last chapters discusses the results and argues the limitations faced during the thesis. In section 6.1 the thesis method and results will be discussed. Followed by the limitations faced in the thesis.

6.1 Discussion

To start, a point of discussion in the methodology is that in using a risk fee rate for calculating the abnormal returns a general risk free rate of a 10 year risk free treasury bond is used. However, this can be improved by using an abnormal return which is dependent on the firms average return. The average return rate should be calculated per firm based on historical returns. This way each firm is compared to its own performance instead of a basic measure of a risk free return. More significant and precise outcomes could have been generated this way in industry and country differences. Global markets can differ significantly in the average returns of stocks so a risk free rate per country is a second option for this point of discussion.

Another point for discussion is the method for how the first assets to liabilities ratio is established for every firm. As this ratio is based on the data at the end of the year. During the quarter this might fluctuate and therefore does not explain how the financial situation of the firm was just before COVID-19 impacted the performance. It is not possible to use as a substitute the assets to liability ratio in the first quarter reports for example as not all firms update this information and leads to insignificant results.

Additionally, a different control variable could have been chosen to account for the firm structure. Total assets to liabilities is one type of criticism, however, controls like a debt to equity ratio. As this shows whether a firm is able to finance its debts. Various different control variables[25] could have been used to asses different firm characteristics and their reaction to the COVID-19 pandemic, which remains open for further research.

The strictness of COVID-19 rules per country is a subjective assessment and difficult to evaluate. This is because not everything can be evaluated and the real situation in countries can differ from what is published for the outside of the company. This part of the research can be extended by using surveys and randomly assign these to the inhabitants of every country. Or even including the views of employees in the evaluation. However, this is not guaranteed it will give a better indication of the situation per firm as the views may be biased. It remains hard to fairly asses the situation per firm and country.

Last, the stock returns of the firms and company indices are used to evaluate the impact on the companies and countries. However, stock prices are based on the speculation and trading behavior of

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[25] Other control variables related to the financial structure of firms can be current assets ratio, growth ratio of the firm, equity ratio, current ratio, quick ratio, inventory turnover, total assets turnover, long-term debts to total equity ratio, operational profits to sales, profit ratio, development expenses, et cetera.

traders in the market. The real situation in the firm may not be fully reflected in this, therefore, using the returns or cash flows of a firm might be interesting and lead to different insights into the firm situation. For countries the GDP or other measures per country can be used to asses the performance.

6.2 Limitations

Based on the discussion of the methodology, a limitation is that not all firms might update their first quarter reports precisely or truthfully. Some firms do not publish these reports, or as in China, some firms block their reports from outsiders. The completeness of these reports influences the results of the thesis by having less data available. According to eToro (2020), it is hard to base measures on the reports of China. They have been accused of falsifying their reports, and compared to the European reports they are considered unreliable. Therefore, comparing in an analysis the European reports to Chinese reports is no trustworthy. Also, firms that do publish information are not able to predict an outlook for the rest of the year due to uncertainties. It cannot be evaluated whether the firms have correctly predicted the second quarter results, which would have been an interesting comparison of predictions and reality.

The coverage of firms and whether they implement different measures for the pandemic can be tested by searching Google hits when combining "corona" or "COVID". However, this measure does not have to be precise, as the fact that both these are mentioned in one article, does not mean that the firm handles the pandemic in the company the right way by ensuring extra safety for employees and customers for example. It remains hard to assess whether firms truly are trying to ensure safety and take enough measures to reduce the spread of the virus.

Another limitation is the assessment of the strictness of the COVID-19 rules per country and how effective they are. It is not possible to cover how many people have been diagnosed and recovered as every country keeps track of these numbers differently. Some countries lack tests, and are not able to tests everyone possibly infected with the virus. The same holds for the death rates, some firms only considered a death caused by the coronavirus when this is tested, however, not everybody who dies from the virus is tested and will not be included in the death rate.

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[26] Type of quarter report may differ per company. Q1 is referred to as the period from January year X to March year X. Within a company the report of 2020 and 2019 will be of the same report, the quarter (Q1, Q2, Q3 or Q4) result depending on the financial statements of the company.

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[27] Type of quarter report may differ per company. Q1 is referred to as the period from January year X to March year X. Within a company the report of 2020 and 2019 will be of the same report, the quarter (Q1, Q2, Q3 or Q4) result depending on the financial statements of the company.

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[28] Type of quarter report may differ per company. Q1 is referred to as the period from January year X to March year X. Within a company the report of 2020 and 2019 will be of the same report, the quarter (Q1, Q2, Q3 or Q4) result depending on the financial statements of the company.

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Snam Q1 2019 report. Retrieved from: https://www.snam.it/export/sites/snam-rp/repository/ENG_file/Media/Press_releases/2019/Snam_Press_Release_I_Q_2019.pdf

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First quarter reports AEX

The first quarter[29] reports for constituents of AEX of 2020 and the preceding year. Ordered on the weight ranking of Appendix 3.6.

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Unilever Q1 2020 report. Retrieved from: https://www.unilever.com/Images/ir-q1-2020-full-announcement_en_tcm244-550281_en.pdf

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[31] Type of quarter report may differ per company. Q1 is referred to as the period from January year X to March year X. Within a company the report of 2020 and 2019 will be of the same report, the quarter (Q1, Q2, Q3 or Q4) result depending on the financial statements of the company.

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Appendix

A. Appendix

Chapter 3

Country	Event date
China	23rd of January 2020[32]
The Netherlands	15th of March 2020[33] [34]
Italy	9th of March 2020[35]
Spain	14th of March 2020[36]
Germany	22nd of March 2020[37]
United States	10th of March 2020[38] [39]

Appendix 3.1: Events dates per country

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[32] Nederland Wereldwijd (2020)

[33] Dujardin (2020)

[34] Willemsen (2020)

[35] Horowitz (2020)

[36] Marcos (2020)

[37] Moné (2020)

[38] Event date for the United States differs per state as all of them individually imposed a lockdown. New York state was the first state to declare a state of emergency on the 30th of January. However, did not impose a lockdown at this point. The first two states to implement a lockdown were Masachusets and Rhode Island on March 10 (Al Jazeera News, 2020). The other states followed in the week after.

[39] The states impose their own rules separately, and reopen individually. The event date is set at the first state going into lockdown (Lee et al., 2020).

Country	Index	Number of companies	Selection of companies
China	XIN9	50	Top 50 Companies in the Shanghai Stock Exchange (SSE) and Shenzhen Stock Exchange.[40]
Germany	DAX	30	Top 30 blue chip stocks traded on the Frankfurt Stock Exchange.[41][42]
Italy	FTSE MIB	40	Top 40 most liquid and capitalized stocks on the Borsa Italiana.[43][44]
The Netherlands	AEX	25	Top 25 largest and most actively traded shares on Euronext Amsterdam.[45][46]
Spain	IBEX 35 Index	35	Top 35 most liquid stocks trade on the Spanish Continuous Exchange.[47]
United States	DJI	30	Top 30 blue chip stocks representing the leaders in their industry.[48]

Appendix 3.2: Index per country

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[40] The FTSE China A50 is compromised of large, mid and small market cap China A-shares, tracking the daily price performance of all companies in this index (FTSE Russell, 2020).

[41] Free float shares are used in the index calculation of DAX, using the XETRA equity prices (Bloomberg, 2020).

[42] The Frankfurt Stock Exchange is the largest of the seven German stock exchanges (Börse Frankfurt, 2020).

[43] Foreign shares can be included in the FTSE MIB, secondary lines cannot be included, using a similar calculation to that of the S&P MIB Index (Bloomberg, 2020).

[44] Borsa Italiana stock market representing the Italian traded stocks (Borsa Italiana, 2020).

[45] Free float market capitalization weighted index based on a widely used Dutch stock market indicator (Bloomberg, 2020).

[46] European stock exchange based in Amsterdam (Euronext Amsterdam, 2020).

[47] Equities are calculated using free float shares for the index created and published by Sociedad de Bolsas (Bloomberg, 2020).

[48] The Dow Jones Industrial Average is a price-weighted average of these top 30 stocks considered leaders (Bloomberg, 2020).

Company	Ticker	Weight	Industry
Ping An Insurance (Group) Company of China	601318	11,46%	Insurance
Kweichow Moutai	600519	10,79%	Food and beverage
China Merchants Bank	600036	6,75%	Banks
Wuliangye Yibin	000858	4,94%	Food and beverage
Gree Electric Appliances Inc of Zhuhai	000651	4,24%	Technology
Jiangsu Hengrui Medicine	600276	3,85%	Health care
Industrial Bank	601166	3,70%	Banks
CITIC Securities	600030	3,14%	Real estate
China Vanke	000002	2,84%	Real estate
China Minsheng Banking	600016	2,66%	Banks
Shanghai Pudong Development Bank	600000	2,59%	Banks
Inner Mongolia Yili Industrial	600887	2,53%	Food and beverage
Agricultural Bank of China	601288	2,18%	Banks
Midea Group	000333	2,11%	Personal and household goods
Luxshare Precision Industry	002475	2,01%	Technology
Industrial and Commercial Bank of China	601398	1,90%	Banks
Ping An Bank	000001	1,77%	Banks
Bank of Communications	601328	1,74%	Banks
China International Travel Service	601888	1,73%	Tourism
Poly Developments and Holdings	600048	1,69%	Real estate
BOE Technology Group	000725	1,61%	Technology
Anhui Conch Cement	600585	1,60%	Basic resources
ZTE	000063	1,56%	Telecommunications
China State Construction Engineering	601668	1,45%	Industrial goods and services
Hangzhou Hikvision Digital Technology	002415	1,45%	Technology
Shenzhen Mindray Bio-Medical Electronics	300760	1,28%	Health care
Muyuan Foodstuff	002714	1,27%	Food and beverage
Bank of China	601988	1,24%	Banks
China Yangtze Power	600900	1,22%	Energy
China Pacific Insurance (Group)	601601	1,19%	Insurance
China Construction Bank	601939	0,96%	Banks
Guotai Junan Securities	601211	0,94%	Real estate
China Everbright Bank	601818	0,90%	Banks
SAIC Motor	600104	0,84%	Automobiles
Jiangsu Yanghe Brewery Joint-Stock	002304	0,81%	Food and beverage
CRRC	601766	0,71%	Industrial goods and services
China Life Insurance	601628	0,70%	Insurance
S.F. Holding	002352	0,68%	Logistics
Foshan Haitian Flavouring and Food	603288	0,66%	Food and beverage
China Petroleum & Chemical (Sinopec Corporation)	600028	0,65%	Oil and gas
China United Network Communications	0762	0,63%	Telecommunications
Contemporary Amperex Technology	300750	0,62%	Technology
Will Semiconductor Shanghai	603501	0,57%	Industrial goods and services
China Shenhua Energy	601088	0,50%	Energy
PetroChina	601857	0,30%	Oil and gas
Foxconn Industrial Internet	601138	0,27%	Telecommunications
China Securities	601066	0,25%	Real estate
China CITIC Bank	601998	0,23%	Banks
Wens Foodstuff Group	300498	0,19%	Food and beverage
360 Security	601360	0,13%	Technology

Appendix 3.3: XIN9 constituents

Company	Ticker	Weight	Industry
SAP	SAP	11,29%	Technology
Linde	LIN	11,08%	Oil and gas
Allianz	ALV	7,95%	Insurance
Siemens	SIE	7,25%	Technology
Bayer	BAYN	6,98%	Health care
Deutsche Telekom	DTE	5,53%	Telecommunications
BASF	BAS	5,31%	Chemicals
Adidas	ADS	4,88%	Clothing
Munich Re	MUV2	3,14%	Insurance
Vonovia	VNA	3,02%	Real estate
Deustche Post	DPW	2,88%	Logistics
Daimler	DAI	2,70%	Industrial goods and services
Deustche Börse	DB1	2,63%	Real estate
E.On	EOAN	2,59%	Energy
Volkswagen Group	VOW3	2,44%	Automobiles
Infineon Technologies	IFX	2,03%	Technology
BMW	BMW	1,88%	Automobiles
RWE	RWE	1,79%	Energy
Henkel	HEN3	1,72%	Personal and household goods
Fresenius	FRE	1,66%	Health care
Fresenius Medical Care	FME	1,63%	Health care
Deutsche Bank	DBK	1,62%	Banks
Merck	MRK	1,56%	Health care
Wirecard	WDI	1,42%	Real estate
Beiersdorf	BEI	1,25%	Personal and household goods
MTU Aero Engines	MTX	0,97%	Aviation
Continental	CON	0,88%	Industrial goods and services
HeidelbergCement	HEI	0,70%	Industrial goods and services
Lufthansa	LHA	0,62%	Aviation
Covestro	1COV	0,59%	Chemicals

Appendix 3.4: DAX constituents

Company	Ticker	Weight	Industry
Enel	ENEL	15,89%	Energy
Eni	ENI	8,92%	Oil and gas
Intesa Sanpaolo	ISP	8,61%	Banks
Ferrari	RACE	6,73%	Automobiles
UniCredit	UCG	6,17%	Banks
Generali	G	6,16%	Insurance
STMicroelectronics	STM	4,93%	Technology
Snam	SRG	3,71%	Oil and gas
Terna	TRN	3,15%	Energy
Fiat Chrysler Automobiles	FCA	2,80%	Automobiles
Moncler	MONC	2,49%	Personal and household goods
Atlantia	ATL	2,17%	Logistics
CNH Industrial	CNHI	1,99%	Industrial goods and services
FinecoBank	FBK	1,95%	Banks
Exor	EXO	1,89%	Real estate
Mediobanca	MB	1,56%	Banks
Telecom Italia	TIT	1,53%	Telecommunications
Recordati	REC	1,43%	Health care
Prysmian	PRY	1,41%	Industrial goods and services
Campari	CPR	1,40%	Food and beverage
Nexi	NEXI	1,37%	Real estate
Poste Italiane	PST	1,36%	Logistics
DiaSorin	DIA	1,04%	Health care
Hera	HER	1,03%	Basic resources
Tenaris	TEN	1,01%	Basic resources
Italgas	IG	0,94%	Oil and gas
Leonardo	LDO	0,91%	Aviation
UBI Banca	UBI	0,89%	Banks
Amplifon	AMP	0,86%	Personal and household goods
Banco BPM	BAMI	0,70%	Banks
A2a	A2A	0,68%	Energy
Azimut Holding	AZM	0,62%	Real estate
Unipol	UNI	0,58%	Insurance
Pirelli	PIRC	0,54%	Industrial goods and services
Banca Mediolanum	BMED	0,52%	Banks
Saipem	SPM	0,49%	Oil and gas
Buzzi Unicem	BZU	0,43%	Industrial goods and services
Banca Generali	BGN	0,42%	Banks
BPER Banca	BPE	0,42%	Banks
Salvatore Ferragamo	SFER	0,31%	Personal and household goods

Appendix 3.5: FTSE MIB constituents

Company	Ticker	Weight	Industry
ASML Holding	ASML	16,37%	Technology
Royal Dutch Shell	RDSA	14,60%	Oil and gas
Unilever	UNA	12,12%	Personal and household goods
RELX	REN	7,85%	Media
Philips	PHIA	6,45%	Health care
Prosus	PRX	5,00%	Technology
Ahold Delhaize	AD	4,57%	Food and beverage
Adyen	ADYEN	3,84%	Industrial goods and services
DSM	DSM	3,66%	Chemicals
ING Group	INGA	3,63%	Banks
Heineken	HEIA	3,42%	Food and beverage
Wolters Kluwer	WKL	3,41%	Media
AkzoNobel	AKZA	2,33%	Chemicals
Just Eat Takeaway	TKWY	1,72%	Food and beverage
KPN	KPN	1,51%	Telecommunications
Galapagos	GLPG	1,48%	Health care
NN Group	NN	1,40%	Insurance
Unibail-Rodamco-Westfield	URW	1,39%	Real estate
ArcelorMittal	MT	1,12%	Basic resources
ASM International	ASM	0,87%	Technology
Aegon	AGN	0,76%	Insurance
Randstad Holding	RAND	0,69%	Industrial goods and services
IMCD	IMCDC	0,66%	Chemicals
ASR Nederland	ASRNL	0,60%	Insurance
ABN AMRO	ABN	0,55%	Banks

Appendix 3.6: AEX constituents

Company	Ticker	Weight	Industry
Santander	SAN	13,06%	Banks
Iberdrola	IBE	12,33%	Energy
Inditex	ITX	10,66%	Clothing
Telefonica	TEF	7,50%	Telecommunications
BBVA	BBVA	6,83%	Banks
Amadeus	AMS	6,13%	Tourism
Repsol	REP	4,75%	Oil and gas
Ferrovial	FER	4,12%	Industrial goods and services
Aena	AENA	3,08%	Aviation
Naturgy Energy	NTGY	3,00%	Energy
Caxiabank	CABK	3,00%	Banks
ACS	ACS	2,37%	Industrial goods and services
Grifols	GRF	2,36%	Health care
Cellnex	CLNX	2,26%	Telecommunications
IAG	IAG	2,25%	Aviation
Endesa	ELE	2,09%	Energy
Red Electrica	REE	2,07%	Energy
Merlin Properties SA	MRL	1,25%	Real estate
Gamesa	SGRE	1,15%	Energy
Bankinter	BKT	1,10%	Banks
Enagas	ENG	1,04%	Oil and gas
Banco Sabadell	SAB	1,03%	Banks
Mapfre	MAP	0,96%	Insurance
Inmobiliara Colonial	COL	0,92%	Real estate
Bankia	BKIA	0,67%	Banks
Acciona	ANA	0,65%	Industrial goods and services
ArcelorMittal	MTS	0,59%	Basic resources
Cie Automotive	CIE	0,49%	Industrial goods and services
Viscofan	VIS	0,42%	Food and beverage
Masmovil Ibercom	MAS	0,41%	Telecommunications
Acerinox	ACX	0,37%	Basic resources
Mediaset	TL5	0,34%	Telecommunications
Indra A	IDR	0,31%	Technology
Melia Hotels	MEL	0,28%	Tourism
ENCE	ENC	0,18%	Energy

Appendix 3.7: IBEX 35 Index constituents

Company	Ticker	Weight	Industry
Apple Inc.	AAPL	8,01%	Technology
UnitedHealth Group	UNH	8,01%	Health care
The Home Depot	HD	6,17%	Personal and household goods
Goldman Sachs	GS	5,29%	Real estate
McDonald's	MCD	5,23%	Food and beverage
Visa Inc.	V	5,06%	Banks
Microsoft	MSFT	4,94%	Technology
3M	MMM	4,35%	Technology
Johnson & Johnson	JNJ	4,18%	Health care
Boeing	BA	3,87%	Aviation
IBM	IBM	3,58%	Technology
Walmart	WMT	3,44%	Personal and household goods
Caterpillar Inc.	CAT	3,34%	Industrial goods and services
Procter & Gamble	PG	3,26%	Personal and household goods
The Walt Disney Company	DIS	3,12%	Media
The Travelers Companies	TRV	2,95%	Insurance
JPMorgan	JPM	2,72%	Real estate
American Express	AXP	2,68%	Banks
Chevron Corporation	CVX	2,63%	Oil and gas
Nike	NKE	2,45%	Clothing
Merck & Co.	MRK	2,25%	Health care
Raytheon Technologies	RTX	1,89%	Aviation
Intel	INTC	1,72%	Technology
Verizon	VZ	1,62%	Telecommunications
ExxonMobil	XOM	1,32%	Oil and gas
The Coca-Cola Company	KO	1,31%	Food and beverage
Walgreens Boots Alliance	WBA	1,26%	Personal and household goods
Cisco Systems	CSCO	1,21%	Technology
Pfizer	PFE	1,06%	Health care
DOW Inc.	DOW	1,04%	Chemicals

Appendix 3.8: DJI constituents

Industry	Number of firms in industry[49]	Description
Automobiles	5	Firms operating in the automotive industry, vehicle manufacturers and parts suppliers.
Aviation	7	Aviation for economic and business flights, aviation force and goods transportation.
Banks	32	Banks offering people the ability to borrow and lend money and put money on the bank.
Basic resources	6	Suppliers of steel and water.
Chemicals	6	Producers of chemicals for experiments or cosmetic products.
Clothing	3	Retail brands for clothing and shoe apparel.
Energy	13	Firms generating and supplying energy.
Food and beverage	14	Restaurants, take-away companies, breweries and food producers.
Health care	15	Health care suppliers in form of hospitals, doctors, medicines and related medical equipment required for the health care industry.
Industrial goods and services	17	Industrial goods and services ranging from supplying parts of the supply chain production to manufacturers.
Insurance	12	Companies providing insurance for lives, health care coverage and goods.
Logistics	4	Logistics related to trade and postal services.
Media	3	Media sources for production of television and literature.
Oil and gas	12	Companies retrieving and supplying oil and gas.
Personal and household goods	11	Supplies for personal hygiene, and for household cleaning.
Real Estate	16	Investment companies enabling consumers to invest themselves or invest in funds.
Technology	20	Software and technology device suppliers.
Telecommunications	11	Mobile phone suppliers, suppliers of communication services and 5G companies.
Tourism	3	Hotels and travel companies for tourists.

Appendix 3.9: Industry composition and explanation

[49] Number of firms per industry based on the sample indices, FTSE China A50, DAX, FTSE MIB, AEX, IBEX 35 Index and INDU.

Question regarding financial reports	Answer
1. Has the firm published its first quarter report of 2020?	Yes / No
2. Has the firm published its first quarter report of 2019?	Yes / No
3. When comparing the 2019 and 2020 report, are they similar in amount and format of published information?	Yes / No
4. Does the firm mention the corona crisis in the 2020 report?	Yes / No
5. Does the firm report a negative or positive impact due to the corona virus or is the firms performance unaffected?	Positive / Negative / Equal
6. In what form do they report the impact?	No amount[50] / Amount ranges[51] / Not applicable[52]
7. Does the firm include in the report how they handle the consequences of the coronavirus (e.g. which precautions or actions they take regarding COVID-19)?	Yes / No
8. How many times does the report mention "corona" or "COVID"?	Amount
9. How many pages does the report have?	Amount

Appendix 3.10: Quarterly report questions

Questions regarding annual reports of China	Answer
1. Has the firm published its annual report of 2019?	Yes / No
2. Do they mention the start of COVID-19?	Yes / No
3. Does the firm mention a positive or negative impact as a result of the start of corona?	Positive / Negative / Equal
4. In what form do they report the impact?	No amount[53] / Amount ranges[54] / Not applicable[55]
5. How many times does the report mention "corona" or "COVID"?	Amount
6. How many pages does the report have?	Amount

Appendix 3.11: Annual report questions

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[50] No specified amount, only a positive or negative forecast in the performance outlook.
[51] Amount ranges set as targets, which can be ranges in between which the amount should result or percentage ranges.
[52] Impact is registered as not applicable if the firm states the outlook will be equal to the outlook pre-coronavirus.
[53] No specified amount, only a positive or negative forecast in the performance outlook.
[54] Amount ranges set as targets, which can be ranges in between which the amount should result or percentage ranges.
[55] Impact is registered as not applicable if the firm states the outlook will be equal to the outlook pre-coronavirus.

Country	Lockdown date t_0	Number of days till end sample[56] $t_{postLD} = t_{end} - t_0$	Begin sample date t_{start}
China	23rd of January 2020	159	18th of August 2019
Germany	22nd of March 2020	100	14th of December 2019
Italy	9th of March 2020	113	18th of November 2019
The Netherlands	15th of March 2020	107	30th of November 2019
Spain	14th of March 2020	108	28th of November 2019
United States	10th of March 2020	112	20th of November 2019

Appendix 3.12: Sample period for equal days before and after corona lockdown implementation

Chapter 4

Criterium	First quarter reports XIN9	Annual reports XIN9
1. How many firms are there in total in the index?	*50*	*50*
2. How many firms have their reports available?	*19*	*21*
3. How many do they mention the existence of corona?	*9*	*19*
4. What is the average ratio of $\frac{\text{nr of times mentioning corona or COVID}}{\text{total number of pages}}$ in the reports for this index?	*0.326*	*0.036*
5. How many firms predict mention a positive impact?	*0*	*1*
6. How many firms predict it does not affect the firm?[57]	*2*	*4*
7. How many firms predict a negative impact	*7*	*14*
8. Are there noteworthy measures the firms have taken? Some of the firms in the XIN9 mention to have donated money to people in need or health care facilities, like the build op of the emergency COVID-19 hospital in Wuhan.		
9. Are there additional notes regarding the reports? Two firms not mentioning the existence of the corona virus and two other firms saying to not be affected by the corona virus or even benefitting and predicting that the Chinese economy will be positively affected by the pandemic (Agricultural Bank of China, 2020).		

Appendix 4.1: Review Q1 and annual reports XIN9

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[56] The 29th of June is used as last day of the sample as data was available until this trading date at the time of examination.

[57] Firms that do not mention corona of COVID are not counted in whether they predict a positive, equal or negative impact on the performance of the coming period.

Criterium	First quarter reports DAX
1. How many firms are there in total in the index?	30
2. How many firms have their reports available?	29
3. How many do they mention the existence of corona?	28
4. What is the average ratio of $\frac{\text{nr of times mentioning corona or COVID}}{\text{total number of pages}}$ in the reports for this index?	0.995
5. How many firms predict mention a positive impact?	2
6. How many firms predict it does not affect the firm?[58]	7
7. How many firms predict a negative impact	20
8. Are there noteworthy measures the firms have taken? Most of the companies mention to ensure the safety of employees and customers by sticking to the rules and providing necessary goods to ensure safety.	
9. Are there additional notes regarding the reports? For example the SAP is dependent on parts of production from China and therefore have difficulties continuing production. Deutsche Post explains concerns of fearing a second wave affecting the business.	

Appendix 4.2: Review Q1 reports DAX

Criterium	First quarter reports FTSE MIB
1. How many firms are there in total in the index?	40
2. How many firms have their reports available?	34
3. How many do they mention the existence of corona?	34
4. What is the average ratio of $\frac{\text{nr of times mentioning corona or COVID}}{\text{total number of pages}}$ in the reports for this index?	0.567
5. How many firms predict mention a positive impact?	2
6. How many firms predict it does not affect the firm?[59]	7
7. How many firms predict a negative impact	25
8. Are there noteworthy measures the firms have taken? Nexi (2020) has innovated on the digital field, which shows the flexibility of the firm during the pandemic. Snam donated supplies to health care institutions as they needed supplies in the Italian hospitals.	
9. Are there additional notes regarding the reports? Some firms, including Ferrari (2020), report uncertainties regarding the outlook of 2020 due to a potential second wave.	

Appendix 4.3: Review Q1 reports FTSE MIB

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[58] Firms that do not mention corona of COVID are not counted in whether they predict a positive, equal or negative impact on the performance of the coming period.

[59] Firms that do not mention corona of COVID are not counted in whether they predict a positive, equal or negative impact on the performance of the coming period.

Criterium	First quarter reports AEX
1. How many firms are there in total in the index?	25
2. How many firms have their reports available?	19
3. How many do they mention the existence of corona?	19
4. What is the average ratio of $\frac{\text{nr of times mentioning corona or COVID}}{\text{total number of pages}}$ in the reports for this index?	1.098
5. How many firms predict mention a positive impact?	1
6. How many firms predict it does not affect the firm?[60]	5
7. How many firms predict a negative impact	13
8. Are there noteworthy measures the firms have taken? Unilever (2020) has reported that it will donate a 500 million euro to smaller companies which are struggling to operate and otherwise would face bankruptcy.	
9. Are there additional notes regarding the reports? Other firms have mentioned to withdraw their outlooks and previous predictions due to the circumstances. There is too many uncertainty about the exact impact at the point of the first quarter report.	

Appendix 4.4: Review Q1 reports AEX

Criterium	First quarter reports IBEX 35 Index
1. How many firms are there in total in the index?	35
2. How many firms have their reports available?	35
3. How many do they mention the existence of corona?	35
4. What is the average ratio of $\frac{\text{nr of times mentioning corona or COVID}}{\text{total number of pages}}$ in the reports for this index?	0.703
5. How many firms predict mention a positive impact?	4
6. How many firms predict it does not affect the firm?[61]	5
7. How many firms predict a negative impact	26
8. Are there noteworthy measures the firms have taken? Viscofan Group focusses on three main areas, protecting the health of workers, running the supply chain, and helping to prevent the spread of COVID-19 (2020). Santander incorporated a similar approach during the pandemic, based on six dimensions, a contingency plan, health of employees, customers, business, liquidity and risk and society and information for stakeholders were their main points.	
9. Are there additional notes regarding the reports? Cie Automotive mentioned in the report that they predicted the worst part of the pandemic is over and are looking forward to an improving performance (2020). Also the telecommunications industry was declared an essential service during the pandemic (CLNX, 2020).	

Appendix 4.5: Review Q1 reports IBEX 35 Index

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[60] Firms that do not mention corona of COVID are not counted in whether they predict a positive, equal or negative impact on the performance of the coming period.

[61] Firms that do not mention corona of COVID are not counted in whether they predict a positive, equal or negative impact on the performance of the coming period.

Criterium	First quarter reports DJI
1. How many firms are there in total in the index?	30
2. How many firms have their reports available?	28
3. How many do they mention the existence of corona?	28
4. What is the average ratio of $\frac{\text{nr of times mentioning corona or COVID}}{\text{total number of pages}}$ in the reports for this index?	*0.907*
5. How many firms predict mention a positive impact?	4
6. How many firms predict it does not affect the firm?[62]	11
7. How many firms predict a negative impact	13
8. Are there noteworthy measures the firms have taken? The Home Depot has set two priorities, working to ensure safety and health of consumers, and being able to ensure the essential products for their consumers (2020).	
9. Are there additional notes regarding the reports? Some of the firms, like the Coca-Cola Company, are uncertainty about how the year will continue (2020). And other firms like Nike and Dow Inc. are expecting a recovery in the economy and are planning on having positive performances during the rest of the year (2020).	

Appendix 4.6: Review Q1 reports DJI

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[62] Firms that do not mention corona of COVID are not counted in whether they predict a positive, equal or negative impact on the performance of the coming period.

Date	Event
1st of December 2019	First patient got infected with unknown disease (COVID-19).
31st of December 2019	China informed the WHO about several cases in the city of Wuhan.
1st of January 2020	The Huanan Seafood Wholesale Market is shut down due to being the suspected infection source.
5th of January 2020	It was ruled out that this was an already existent virus, they discovered it was a new infection.
11th of January 2020	The first person died from the novel Coronavirus.
13th of January 2020	The first case outside China was discovered, located in Thailand from a person who travelled from Wuhan.
23rd of January 2020	The city of Wuhan was placed in quarantine. Strict lockdown due to which nobody could continue regular life (work, school, events). Only allowing the citizens to go out for groceries. Prison sentences for people who broke the lockdown rules.
7th of March 2020	Almost two months after the start, the number of reported cases drops in China.
8th of April 2020	For the first time since the lockdown citizens of Wuhan were allowed to leave the city.
26th of April 2020	China announced they had no remaining cases infected with the disease in hospitals, all patients were discharged.
15th of June 2020	China moved to mass testing in Beijing due to infections which can be related to another major wholesale food market,

Overview

Due to late alarm of the Chinese city of Wuhan, the virus had already spread. The way China tackled the virus was by very strict rules, people were not allowed outside and had to quarantine at home. This way contact was limited to slow down the number of infections. Even though they were strict, the lockdown was too late to stop the virus from spreading.

Appendix 4.7: Time line COVID-19 China[63]

Date	Event
27th of January 2020	First confirmed case in Germany.
9th of March 2020	Recommendation of the minister of health to cancel all big events. First German person died due to COVID-19.
13th of March 2020	The first official restrictions on public living were set.
8th of April 2020	An increasing trend in infections is confirmed.
15th of April 2020	Easing of the set corona measures.
27th of April 2020	The first schools reopen and working life continues and slowly gets back to normal circumstances.
30th of April 2020	More restrictions are lifted.
13th of May 2020	The first border controls are lifted.

Overview

Germany has showed during this pandemic that they have a good crisis management team as they succeeded in keeping the number of infections and death rates low. They had enough corona tests at hand to test inhabitants, and even studies show that Germany is one of the best countries in dealing with the COVID-19 pandemic.

Appendix 4.8: Timeline COVID-19 Germany[64]

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[63] Aljazeera (2020)
[64] Deutschland.de (2020)

Date	Event
31st of January 2020	The first two cases of COVID-19 were found in Italy.
23rd of February 2020	The third death was reported and Venice Carnival and sport events were closed.
25th of February 2020	Lombardy region of Italy has villages that are in complete lockdown.
9th of March 2020	Whole Italy is in lockdown.
4th of May 2020	The country rushed to reopening of the lockdown.
3rd of June 2020	Italy has reopened borders for travelers from Europe.

Overview

At first the country implemented the lockdown quickly in the affected areas to slow the spreading, however, the whole country could have been in lockdown earlier to limit the spread even more. The lockdown was strict and people were only allowed outside for groceries or essential jobs. The way the lockdown was lifted was too quick and could have been more controlled.

Appendix 4.9: Timeline COVID-19 Italy[65] [66] [67]

Date	Event
27th of February 2020	First case of corona is tested positive.
6th of March 2020	First death in the Netherlands due to corona.
12th of March 2020	Events are cancelled and preferred to work from home when possible.
15th of March 2020	Schools, shops and restaurants, clubs and bars close.
16th of March 2020	Increasing in the number of intensive care hospital beds.
23th of March 2020	Tightening the corona rules and limit being outside in a group of people.
16th of April 2020	Increase in the number of tests and testing availability.
1st of June 2020	The restaurants and bars are allowed to open and the corona rules are less strict, however still existent.

Overview

The lockdown was implemented too late by the Dutch government and due to the combination with the Dutch carnival the virus quickly spread. Compared to other countries, inhabitants of the Netherlands were still allowed to go outside during the lockdown, making the rules seem if you look at the Italian or Spanish lockdown. Due to the restricted amount of tests available people, potentially infected, could not be tested.

Appendix 4.10: Timeline COVID-19 the Netherlands[68]

[65] Aljazeera (2020)
[66] CNN (2020)
[67] Laterza (2020)
[68] NU.nl (2020)

Date	Event
31st of January 2020	First confirmed case in Spain.
25th of February 2020	Spain starts reporting coronavirus cases.
3rd of March 2020	The first coronavirus death has been reported in the country.
9th of March 2020	Sports events have been cancelled and schools are being closed.
14th of March 2020	The lockdown is implemented and people are only allowed to go outside to go to the doctor, do the groceries and go to work.
28th of March 2020	The lockdown is tightened further and people are only allowed to go to work if they are essential workers.
29th of March 2020	Spain recorded a record highest death toll within 24 hours, they are close behind the severe situation in Italy.
25th of May	Some restaurants and areas are allowed to reopen. It differs per city whether the lockdown measures are eased.
21st of June 2020	Spain reopened the borders for European tourists.

Overview

The moment from the first COVID-19 case to the lockdown date has been around 6 weeks. This is a long period before deciding to close the country. The lockdown rules however were strict. Now in some placed new order to stay in quarantine have been given as the spread of the virus increased again after reopening the country.

Appendix 4.11: Timeline COVID-19 Spain[69] [70]

Date	Event
19th of January 2020	The first case was reported in Washington.
27th of February 2020	President Donald Trump invoking the Defense Production Act[71].
10th of March 2020	The lockdown was implement in one of the states as first in the U.S.
25th of March 2020	The U.S. accounts for the highest number of infections in the world. The number of infections doubled in two days.
31st of March 2020	They passed the number of reported deaths in China.
23rd of April 2020	U.S. citizens were allowed to file for unemployment benefits, which reached a total of 26 million submissions.
28th of April 2020	The death toll kept rising and made up one third of the total global amount of cases. However, the first states started reopening already.

Overview

The U.S. does not have a clear overview due to the different states in the U.S. being able to set their own lockdown rules. The lockdown was for most states relatively short, especially when considering they were still on an increasing trend of infections and death rates.

Appendix 4.12: Timeline COVID-19 United States[72]

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[69] Aljazeera (2020)
[70] France24.com (2020)
[71] This act grants the U.S. the power to expand the production of key products for national security.
[72] Aljazeera (2020)

Rank	Country
1	Germany
2	The Netherlands
3	Italy
4	Spain
5	China
6	United States

Appendix 4.13: Ranking of countries[73]

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[73] Germany at the first place representing the best lockdown implementation and rules. The United States representing the last place, corresponding to the worst lockdown implementation and rules.

G. Graphs

Chapter 3
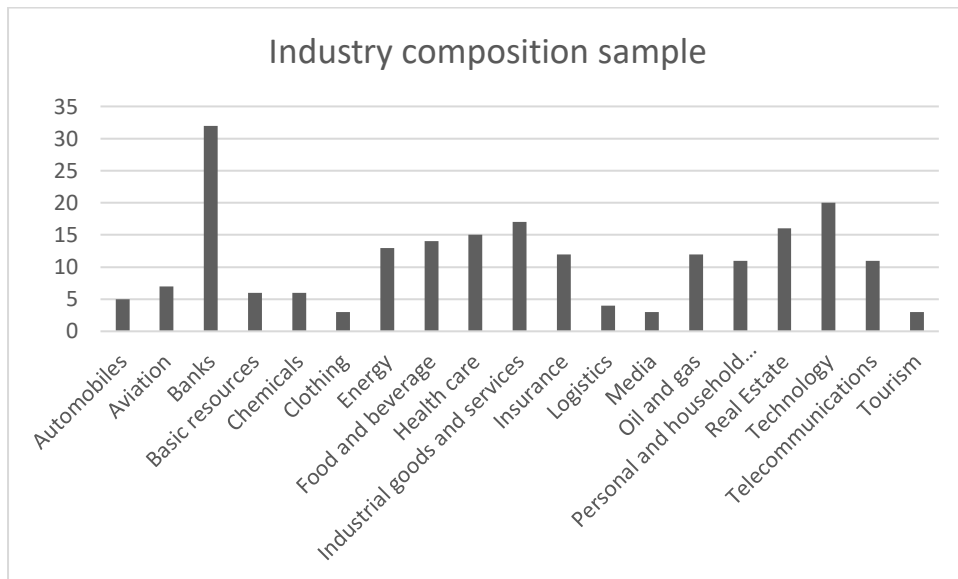
Graph 3.1: Industry composition total sample
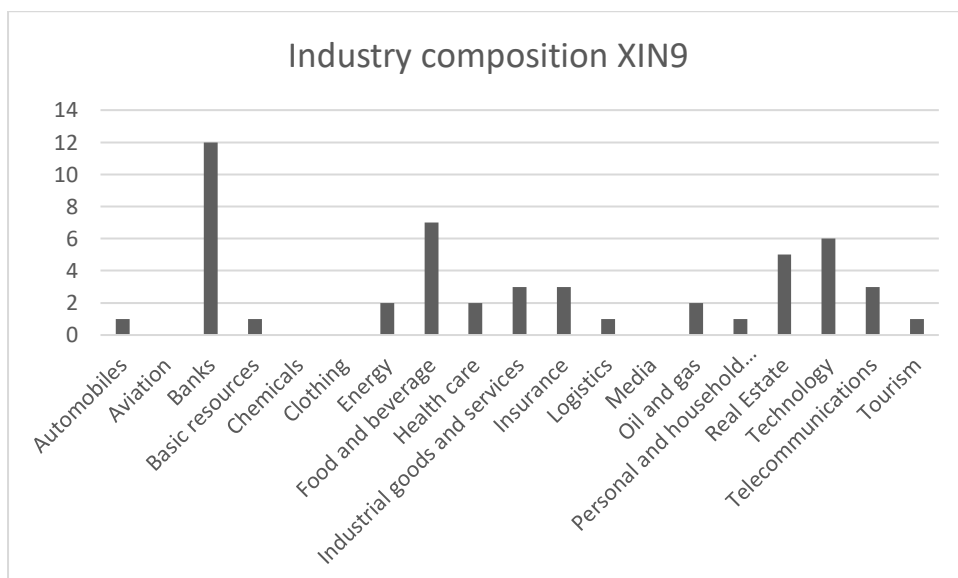
Graph 3.2: Industry composition XIN9
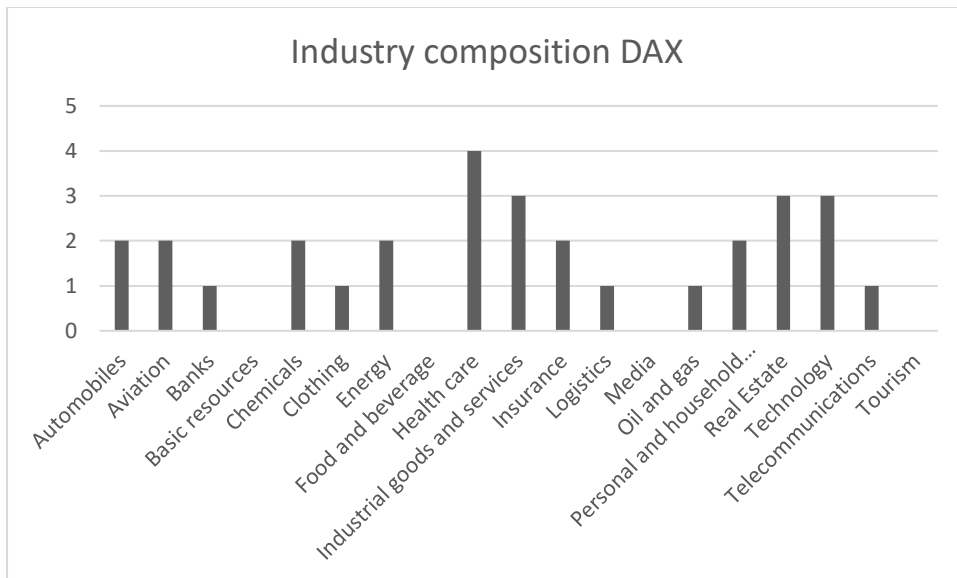
Graph 3.3: Industry composition DAX
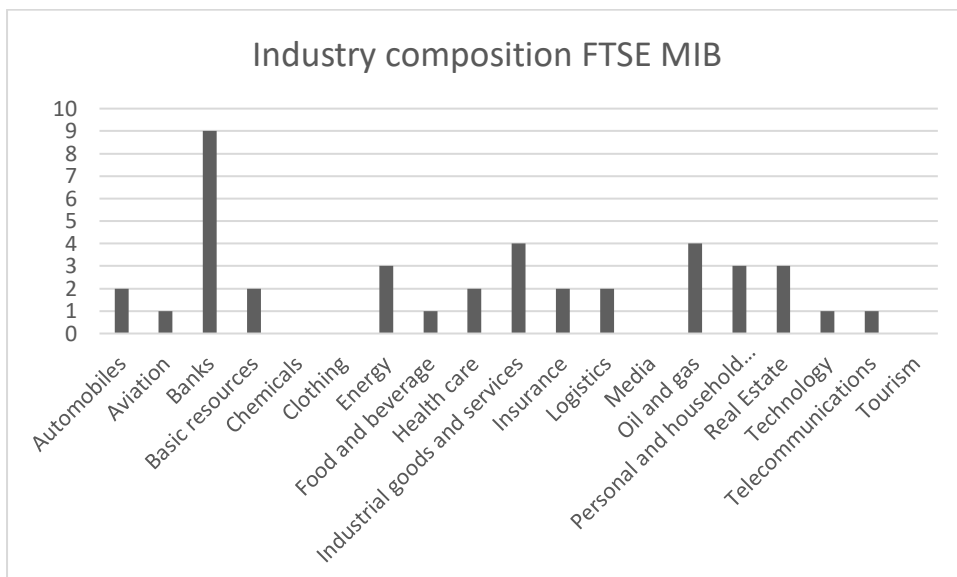
Graph 3.4: Industry composition FTSE MIB
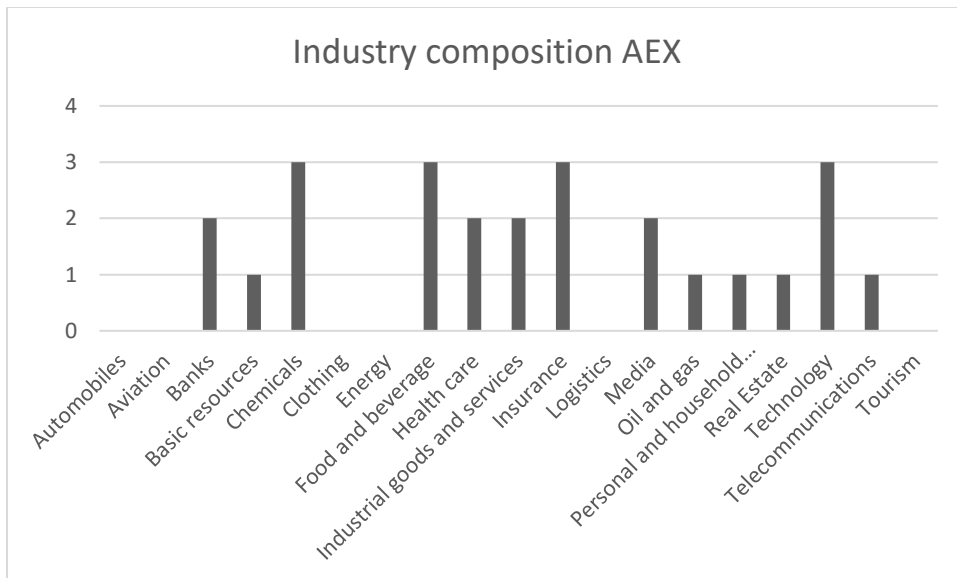
Graph 3.5: Industry composition AEX
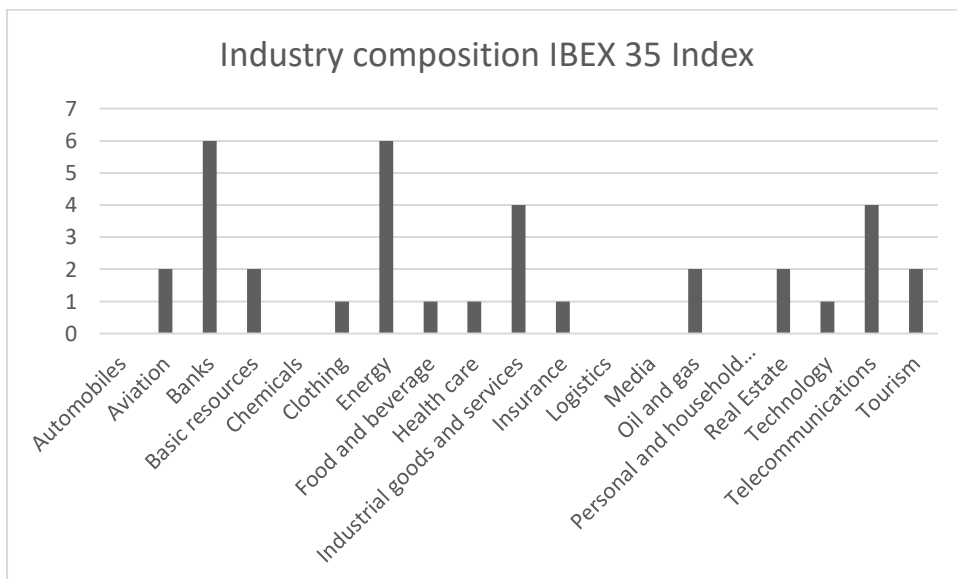
Graph 3.6: Industry composition IBEX 35 Index
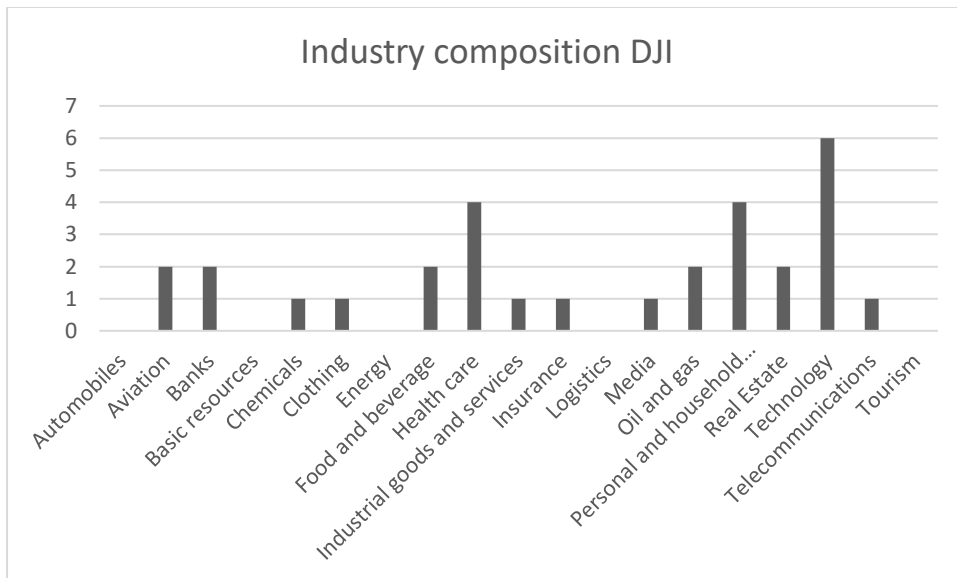
Graph 3.7: Industry composition DJI
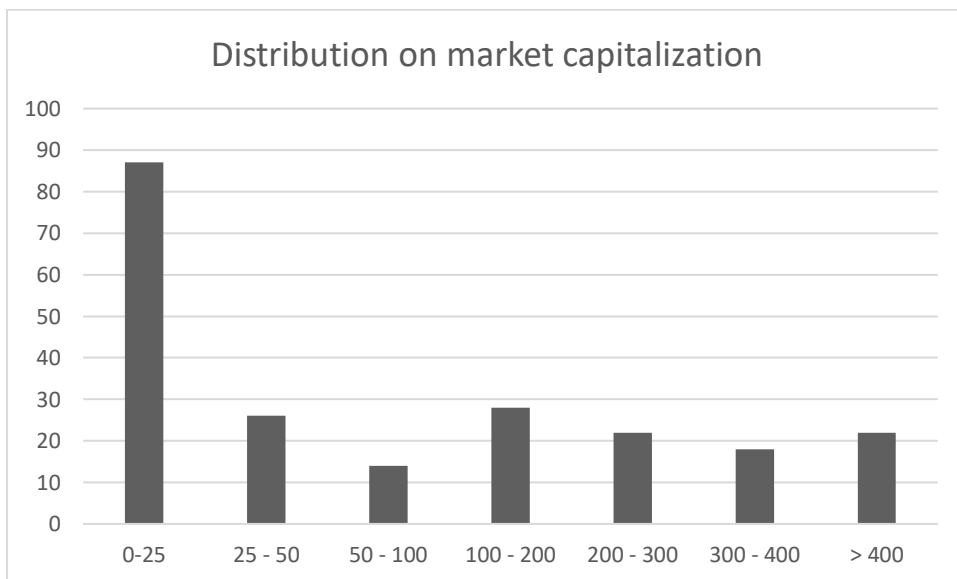
Graph 3.8: Distribution of market capitalization of firms (in millions)

T. Tables

Chapter 3

	2020	**2019**
Marketwatch	0,01877	0,0267
CNBC	0,01882	0,02661
YCharts	0,0188	0,0267
Average	0,018796667	0,02667
Daily rate	0,0000739	0,000104

Table 3.1: Annual U.S. Treasury yield and daily rate

Chapter 4

			Number of obs		714	
			F(1,712)		11.34	
			Prob > F		0.0008	
			R-squared		0.0157	
			Root MSE		0.0258	
AR	**Coef.**	**Robust Std. Err.**	**T**	**P>|t|**	**95% Conf. Interval**	
Time period	-.0065	.0019	-3.37	0.001	-.0103	-.0027
constant	.0017	.0014	1.22	0.223	-.0010	.0044

Table 4.1: Linear regression of abnormal return on time period dummy first quarter 2019 and 2020

			Number of obs		714	
			F(6,707)		1.96	
			Prob > F		0.0693	
			R-squared		0.0080	
			Root MSE		0.0259	
AR	**Coef.**	**Robust Std. Err.**	**T**	**P>|t|**	**95% Conf. Interval**	
Time period	-.0065	.0019	-3.36	0.001	-.0103	-.0027
AEX	.0008	.0034	0.24	0.808	-.0058	.0074
FTSE MIB	.0002	.0034	0.06	0.951	-.0064	.0068
IBEX	-.0006	.0034	-0.19	0.849	-.0072	.0059
XIN9	-.0011	.0034	-0.33	0.742	-.0077	.0055
DJI	.0006	.0034	0.18	0.858	-.0060	.0072
constant	.0017	.0026	0.67	0.505	-.0033	.0068

Table 4.2: Linear regression of abnormal return on time period dummy and country indexes first quarter 2019 and 2020

			Number of obs		726	
			F(1,724)		2.69	
			Prob > F		0.1013	
			R-squared		0.0037	
			Root MSE		0.0195	
AR	**Coef.**	**Robust Std. Err.**	**T**	**P>|t|**	**95% Conf. Interval**	
Time period	.0024	.0015	1.64	0.100	-.0005	.0052
constant	-.0001	.0010	-0.08	0.933	-.0021	.0019

Table 4.3: Linear regression of abnormal return on time period dummy second quarter 2019 and 2020

			Number of obs		726	
			F(6,719)		0.69	
			Prob > F		0.6562	
			R-squared		0.0057	
			Root MSE		0.0196	
AR	**Coef.**	**Robust Std. Err.**	**T**	**P>|t|**	**95% Conf. Interval**	
Time period	.0024	.0015	1.64	0.102	-.0005	.0052
AEX	-.0010	.0025	-0.39	0.700	-.0059	.0040
FTSE MIB	-.0012	.0025	-0.51	0.612	-.0062	.0037
IBEX	-.0018	.0015	-.072	0.473	-.0067	.0031
XIN9	-.0029	.0025	-1.13	0.258	-.0078	.0021
DJI	-.0085	.0025	-0.34	0.258	-.0058	.0041
constant	.0012	.0019	0.63	0.530	-.0026	.0050

Table 4.4: Linear regression of abnormal return on time period dummy and country indexes second quarter 2019 and 2020

	ER	TP	AUT	AVI	BR	CH	CLO	NRG	FAB	HC	IGS	INS	LOG	MED	OAG	PHG	RE	TCH	TEL	TOU	CHI	DL	IT	SP	US	AL	MC
ER	1.00																										
TP	.042	1.00																									
AUT	-.004	.001	1.00																								
AVI	-.012	.002	-.027	1.00																							
BR	-.004	.000	-.026	-.030	1.00																						
CH	.001	.002	-.025	-.028	-.027	1.00																					
CLO	.001	.002	-.018	-.020	-.019	-.018	1.00																				
NRG	.003	.000	-.039	-.044	-.043	-.041	-.029	1.00																			
FAB	.006	-.003	-.043	-.050	-.048	-.045	-.032	-.071	1.00																		
HC	.009	.002	-.041	-.048	-0.46	-.044	-.031	-.068	-.076	1.00																	
IGS	.002	.001	-.045	-.052	-.050	-.047	-.033	-.074	-.083	-.079	1.00																
INS	-.005	.000	.038	-.043	-.042	-.040	-.028	-.062	-.070	-.066	-.072	1.00															
LOG	.001	.000	-.021	-.025	-.024	-.022	-.016	0.35	-.039	-.038	-.041	-.034	1.00														
MED	.000	.001	-.018	-.020	-.020	-.019	-.013	-.029	-.033	-.031	-.034	-.028	-.016	1.00													
OAG	-.008	.001	-.038	-.043	-.042	-.040	-.028	-.062	-.069	-.066	-.071	-.060	-.034	-.028	1.00												
PHG	.001	.003	-.035	-.040	-.040	-.037	-.026	-.058	-.065	-.062	-.067	-.056	-.032	-.026	-.056	1.00											
RE	-.001	-.001	-.045	-.051	-.050	-.047	-.033	-.73	-.082	-.079	-.085	-.072	-.041	-.036	-.071	-.067	1.00										
TCH	.015	.000	-.050	-.058	-.056	-.53	-.037	-.083	-.093	-.089	-.096	-.081	-.046	-.038	-.080	-.075	-.100	1.00									
TEL	.000	-.001	-.036	-.042	-.040	-.038	-.027	-.060	-.067	-.064	-.069	-.058	-.033	-.027	-.058	-.0542	-.069	-.078	1.00								
TOU	-.001	-.001	-.019	-.022	-.021	-.020	-.014	-.031	-.035	-.033	-.036	-.030	-.017	-.014	-.030	-.028	-.036	-.040	-.029	1.00							
CHI	.014	-.018	-.013	-.117	-.033	-.107	-.076	-.056	.169	-..074	-.046	.009	.004	-.077	-.047	-.092	.055	.051	.021	.028	1.00						
DL	-.001	.004	.106	.078	-.062	.096	.067	.011	-.103	.095	.029	.015	.038	-.042	-.036	.028	.030	.033	-.032	-.045	-.242	1.00					
IT	-.007	.008	.085	-.014	.062	-.076	-.054	.030	-.088	-.034	.037	-.014	.106	-.054	.089	.054	-.005	.115	-.059	-.058	-.313	-.172	1.00				
SP	-.011	.002	-.065	.067	,074	-.068	.056	.200	-.073	-.066	.060	-.052	-.059	-.049	.002	-.097	-.033	-.098	.116	.148	-.282	-.155	-.200	1.00			
US	.001	.009	-.061	.085	-.067	.021	.072	-.100	-.011	.103	-.067	-.040	-.055	.070	.018	.152	-.017	.137	-.035	-.049	-.263	-.144	-.186	-.168	1.00		
AL	.013	-.004	-.024	-.068	.182	.009	.002	-.008	.209	.249	-.070	-.140	-.045	-.022	-.003	-.023	-.102	.194	-.034	.048	.220	-.056	-.087	-.088	-.104	1.00	
MC	.015	-.011	-.057	-.054	-.0271	.146	.056	-.088	.144	-.003	-.128	-.064	-.037	-.025	.036	.013	.000	.220	-.009	-.009	.707	-.028	-.427	-.311	.304	.188	1.00

Table 4.5: Correlation between variables in long term sample period

			Number of obs		33,760	
			F(1,33758)		60.13	
			Prob > F		0.0000	
			R-squared		0.0018	
			Root MSE		0.0334	
AR	**Coef.**	**Robust Std. Err.**	**T**	**P>|t|**	**95% Conf. Interval**	
Time period	.0028	.0004	7.75	0.000	.0021	.0035
constant	-.0017	.0002	-9.39	0.000	-.0020	-.0013

Table 4.6: Linear regression of abnormal return on time period dummy (LT)

			Number of obs		33,760	
			F(1,33758)		5.26	
			Prob > F		0.0000	
			R-squared		0.0024	
			Root MSE		0.0334	
AR	**Coef.**	**Robust Std. Err.**	**T**	**P>|t|**	**95% Conf. Interval**	
Time period	.0028	.0004	7.76	0.000	.0021	.0035
Automobiles	-.0002	.0012	-0.17	0.863	-.0026	.0022
Aviation	-.0016	.0016	-0.98	0.329	-.0047	.0016
Basic resources	.0000	.0013	0.02	0.984	-.0024	.0025
Chemicals	.0001	.0011	0.78	0.436	-.0013	.0031
Clothing	.0010	.0020	0.52	0.601	-.0029	.0050
Energy	.0011	.0007	1.58	0.114	-.0003	.0025
Food and beverage	.0014	.0007	2.10	0.035	.0001	.0028
Health care	.0019	.0007	2.63	0.009	.0005	.0033
Industrial goods and services	.0001	.0008	1.17	0.240	-.0006	.0025
Insurance	.0000	.0008	-0.01	0.991	-.0016	.0016
Logistics	.0008	.0013	0.64	0.520	-.0017	.0034
Media	.0006	.0013	0.48	0.630	-.0020	.0033
Oil and gas	-.0004	.0008	-0.50	-.619	-.0021	.0012
Personal and household goods	.0008	.0008	1.04	0.297	-.0007	.0024
Real estate	.0005	.0011	0.51	0.612	-.0016	.0027
Technology	.0023	.0007	3.21	0.001	.0009	.0036
Telecommunications	.0007	.0008	0.90	0.370	-.0008	.0024
Tourism	.0006	.0018	0.33	0.739	-.0029	.0040
Constant	-.0024	.0005	-5.17	0.000	-.0033	-.0015

Table 4.7: Linear regression of abnormal return on time period dummy and industry dummies (LT)

			Number of obs		33,760	
			F(1,33758)		17.90	
			Prob > F		0.0000	
			R-squared		0.0021	
			Root MSE		0.0334	
AR	**Coef.**	**Robust Std. Err.**	**T**	**P>|t|**	**95% Conf. Interval**	
Time period	.0028	.0004	7.84	0.000	.0021	.0035
China	.0007	.0006	1.13	0.259	-.0005	.0019
Germany	-.0002	.0009	-0.25	0.801	-.0020	.0016
Italy	-.0006	.0007	-0.79	0.430	-.0019	.0008
Spain	-.0009	.0008	-1.22	0.221	-.0024	.0006
United States	-.0000	.0008	-0.00	0.998	-.0015	.0015
constant	-.0017	.0002	-2.85	0.004	-.0020	-.0013

Table 4.8: Linear regression of abnormal return on time period dummy and country dummies (LT)

			Number of obs		33,760	
			F(1,33758)		30.16	
			Prob > F		0.0000	
			R-squared		0.0021	
			Root MSE		0.0334	
AR	**Coef.**	**Robust Std. Err.**	**T**	**P>|t|**	**95% Conf. Interval**	
Time period	.0028	.0004	7.81	0.000	.0021	.0035
Assets to liabilities ratio	.0003	.0001	2.21	0.027	.0000	.0006
Market capitalization	.0009	.0004	2.44	0.015	.0002	.0016
constant	-.0026	.0003	-7.96	0.000	-.0032	-.0019

Table 4.9: Linear regression of abnormal return on time period dummy and assets to liabilities ratio and market capitalization dummy (LT)

		Number of obs	33,760		
		F(1,33758)	5.19		
		Prob > F	0.0000		
		R-squared	0.0027		
		Root MSE	0.0334		

AR	Coef.	Robust Std. Err.	T	P>|t|	95% Conf. Interval	
Time period	.0028	.0004	7.84	0.000	.0021	.0035
Automobiles	-.0001	.0012	-0.08	0.940	-.0026	.0023
Aviation	-.0011	.0016	-0.64	0.521	-.0043	.0022
Basic resources	.0003	.0013	0.02	0.843	-.0024	.0029
Chemicals	.0012	.0013	0.96	0.338	-.0013	.0037
Clothing	.0015	.0020	0.74	0.458	-.0025	.0055
Energy	.0015	.0008	1.96	0.049	-.0000	.0030
Food and beverage	.0012	.0007	1.61	0.108	-.0003	.0027
Health care	.0020	.0009	2.35	0.019	.0003	.0037
Industrial goods and services	.0001	.0008	1.45	0.148	-.0004	.0028
Insurance	.0001	.0008	0.09	0.930	-.0016	.0017
Logistics	.0009	.0013	0.68	0.498	-.0017	.0034
Media	.0009	.0015	0.63	0.530	-.0020	.0037
Oil and gas	-.0002	.0008	-0.27	0.0785	-.0020	.0015
Personal and household goods	.0010	.0009	1.19	0.233	-.0007	.0028
Real estate	.0006	.0011	0.57	0.571	-.0015	.0027
Technology	.0022	.0008	2.75	0.006	.0006	.0037
Telecommunications	.0009	.0009	1.08	0.280	-.0008	.0026
Tourism	.0008	.0018	0.47	0.640	-.0027	.0040
China	.0007	.0009	0.79	0.429	-.0010	.0025
Germany	-.0002	.0010	-0.17	0.865	-.0021	.0017
Italy	-.0001	.0009	-.012	0.906	-.0017	.0015
Spain	-.0006	.0008	-.074	0.462	-.0023	.0010
United States	-.0002	.0009	-0.21	0.836	-.0020	.0016
Assets to liabilities ratio	.0000	.0002	0.10	0.920	-.0003	.0003
Market capitalization	.0002	.0008	0.21	0.830	-.0014	.0017
Constant	-.0024	.0005	-5.17	0.000	-.0033	-.0015

Table 4.10: Linear regression of abnormal return on time period dummy and industry dummies and assets to liabilities variable and market capitalization dummy (LT)

			Number of obs	8,690	
			F(1,33758)	78.86	
			Prob > F	0.0000	
			R-squared	0.0089	
			Root MSE	0.0465	
AR	**Coef.**	**Robust Std. Err.**	**T**	**P>|t|**	**95% Conf. Interval**
Time period	.0088	.0010	8.88	0.000	.0068	.0108
constant	-.0089	.0005	-18.12	0.000	-.0099	-.0080

Table 4.11: Linear regression of abnormal return on time period dummy (ST)

			Number of obs	8,690	
			F(1,33758)	6.04	
			Prob > F	0.0000	
			R-squared	0.0131	
			Root MSE	0.0464	
AR	**Coef.**	**Robust Std. Err.**	**T**	**P>|t|**	**95% Conf. Interval**
Time period	.0088	.0010	8.87	0.000	.0068	.0108
Automobiles	.0024	.0035	0.70	0.481	-.0043	.0092
Aviation	-.0070	.0030	-2.36	0.018	-.0129	-.0012
Basic resources	-.0013	.0032	-0.41	0.684	-.0076	.0050
Chemicals	.0027	.0032	0.84	0.400	-.0036	.0090
Clothing	.0034	.0043	0.78	0.434	-.0051	.0119
Energy	.0021	.0024	0.90	0.366	-.0025	.0068
Food and beverage	.0064	.0023	2.73	0.006	.0018	.0110
Health care	.0060	.0023	2.67	0.008	.0016	.0104
Industrial goods and services	.0019	.0022	0.86	0.387	-.0024	.0061
Insurance	.0004	.0024	0.18	0.859	-.0044	.005
Logistics	.0032	.0038	0.83	0.404	-.0043	.0106
Media	.0031	.0043	0.72	0.469	-.0054	.0117
Oil and gas	.0016	.0024	0.67	0.501	-.0031	.0064
Personal and household goods	.0042	.0025	1.66	0.096	-.0007	.0091
Real estate	.0032	.0022	1.46	0.144	-.0011	.076
Technology	.0065	.0021	3.15	0.002	.0025	.0105
Telecommunications	.0050	.0025	1.98	0.048	.0001	.0100
Tourism	-.0025	.0044	-0.56	0.576	-.0111	.0062
Constant	-.0116	.0014	-8.44	0.000	-.0143	-.0089

Table 4.12: Linear regression of abnormal return on time period dummy and industry dummies (ST)

			Number of obs		8,690	
			F(1,33758)		41.42	
			Prob > F		0.0000	
			R-squared		0.0153	
			Root MSE		0.0463	
AR	**Coef.**	**Robust Std. Err.**	**T**	**P>|t|**	**95% Conf. Interval**	
Time period	.0093	.0097	9.51	0.000	.0074	.0112
China	.0085	.0016	5.23	0.000	.0053	.0117
Germany	.0006	.0020	0.30	0.765	-.0033	.0045
Italy	.0003	.0019	0.16	0.872	-.0035	.0041
Spain	-.0022	.0021	-1.05	0.296	-.0062	.0019
United States	.0036	.0022	1.67	0.094	-.0006	.0078
constant	-.0114	.0016	-7.37	0.000	-.0145	-.0084

Table 4.13: Linear regression of abnormal return on time period dummy and country dummies (ST)

			Number of obs		8,690	
			F(1,33758)		45.69	
			Prob > F		0.0000	
			R-squared		0.0138	
			Root MSE		0.0464	
AR	**Coef.**	**Robust Std. Err.**	**T**	**P>|t|**	**95% Conf. Interval**	
Time period	.0091	.0010	9.22	0.000	.0072	.0111
Assets to liabilities ratio	.0010	.0004	2.46	0.014	.0002	.0017
Market capitalization	.0060	.0010	6.06	0.000	.0041	.0080
constant	-.0131	.0009	-14.45	0.000	-.0149	-.0113

Table 4.14: Linear regression of abnormal return on time period dummy and assets to liabilities ratio and market capitalization dummy (ST)

		Number of obs	8,690		
		F(1,33758)	10.40		
		Prob > F	0.0000		
		R-squared	0.0187		
		Root MSE	0.0473		

AR	Coef.	Robust Std. Err.	T	P>|t|	95% Conf. Interval	
Time period	.0093	.0010	9.52	0.000	.0074	.0112
Automobiles	.0036	.0036	1.00	0.319	-.0035	.0106
Aviation	-.0045	.0044	-1.02	0.306	-.0130	.0041
Basic resources	.0006	.0037	0.17	0.865	-.0066	.0079
Chemicals	.0059	.0035	1.72	0.086	-.0008	.0127
Clothing	.0059	.0061	0.96	0.336	-.0061	.0178
Energy	.0044	.0022	1.98	0.048	.0000	.0088
Food and beverage	.0051	.0021	2.44	0.015	.0010	.0093
Health care	.0074	.0024	3.09	0.002	.0027	.0120
Industrial goods and services	.0037	.0023	1.60	0.111	-.0008	.0082
Insurance	.0016	.0025	00.63	0.527	-.0033	.0065
Logistics	.0038	.0040	-.96	0.336	-.0040	.0116
Media	.0060	.0042	1.43	0.153	-.0022	.0142
Oil and gas	.0029	.0026	1.10	0.273	-.0022	.0080
Personal and household goods	.0054	.0025	2.14	0.033	.0004	.0103
Real estate	.0036	.0023	1.52	0.128	-.0010	.0082
Technology	.0064	.0023	2.75	0.006	.0018	.0109
Telecommunications	.0062	.0024	2.59	0.010	.0015	.0109
Tourism	-.0011	.0049	-.024	0.814	-.0107	.0084
China	.0091	.0026	3.53	0.00	.0040	.0141
Germany	.0010	.0022	0.46	0.645	-.0033	.0053
Italy	.0020	.0022	0.89	0.373	-.0024	.0063
Spain	-.0004	.0023	-0.18	0.857	-.0050	.0042
United States	.0033	.0027	1.22	0.224	-.0019	.0085
Assets to liabilities ratio	.0001	.00047	0.13	0.898	-.0009	.0010
Market capitalization	.0005	.0024	0.22	0.823	-.0041	.0051
Constant	-.0160	.0023	-7.10	0.000	-.0205	-.0116

Table 4.15: Linear regression of abnormal return on time period dummy and industry dummies and assets to liabilities variable and market capitalization dummy (ST)

			Number of obs		919	
			F(6,912)		0.81	
			Prob > F		0.5602	
			R-squared		0.0053	
			Root MSE		0.0279	
AR	**Coef.**	**Robust Std. Err.**	**T**	**P>|t|**	**95% Conf. Interval**	
Time period	.0038	.0018	2.08	0.038	.0002	.007
AEX	.0001	.0034	0.02	0.980	-.0066	.0067
FTSE MIB	-.0007	.0034	-0.20	0.845	-.0072	.0059
IBEX	-.0011	.0034	-0.34	0.734	-.0078	.0055
XIN9	-.0015	.0031	-0.49	0.624	-.0076	.0046
DJI	.0001	.0034	0.03	0.974	-.0065	.0067
constant	-.0023	.0026	-0.89	.0371	-.0075	.0028

Table 4.16: Linear regression of abnormal return on time period dummy and country ranking