Handelshøyskolen BI

GRA 19703 Master Thesis

Final Thesis Master of Science 100%

Predefinert informasjon

Startdato:	08-01-2024 09:00 CET
Sluttdato:	01-07-2024 12:00 CEST
Eksamensform:	T
Termin:	202410
Vurderingsform:	Norsk 6-trinns skala (A-F)
Flowkode:	202410||11255||IN00||B||T
External assessor:	External assessor 1
Internal assessor:	Internal assessor 1

Navn:

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Informasjon fra deltaker

Tittel *:	Family ownership and firm performance during COVID-19
Navn på veileder *:	Negar Ghanbari

Inneholder besvarelsen konfidensielt materiale?:	Nei	**Kan besvarelsen offentliggjøres?:**	Ja

Gruppe

Gruppenavn:	(Anonymisert)
Gruppenummer:	8
Andre medlemmer i gruppen:	

Family ownership and firm performance during COVID-19

Hand-in date:

01.07.2024

BI Bergen

GRA 19703 *Master Thesis*

Master of Science in Business – Major in Finance

Acknowledgment

We want to thank our supervisor, Negar Ghanbari, for her guidance during the thesis writing process. She has pushed us to dig deeper in our analysis to produce the best thesis possible. We have been inspired to keep searching for relevant theories to test for the Norwegian sample and add to the relevant ongoing literature for family firms. Negar´s method of supervising has been optimal for us to do our research and write a thesis we proudly can put our names on.

No text in this thesis has been generated or suggested using AI. We have used AI, Grammarly, to improve the text and Grammarly and Microsoft Word spell check to suggest grammatical or spelling corrections, and used our discretion to accept or reject any of the suggestions. We have used AI tools to suggest or improve part or all of the code in the computer programs used to conduct the research reported in this thesis. These AI tools were: ChatGPT

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Summary

In 2020, the COVID-19 pandemic made disruptions all over the globe, affecting all industries and businesses. Most firms experienced it as a difficult period with lockdowns, restrictions, and a drastic drop in business activities. The effects on businesses have yet to be discovered. This thesis investigates the financial performance of Norwegian publicly traded companies through COVID-19, emphasizing the impact of family ownership. Having designed a model, we perform a panel regression, including seven regressors, to explain what drives the cumulative abnormal returns during the pandemic.

Our model shows that family firms outperform non-family firms during COVID-19, exhibiting up to **45% better cumulative abnormal returns**. The abnormal returns are calculated as the difference between CAPM-expected and actual returns. We also conclude that this outperformance is specific to family firms, as there is no evidence for other large shareholder types to achieve similar results. Further, we find that firms carrying more debt performed worse, with short-term debt being the most important factor for worse performance. There is a positive correlation between financial performance and the M/B ratio, suggesting that companies with a higher M/B performed better than those with a lower ratio during the pandemic.

Results from our tests suggest that Norwegian family-owned companies are influenced by socioemotional wealth. A theory introduced in 2007 by Gomez-Meija states that business decisions might not be financially optimal but in the family's best interest.

Keywords - *Family firm, COVID-19, Ownership*

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1 Introduction

The COVID-19 outbreak came as a global catastrophe of unparalleled proportions, leaving a long-lasting impact on businesses worldwide. Enterprises had to cope with significant operational and financial challenges, such as liquidity constraints, supply chain disruptions, and the need to adopt remote work policies. Overcoming these hurdles necessitated swift adjustments in business strategies and governance, underscoring the importance of resilience and adaptability in economic uncertainty and global health crises. Notably, research by Amore et al. (2022) shows that family firms outperformed non-family firms during the COVID-19 pandemic in Italy. However, whether this finding applies only to Italy or can be generalized to other countries remains to be seen.

With this thesis, we are looking for concrete answers to the question of whether the theory about Socioemotional Wealth (SEW) can be found for Norwegian companies. The theory was first presented by Gomez-Meija et al. (2007), stating that businesses controlled by a family would behave differently than non-family firms. Family firms tend to act in the best interest of family members, while non-family firms show less consideration for the people within the firm. In contrast to "regular" equity owners, family members tend to substantially influence operations within the company through employment, voting rights, managers, and board members.

Using a sample of 106 companies, 27 of which are family firms, we will examine their financial performance through stock returns during the pre-COVID-19, COVID-19, and post-COVID-19 periods. We are investigating the relationship between family ownership for publicly listed Norwegian companies and financial performance during a crisis, COVID-19. For the research, we have collected data on stock prices and financial fundamentals of public Norwegian companies and manually identified family firms. There is a variety in previous research on how much of a company´s share a family needs to own to be classified as a family firm. For this thesis, we have chosen 25%, which also has traction for studies conducted in Europe and is similar to Amore et al. (2022). The stock prices have been collected from Wharton Research Data Services using daily observations. We find it

beneficial to have stock prices daily, as we are using abnormal returns to measure financial performance and will more accurately capture movements using this perspective. The fundamental financial data was collected from LSEG (Refinitiv); we used another database, as we found it to have more consistent data presented in a standardized currency. The fundamentals have been collected annually, with one observation per variable. When merging stock returns and fundamentals, we have cumulated stock returns for every company for each year included.

Several studies have been published for more than 20 years looking into the effects of having family owners. This is relatively untouched ground in the Norwegian market, and we will be among the first to publish this literature in Norway and the first for a COVID-19-focused study. To go further into the discussion on family ownership, we present results for periods before (2017-2019) and after (2022) for comparison, but we will keep our focus on the pandemic (2020-2021). We have developed the research question: *Do family firms exhibit higher market performance during COVID-19 than non-family firms in Norway?*

When answering this, we will also answer multiple other hypotheses relevant to the topic and research question. We will present several tables with descriptive statistics for our data, allowing deep insight into the analysis. Before discussing results, we present all models used, with an introduction explaining why they are helpful for our conclusion.
To help us conclude, we have conducted several robustness tests to challenge the results we get from running a model to answer the research question.

Our goal with this thesis is to provide valuable insights into the characteristics of Norwegian firms that affected their financial performance during the pandemic, defined as the years 2020 and 2021. By identifying what made firms achieve better returns, investors can use this study when deciding what companies to invest in during future shocks and times of uncertainty.

The thesis has the following structure:
Section 2 will first present several previous studies on family ownership, COVID-19, and other relevant theories for our discussions.

Section 3 presents the hypotheses development, building on previous literature and introducing the tests we will conduct.

In **section 4,** we present the dataset, explain how it was made, and present several descriptive statistics about the sample. We will also explain the variables used for our model and how we have made and treated them.

Section 5 explains the methodology for the thesis. Here, we address skewness, missing data, and other possible issues that can occur during such an analysis. Here, we will also present the model we run to answer the research question.

In **section 6,** we will discuss the main results of models, linking the results with previous literature and drawing the relationship between firm performance during COVID-19 and family ownership.

In **section 7,** we present robustness variables, tests, and results that challenge the results from section 6.

Section 8 is the conclusion of the thesis, based on results from sections 6 and 7. We will also provide suggestions for further research on the topic.

Section 9 showcases results from additional tests that were not directly linked with the research question or hypotheses.

2 Literature Review

In 2022, Amore et al. published a study investigating the relationship between financial performance and ownership, especially family ownership, during COVID-19. Using a sample of 356 public Italian companies, they looked at two periods within 2020: January through April and the entire year of 2020. Amore et al. looked further into a field of study that was, and still is, relatively unexplored. Ding et al. (2021) found that firms with higher ESG involvement performed better through the pandemic. Also, evidence was obtained that family involvement was essential for businesses. The corporate culture has been proven essential for a firm's resilience to outside factors like the pandemic. Companies with a culture that employees considered good and healthy showed greater abilities for innovation and to adjust their product offerings during the COVID-19 pandemic (Li et al., 2021).

To measure the performance of the Italian companies, Amore et al. used a Capital Asset Pricing Model (CAPM) approach, calculating the firms´ expected returns based on market movements. This allows the authors to see which companies performed better or worse than an investor would expect, assuming CAPM theory holds. Setting the ownership threshold to 25% for a firm to be classified as a family firm, the results showed that family firms had, on average, an 8.5% better performance from January through April and 20.2% better for the whole year.

Socioemotional Wealth (SEW) is a term introduced by Gomez-Meija et al. (2007), defining it as "non-financial aspects of the firm that meets the family´s affective needs, such as identity, the ability to exercise family influence, and the perpetuation of the family dynasty." SEW is found explicitly in family businesses, suggesting that family firms will influence their business decisions for the greater good of family members and family control (Hernández-Perlines et al., 2023).

Even though the theory about socioemotional wealth is about the non-financial aspects of the business, this can be the root of why family businesses can perform better during external shocks like COVID-19. The culture of family firms is known to be strong and heavily influenced by a joint vision (Stuart, 2020). This leads the family firms to the findings of Li et al. that firms with a good culture have a greater ability to adjust when needed. The employees are more satisfied with their employer and more motivated to keep the cash flow up. Family firms are, therefore, more flexible to use their working capital in different ways.

Studies have found evidence of better and worse performance within the literature investigating family ownership and businesses. Lins et al. (2013) conducted a study of more than 8.500 firms across 35 countries, finding that the family firms had a significantly worse performance than the non-family firms. Through their research, they found that family firms chose to cut down on investments that were directly linked with underperformance. Lins et al. link this with families wanting to take action to ensure survival at the expense of external shareholders. This is directly linked with agency problems that can occur with conflict of interest for owners and managers.

Another study that has found results suggesting that a family-ownership stake is positive found that family involvement only would give positive outcomes if the founder were the CEO or the Chair of the Board with a hired CEO (Villalonga & Amit, 2006). Even if the CEO is a descendant of the founder, value will be destroyed. These results place their findings of family ownership somewhere in the middle of the discussion. Family ownership will only create value for the company if the founder is still highly involved in the operations through a CEO position or the founder serves as the Chair of the Board.

Evidence from different countries finds that having a family member as the CEO will destroy the company's value compared to hiring an external CEO (Bennedsen et al., 2007; Cucculelli et al., 2008). These studies have been conducted in Denmark and Italy. We consider Denmark to be a country suitable for comparison with Norway. Furthermore, Bennedsen et al. (2007) conclude that when appointing a new CEO related to the former CEO, profitability on assets will drop by 4% on average.

Cucculelli et al. (2008) differ between firms with a descendant of the founder as the new CEO and those that turn to an external candidate. In the literature on family impact through the involvement of the founder´s descendants, there is a consensus that the “Family” advantage disappears (Miller et al., 2007). However, Amore et al. (2022) found that within an Italian sample, having a family member as the CEO was an advantage, complementing the literature for the French stock market (Sraer & Thesmar, 2007). Sraer & Thesmar (2007) even found that heir-managed firms' use of labor is more efficient and that descendants would handle

industry shocks better. This literature is still to be settled, having evidence with different conclusions in different countries.

The effects of the COVID-19 pandemic and the shock that hit businesses through lockdowns, lower trade activity, and a drop in demand are still to be discovered. The world has previously experienced larger outbreaks of diseases, but none has impacted stock markets as large as COVID-19 (Baker et al., 2020). The US level of volatility in March 2020 was either higher or close to the levels of the Great Depression, the financial crisis during 2008-2009, and Black Monday.

From February to April 2020, the number of active business owners was estimated to have dropped by 22% (Fairlie & Fossen, 2022). A sample of businesses in California saw sales drop 17% on average during the second quarter of the pandemic in 2020. However, online sales increased by 180%, showcasing the transition of shopping habits. With less physical shopping, the need for store employees to serve customers fell, and the spiral of lower business activity continued.

During lockdowns, customer demand shifted from all types of goods towards only the essentials, e.g., food and medicine (Barua, 2020). The rest will be prioritized second, which will hit the larger part of global production harder, considering that China provides about 60% of global supply and demand (Baldwin and di Mauro, 2020). This has even more significant repercussions globally as China had an extra strict lockdown policy.

COVID-19 was, at the start of the pandemic, expected for the US market to threaten 22% of GDP, 24% of employment, and 17% of income (Del Rio-Chanona et al., 2020). Later, we know that these estimations fell close to the actual economic impact of the pandemic shock. Specific sectors were more exposed than others, and we can divide the sectors by the type of impact: transport and shipping got hit by a decrease in demand. Manufacturing and mining by supply shocks, and entertainment and tourism by both. Women would, 65% of the time, be the ones to stay home to take care of children; in the UK, this percentage increased, and women have been more exposed to losing their jobs during the pandemic (Sevilla & Smith, 2020).

In May 2020, the IMF estimated that the total amount spent on compensation packages amounted to USD 9 trillion. The amount was about 10% of the world GDP (IMF, 2020). For companies that have received such loans, we still have yet to see the effects when the down payments need to be made. With many large loans, many companies may have problems paying back their loans, and massive bailouts may be necessary (Johnstone-Louis et al., 2020). Such types of bailouts can be burdensome, and looking back at the financial crisis, the banks ended up putting the rebuilding costs on the society. They put their customers second in line after making sure their balance sheets looked as good as possible.

On March 12th, the Norwegian government implemented restrictions to fight the contagion of the COVID-19 virus. These restrictions included closing many public spaces, quarantining people traveling from abroad, and home office practices (Christensen & Lægreid, 2020). In total, 291.000, or approximately 10.4% of the labor force, were registered unemployed by March 24th. The unemployment rate was only 2.3% before the Covid restrictions were introduced. To prevent large-scale economic negative effects, the government launched several financial aids:

- March 16th: NOK 100 billion for crisis support for businesses.
- March 27th: Additional financial measures for sustainable businesses that the introduced restrictions had severely hit.
- April 3rd: Cash support for the most struggling firms. This amounted to NOK 241 billion from the National Pension Fund (Statens Pensjonsfond Utland), (Christensen & Lægreid, 2020).

Through such compensation packages and a good relationship between the population and government, Norway was the first European country to claim that the situation was under control. Being a good welfare state, Norway managed to navigate through the storm and gain control over contagion and the economic environment quickly, relatively to the rest of the world.

3 Research Questions and Hypotheses

This study examines if public-traded family firms in the Norwegian market perform differently than their non-family counterparts. Hence, we propose the following research question:

Did family firms exhibit higher market performance during COVID-19 than non-family firms in Norway?

By analyzing the cumulative abnormal return (hereafter CAR) as the dependent variable and including a dummy variable for family firms, we design a model with six other independent variables explaining CAR. This model will help us to better understand the factors that contribute to overall returns during COVID-19 and if they have a positive or negative effect. By including the dummy variable *Family firms* and carefully selecting the other variables, we can closely examine the effects and significance of each variable on firms´ returns. We look to identify any significant differences between family and non-family firms, making family ownership unique during the pandemic. This will enable us to analyze the factors that contribute to returns for family firms and could help investors make more informed decisions in the future.

Hypothesis 1: *Family firms demonstrate superior operational performance to non-family firms during external shocks such as COVID-19.*

For this thesis, the main objective is to investigate whether family firms have performed better than non-family firms in Norway during the COVID-19 pandemic. Anderson and Reeb (2003) suggest that family ownership can help address agency problems between owners and managers by fostering better alignment of interests, quicker decision-making, and more cohesive strategies, which are crucial during crises like COVID-19. Additionally, they found that family firms often have a long-term orientation and strong stakeholder relationships, further enhancing their resilience in adverse conditions. Therefore, we expect that family firms have demonstrated superior performance during COVID-19. Focusing on the Norwegian context, we aim to expand on existing literature and gain deeper insights into the

performance disparities between family and non-family enterprises in the Norwegian stock market amid the pandemic.

Hypothesis 2: *The effects of family ownership are unique and cannot be found with other dominant ownerships during external shocks, such as COVID-19.*

One crucial question is whether the performance during COVID-19 is solely due to family involvement or if it could be found for any dominant ownership. According to agency theory, higher ownership levels increase shareholders' incentive to monitor management, which results in positive impacts on firm performance. To test whether this holds for any type of shareholder, we conduct a test where we include financial institutions and governmental ownership with a 15% threshold. Another important perspective of this test is to check if the family firm effects we find when answering *Hypothesis 1* will disappear when the other ownership types are included. This will test whether the results found from the research question are specific to family firms or if it applies to all types of large shareholders.

Hypothesis 3: *Family ownership will have a positive effect on a firm's other valuable characteristics, making it a favorable ownership structure during crises.*

In our investigation into whether family firms differentiate themselves beyond CAR, we also consider their operational efficiency, financial policies, and adaptability during COVID-19. Through previous research, family firms have been proven to get better terms on loans and bond issues (Yen et al., 2015). To test this, we change the dependent variable from CAR to other accounting numbers. We will look at the effect of family ownership on labor costs to see if the results suggest that family firms had fewer leave of absence cases, enhancing the effect of SEW in Norway. If we can find evidence of this, we could also connect the findings of Lins et al. (2013) to our sample of Norwegian firms, with family firms sacrificing financially optimal business decisions. This will help us understand if family ownership significantly affects higher operational performance during a crisis.

4 Data and Descriptive Statistics

4.1 The Sample

We have obtained daily stock prices for each company listed on the Norwegian stock exchange, available from Wharton Research Data Services (WRDS), Compustat Global. Using this data, we analyzed the firms' stock market performance before, during, and after COVID-19. The first period covers 2017 to the end of 2019, the second period covers 2020 to 2021, which is defined as COVID-19, and the last period covers 2022 and is defined as post–COVID–19. Further on, we downloaded annual accounting data from LSEG (Refinitiv), mainly due to larger data but also because we identified that the accounting data from WRDS had different currencies for some of the observations.

The dataset uses different databases to achieve the most observations for every variable. In Compustat Global on WRDS, we found more missing values in the fundamental data than from Refinitiv. Additionally, we found no standardized currency in which the numbers were reported on WRDS, which could be a reason for huge differences if some companies had values in NOK and others in USD. Refinitiv offered a more complete dataset, with the possibility of getting all numbers in the same currency, making our dataset standardized using NOK. As the stock price data was gathered on a daily frequency, we first calculated daily returns for the companies each year and then created the variable of "Abnormal Returns". This new variable showed the differences in the CAPM–expected returns and the actual observed returns. We then cumulated this for every company each year and merged it with the annual fundamental data.
The next step was to merge it with our dataset identifying companies as family- and non-family firms and divide the dataset into three samples: before -, during -, and after – COVID-19.

4.2 Geography

As previously mentioned, our sample consists of companies listed in Norway that are spread over the whole country. The geographical distribution of the postal codes in Norway is shown in **Figure 1**. We use the postal codes the firms are registered with to place them into the regions North, South, East and West. We have classified

the different groups: 0000-3999 for the East, 4000-4999 for the South, 5000-6999 for the West, and 7000-9999 for the North. In **Figure 2**, we present a count of the companies within each region based on their postal codes. Companies with non-standard postal codes were designated as *Foreign*, as some have relocated their offices out of the country while maintaining their listing on the Norwegian Stock Exchange.

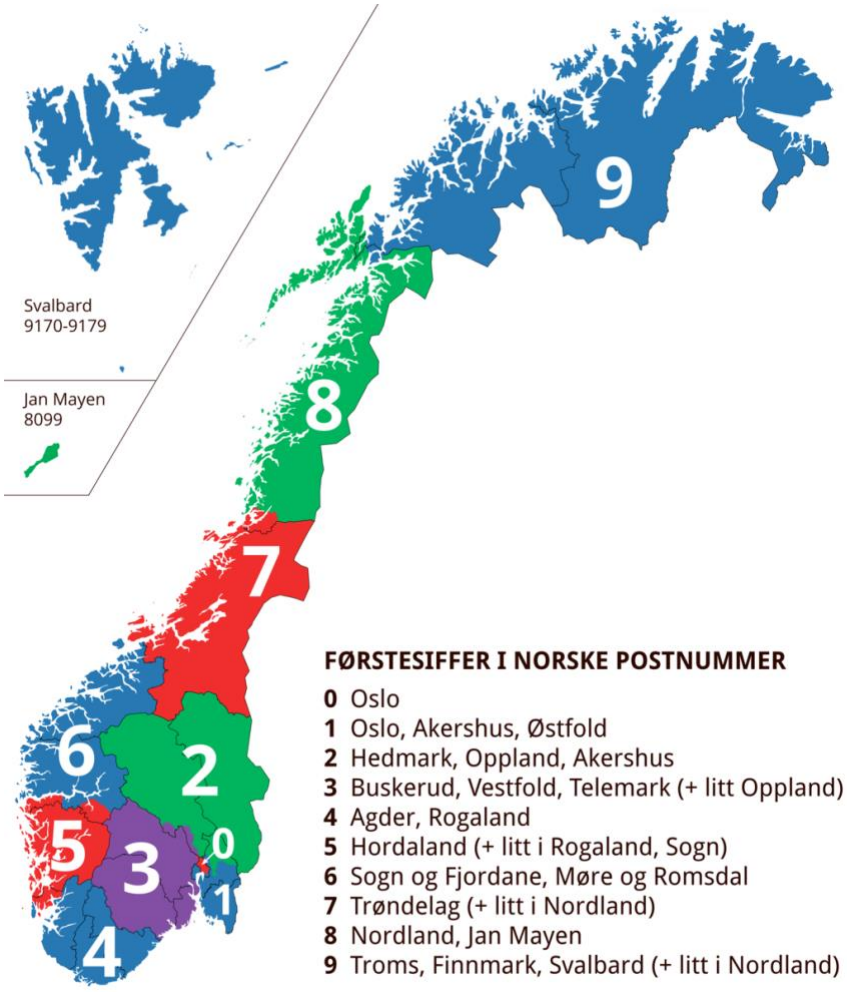

Figure 1 Postal codes geographic limits in Norway (Bolstad, 2023)

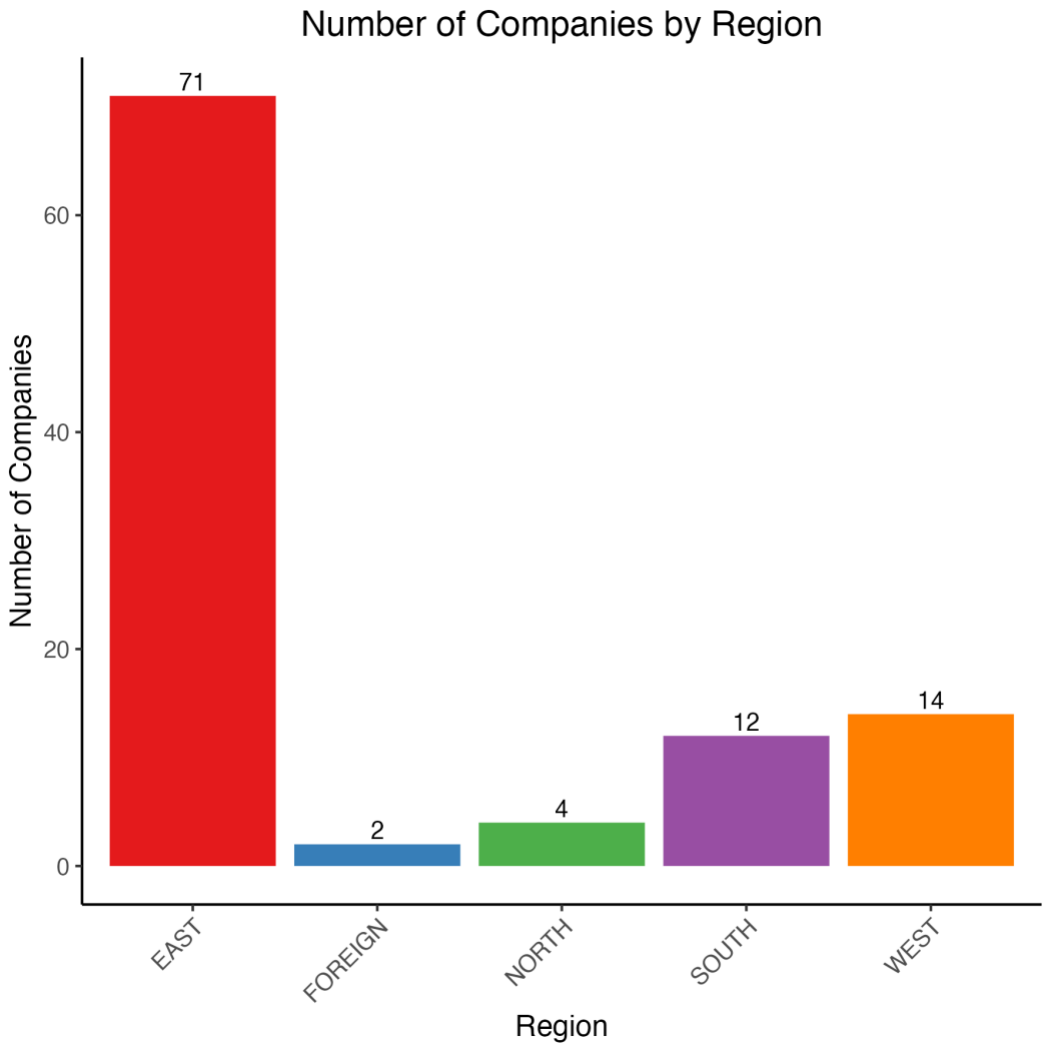

Figure 2 Companies location divided by North-, South-, West-, and East Norway

The distribution of companies in Norway is illustrated in **Figure 2**, with a significant concentration in the East region, where 71 companies are located, equal to 69% of all firms. As Eastern Norway is the home of the capital and the country's administrative and financial center, it is no surprise that most firms are located here. The West region, known for its maritime and oil industries, is followed by 14 companies, reflecting Norway's substantial energy and shipping sectors, which is a big part of Norway´s history. The South and North regions have fewer companies, 12 and 4, respectively, consistent with their smaller populations as the population is strongly concentrated in Oslo and its surroundings. These companies typically focus on agriculture, fishing, and tourism. For Norwegian firms, there have been found evidence that there are no regional limits to innovation, and that it is found all over the country (Isaksen & Onsager, 2010). The smaller regions actually tend to have a higher percentage of innovative firms.

4.3 Industry

Global Industry Classification Standard (GICS) is a framework for analyzing companies' core business activities worldwide and helps investors understand the industry in which a company operates. MSCI and S&P Dow Jones Indices developed this classification standard to offer investors consistent and thorough industry definitions (*MSCI*, n.d.). The GICS consists of 11 sectors, and here, we have used data from Refinitiv on the Norwegian firms´ GICS code to categorize them and count the number of firms in every industry in our dataset (**Figure 3**).

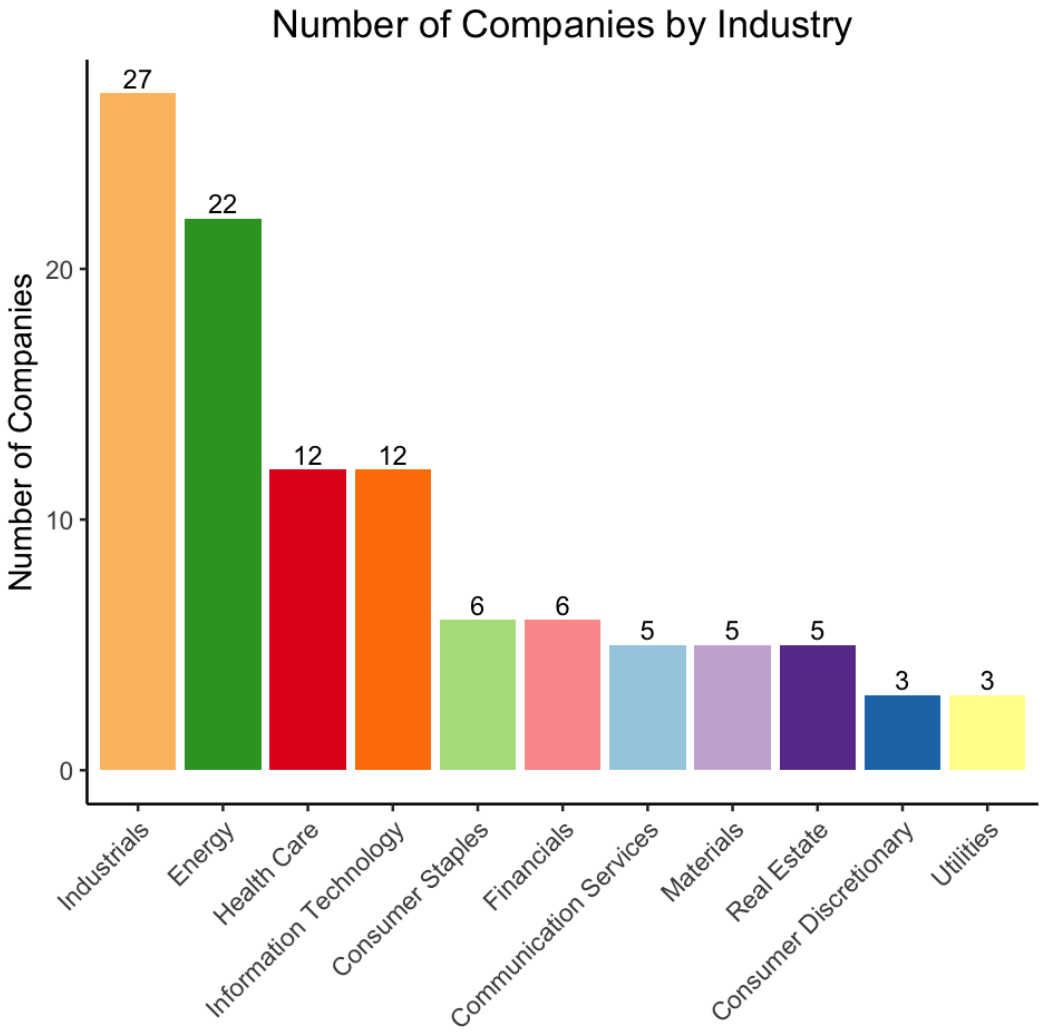

Figure 3 Number of companies by industry

The composition of our sample is heavily weighted towards the industrial and energy sectors, reflecting Norway's economic strengths and traditions. The *Energy* sector, particularly oil and gas, is crucial to Norway being the main driver of the wealth, along with significant investments in renewable energy. Similarly, the

Industrial sector, encompassing shipping, manufacturing, and advanced technology, is a cornerstone of the Norwegian economy. These two sectors include 46.22% of the companies. *Health care* and *Information technology* also have significant representation, with twelve companies each totaling about 20%, highlighting Norway's dedication to innovation and sustainable business practices. The remaining industries have an even distribution of observations, with *Consumer discretionary* and *Utilities* as the industries with the fewest companies. Beyond the large clusters for *Industrials* and *Energy*, we find a relatively even distribution indicating that Norway has a diverse offer of business sectors.

4.4 Family and non-family firms over time

In **Table 4.1**, we have presented the frequency of family and non-family firms depending on whether a family holds at least 25% of a firm. Of our total sample of 106 companies, 27 are family firms, and 79 are non-family firms. Thus, 25% of our sample consists of family firms. This reflects Norway's concentrated ownership, often by large families, which is quite the opposite compared to England and the US's typical dispersed ownership style (Goergen, 2022).

Table 4.1 Number of Family Firms

Ownership Type	2017	2018	2019	2020	2021	2022
Non-family firm	79	79	79	79	79	79
Family firm	27	27	27	27	27	27

Table 4.2 illustrates the distribution of family firms across the regions in Norway as introduced in **section 4.2**; we see a similar distribution as presented in *Figure 2*. The table shows a concentration of family firms in the east region, with sixteen located there, equaling 60% of all family firms. The western region follows with six family firms, meaning that almost half of the firms located west in Norway are family firms. The south region has four family firms, while the north only has one, indicating a more limited presence of family businesses, with 25% of the northern firms being owned by a family. Overall, the dominance of economic activities in Eastern Norway, with advanced infrastructure and comprehensive business services, attracts more family firms.

Table 4.2 Number of Family Firms by Region

Region	Count
EAST	16
NORTH	1
SOUTH	4
WEST	6

In **Table 4.3**, we can see how family firms are distributed across different industries in Norway, and we see that not all industries are represented by a family firm. The *Energy* and *Industrial* sectors have the highest representation, with seven family firms each, showcasing Norway's strong industrial base in oil, gas, and renewables. Next is *Consumer Staples* with five family firms, emphasizing the importance of essential goods and services. Following are *Financials, Health Care, Information Technology*, and *Real Estate,* which each have two family firms. This diverse distribution across the seven represented industries highlights the versatile nature of family firms in Norway. There are no family firms operating in *Consumer staples, Materials, Consumer discretionary* or *Utilities*, making a more concentrated distribution of the family firms with regards to industry.

Table 4.3 Number of Family Firms by Industry

GICS Sector Name	Count
Consumer Staples	5
Energy	7
Financials	2
Health Care	2
Industrials	7
Information Technology	2
Real Estate	2

4.5 Dependent variable

We have adopted a similar practice based on previous research examining companies' performance during COVID-19 (e.g., Amore et al., 2022). We have calculated the CAPM-beta for every company in the sample. To estimate the company betas, we obtained daily stock returns and daily market returns for OSEBX from WRDS from 2014 to 2016. The betas were then created by running a

regression on the logarithmic daily excess returns of stocks on the logarithmic excess market return, meaning the returns above the risk-free rate in the period. The period from 2014 to 2016 provided enough data for calculating a suitable beta, given the availability of daily observations. These betas were then used to calculate the CAPM expected returns (*see Formula 1*) during our sample period (2017-2022) by combining them with the risk-free rate and excess market returns. Subsequently, the CAPM expected returns were compared with the actual returns to calculate the abnormal returns for each company, which were later cumulated annually.

$$E(r) = Rf + \beta * (Rmkt - Rf)$$

Formula 1, Expected return under CAPM theory.

We have also used the Fama French 3-factor model (FF3) to create expected returns as an additional test. We calculate expected returns in-sample using the same method as the CAPM-expected returns, using the out-of-sample period to create betas for the FF3 variables. The FF3 model is an extension of the CAPM model, adding the Small minus Big (SMB) and High minus Low (HML) variables to predict asset prices. A study of the US stock market in 2021-2022 finds that the FF3 model is better suited for the variability and uncertainty within the stock market (Gao & Hu, 2022). The CAPM model uses only the systemic risk and its relationship with market movements to predict returns. Fama and French add size risk and book-to-market equity ratio to supply the market correlation from CAPM.

$$E(r) = Rf + \beta_1(Rm - Rf) + \beta_2(SMB) + \beta_3(HML)$$

Formula 2, Fama French 3 – factor model

SMB is the simulated return rate of a portfolio built on a size factor, having a long position in smaller-sized companies and shorting big-sized firms. *HML* is the simulated portfolio built on the book-to-market (B/M) factor, going long in the high B/M companies and shorting low B/M.

4.6 Control Variables

Family Firm – Firm characteristics

Previous studies investigating family firms often have a threshold for 25% ownership within one family (Amore et al., 2022; Andres, 2008). For this analysis,

we have used the same threshold of 25% for one person or split among family members. Most of the company's web pages have a list of the top shareholders' names and positions; we could, therefore, quickly look at the owner(s) through Proff.no or the owning company's website to look at the ownership structure. If it was a position held by a government, this has not been identified as a family firm. For the position held by an investing company, we looked at the people owning that company and whether they were related. We also calculated if the total amount held by a family equaled 25% or more of the company under investigation.

Having downloaded the data from Refinitiv and filtered it to companies with a shareholder position larger than 15%, we investigated the owners and ownership type to identify which firms would be classified as family firms.

Total Asset – Firm Size (Natural logarithm)

The variable *Total Assets* can be filled with an extensive range of values across the firms. Some companies are asset-heavy, while others are less dependent on assets. We have chosen to use the natural logarithm of the *Total Assets* value to deal with outliers, both extra large and small, and minimize the variable's skewness. This will stabilize variance within the dataset and make the results less affected by companies with "extreme" values. When performing linear regressions, the data must have a linearized relationship. These linear relationships can be established by taking the logarithmic equivalent, strengthening the analysis.

Return on Asset (ROA) – Financial Performance

ROA is a financial measure used to assess a company's profitability relative to its assets. The metric is derived by dividing the net income by the total assets and is typically represented as a percentage. *ROA* provides an indication of operational efficiency and how well companies exploit their assets to generate profits (Petersen and Schoeman, 2008). Evaluating *ROA* is crucial for understanding a company's performance, particularly in times of economic crisis, such as COVID-19, as it reflects the company's resource utilization. A higher value for *ROA* indicates that the firm is effective in its asset deployment and shows resilience. While a lower *ROA* may signal challenges in sustaining profitability and operational efficiency, shedding light on potential weaknesses in the company.

Market-to-Book ratio (M/B) – Valuation metric

The *M/B* ratio is a valuation measure used to compare a company's market value (determined by the stock price multiplied by the number of shares outstanding) to its book value (total assets minus total liabilities according to the balance sheet). The ratio is an indication of how much investors are willing to pay for each dollar of a company's net assets. A higher *M/B* ratio suggests strong future growth expectations, meaning that investors expect the company to expand until the book value matches market value. A lower ratio may indicate that the market undervalues the company or potentially believes there are issues with the company's growth prospects. While analyzing firm performance during the pandemic, the *M/B* ratio helps evaluate expectations about a company's future profitability and stability. It provides insights into how market perceptions align with the company's financial condition. Relative to other ratios that can be used for valuation, *M/B* is the one carrying the most information regarding investment opportunities (Adam & Goyal, 2008).

Age – Foundation Year

Company age can indicate its maturity and stage of development, which could affect its performance during the COVID-19 pandemic. Younger companies are in the development or growth stages and may therefore focus on rapid expansion and innovation. By focusing on this, younger firms carry more risk and potentially limit their ability to withstand economic shocks. They would also use more of their available capital to reinvest in their projects and expansion, reducing the cash reserves that would make them more robust during the COVID-19 shock. In contrast, the older and more established firms may have more resources and experience to navigate and overcome the challenges presented by the pandemic. These are characteristics that potentially make them to be more prepared for difficult business environments. There is evidence that company age has a non-linear correlation with firm performance, which will eventually plateau (Coad et al., 2018). We are using the natural logarithmic version of company age to deal with large variations, as several of the companies are more than 90 years old.

Cash/TA – Capital structure

We measure the firms´ cash reserves by the *Cash* / *Total assets* metric, making it a ratio based on asset value. Cash reserves provide a cushion that enables firms to

manage unexpected disruptions, sustain operations, and meet financial obligations despite revenue shortfalls or increased expenses. Companies with more cash may have been better positioned to navigate economic uncertainty, make the necessary adjustments, and capitalize on opportunities that emerged during COVID-19. Previous work on cash reserves shows that companies holding more than a quarter of assets in cash and cash equivalents would perform better than the "low-cash" firms when compared by size (Mikkelson & Partch, 2003). Having financial flexibility could contribute to a firm's ability to outperform the less liquid competitors during the pandemic.

Leverage – Capital Structure

Leverage is a financial metric that reflects the proportion of debt relative to total assets, offering insight into a company's capital structure. Incorporating leverage into the regression analysis is crucial, as high leverage can negatively affect a company's performance. During the pandemic, the economic disruptions made revenues fall drastically while the companies still had downpayments to make on their loans. With companies not being able to pay back their loans, there will come financial repercussions as the lender will have less money to cover their costs, eventually placing the cost on the state and population.

Conversely, low leverage can provide more financial flexibility, proving advantageous when revenues decline while costs remain constant. We expect to find significant effects from the firm's capital structure on its CAR.

Short–term and Long-term debt to asset – Capital Structure

To further investigate the effect of the firms´ capital structure, we have divided leverage into short-term and long-term debt-to-asset ratios. By examining the short-term and long-term effects of debt structure, we can better understand the cost of debt. These variables can also show what type of debt is superior during crises like COVID-19 by looking at their significance. During COVID-19, the Norwegian policy rate dropped to 0%, making it more achievable for firms to avoid defaulting on their loans. This is interesting to check since Fahlenbrach et al. (2021) found that firms with better financial stability experienced lower drops in stock prices during this period.

4.7 Descriptive Statistics

Table 4.4 summarizes the statistical data for the primary variables used in the analysis. The sample includes Norwegian-listed firms with accounting data from Refinitiv. CAR is the cumulation of the abnormal returns calculated by taking the difference between the daily logarithmic return of a stock and the CAPM – expected returns. The calculation is done from 2017 through 2019 (before), 2020 through 2021 (during), and 2022 (after). Other factors taken into consideration are the natural logarithm of total assets, the ratio of debt to total assets (leverage), the natural logarithm of the number of years since the establishment of a firm, the ratio of net profits to book value of assets, the ratio of a firm's cash and equivalent securities to total assets, the ratio of short-term debt and long-term debt to total debt, and the ratio of market to book. The variations in the number of observations are due to CAR being divided into periods spanning over different amounts of years and a few missing values for the other variables.

Table 4.4 Total Summary Statistics

	N	Mean	Std.Dev	p25	Median	p75
$CAR_{17\text{-}19}$	317	-0.091	0.947	-0.497	-0.056	0.287
$CAR_{20\text{-}21}$	212	-0.062	0.835	-0.430	-0.001	0.353
CAR_{22}	106	-0.141	0.948	-0.475	-0.216	0.061
Cash/TA	634	0.176	0.200	0.050	0.102	0.223
Ln(Age)	635	2.755	0.597	2.485	2.996	3.178
Leverage	581	0.560	0.253	0.418	0.554	0.715
Ln(Asset)	634	21.769	2.112	20.013	21.703	23.452
Long term debt	581	0.269	0.224	0.078	0.233	0.406
M/B	629	1.595	2.490	0.362	0.738	1.645
ROA	634	-0.050	0.367	-0.059	0.015	0.072
Short term debt	634	0.286	0.229	0.131	0.222	0.390

The statistics presented in **Table 4.4** provide insights into the performance of Norwegian-listed companies and firm characteristics. From 2017 to 2019, the average CAR was -0.091, indicating a slight underperformance given the market return. However, there was an improvement in the average CAR from 2020 to 2021, which stood at -0.062, telling us that during COVID-19, the firms, on average, performed close to the CAPM expectations. The average CAR declined to -0.141 in 2022, signifying these firms' increased challenges and suggesting expectations of stronger performance for this period. In 2022, the world had reached a state where vaccinations were broadly distributed, and there was an uplift in the global economic environment. The varying CAR across these periods reflects the diverse performance and shows that Norwegian firms, on average, performed worse than one would expect given CAPM calculations. All median values of CAR across the periods are negative, suggesting a majority of firms have achieved returns below expectations.

Looking at the other statistics, beginning with the liquidity ratio (*Cash/TA*), the dataset has an average of 0.176, indicating relatively low cash reserves at just under 20%. The average *Leverage* ratio is 0.560, highlighting significant levels of debt, with the average firm holding almost half the value of its assets in debt. The *Leverage* median of 0.554 tells that there is an even distribution around the average. Profitability, measured by *ROA*, averages at -0.050, indicating low or negative profitability overall. With the average *ROA* being negative, we learn that the average net income was negative within the sample. Based on the natural logarithm of *Total Assets*, the average firm size is 21.769, meaning that the average asset value is NOK 2 845 486 808. Furthermore, the median *M/B* of 0.738 suggests that many firms are valued close to their book value, but most firms in the dataset are undervalued in the market based on this measure. With a mean of 1.595, we understand that *M/B* has some high outliers that increase the sample average.

5 Methodology

5.1 Missing data and skewness

Going through the raw data, we found that some companies had their reported numbers skewed from others as the data available were from their latest report. Some companies had published numbers from 2023, while others had not. We have reviewed all companies´ annual reports to ensure the accounted numbers were in the correct year. The sample consists of all observations beginning in 2022 and returning to 2017. When we collected the data during the spring of 2024, some companies had not completed their annual reports for 2023 and, therefore, had not published them yet. Due to this discrepancy of available reports, we have excluded 2023 due to too many missing observations.

For the data collected between 2017 and 2019, we have only ten missing observations for the fundamental accounting data: *Total Assets*, *Total Debt*, and c*ash*. For our dataset, this is optimal as the sample size (for Norwegian firms) is relatively small. We will have data points that are fulfilling when conducting our analyses. Even though companies have been founded all over Norway, many moved to eastern Norway, mainly in Oslo. As most companies are located around Oslo, regional skewness could affect results when not applying a region-fixed effect.

There is a skewness towards non-family firms regarding the amount of family and non-family firms. In our sample, 25% of the firms fall under our definition of family firm, with the rest being non-family. This skewness in the two types of companies can be problematic as the model will fit the non-family data better. However, in most previous work within this literature, 25% ownership is the preferred threshold, and we have decided to add on this and accept the 25/75 ratio.

Overall, we have concluded that the dataset is sufficient to conduct a concluding analysis of the effects of the Norwegian ownership structure. For the dependent variable, CAR, we have removed a few missing values of daily stock prices to capture the compounding effect. This has been done because replacing the NAs in daily stock returns with zeros would affect the data due to differences in compounding returns and give wrong conclusions.

The following sections will explain the use of the model and the techniques that have been applied.

5.2 Panel regression

We examine several companies across different periods and perform the analyses through panel regressions. When datasets contain data on the same entities over multiple periods, panel regressions combine cross-sectional and time series data. Panel regressions allow for more complicated behavioral models than each time series and cross-sectional analysis alone (Hsiao, 1985).

When creating the model, movements in the dependent variable will be explained by the independent variables, the regressors. This study uses several aspects of the firms´ financial positions, using the reported numbers for their fundamentals. The model is designed to capture the effects of different aspects of the companies during the shock of COVID-19 in 2020 and 2021. By applying a dummy variable for companies identified as family firms, we will capture performance through CAR for family firms, measured against non-family firms.

$$CAR = \beta_0 + \beta_{1i}\, family\ firm + \beta_{2i} \ln(assets) + \beta_{3i}\, ROA + \beta_{4i} \frac{Total\ Debt}{Assets} + \beta_{5i} \frac{Cash}{Assets} + \beta_{6i}\, M/B + \beta_{7i} \ln(firm\ age) + \varepsilon i$$

Formula 3, Cumulative Abnormal Return, main regression

5.3 Fixed Effects Models

We conducted several tests using fixed effects to explore the analysis further and learn more about the results. Fixed effects control for omitted variables (deHaan, 2020) and are often used for multiple groupings.

5.3.1 Regional Fixed Effects

As **Table 4.2** exhibits, most of the listed Norwegian firms in this sample are in Eastern Norway. As the capital is located in East Norway, and the city acts as a cluster area for large companies, we find this natural.

Therefore, we have applied fixed effects in the model by computing a dummy variable for companies in the east and non-east, one if the firm is located in Eastern Norway and zero otherwise. This will avoid a significant skew in the firms´ positioning. We will not handle this as a normal variable, as we only want it to capture the regional effects.

$$CAR = \beta_0 + \beta_{1i}\, familyfirm + \beta_{2i} Region + \beta_{3i} \ln(assets) + \beta_{4i} ROA + \beta_{5i} \frac{Total\ Debt}{Assets} + \beta_{6i} \frac{Cash}{Assets} + \beta_{7i}\, M/B + \beta_{8i} \ln(firm\ age) + \varepsilon i$$

Formula 4, CAR with regional fixed effects

5.3.2 Industry Fixed Effects

Within industries, companies will often be affected by the same events that will give some movement in the same direction. For example, there was a 25% drop in the Norwegian seafood index after the proposal of a 40% tax for companies within the industry (Kozul-Wright, 2023). We apply an industry-fixed effect using the Global Industry Classification Standard (GICS) code for accounting for such effects. This will help capture industry-specific movements in the model and prevent it from affecting the results.

6 Results and Discussion

6.1 Main Regression, Research Question

The following analysis will discuss our first hypothesis on whether family firms exhibit superior market performance in Norway during external shocks; here, we use COVID-19 as the shock. We will provide results from regressions run on the COVID-19 sample (2020 and 2021), as well as the periods before (2017-2019) and after (2022) for comparison. The dependent variable, CAR, is described in *Formula 3* with several independent regressors from companies' financial statements. As mentioned in **section 5**, this analysis used an OLS regression model on a panel data sample, including fixed effects variables for industry and regions.

The results from the three periods are presented as follows: **Table 6.1** contains the results from the pre-COVID-19 period and will give information about important factors for CAR during normal times. **Table 6.2** contains results from the COVID-19 period, which is the crisis period. **Table 6.3** contains results from the post-COVID-19 period, where we will capture the most critical factors driving CAR after external shocks. Through this method, we can easily compare the effects of each variable at three different periods with distinctive features.

The primary variable we are investigating is the *Family Firm*, which represents the effects of having family owners with a minimum position of 25% of the shares outstanding. All the tables progressively introduce a new variable in columns 1-8, with column (1) only including *Family Firm* and column (7) including all regressors. Column (8) switches *Leverage* with the short- and long-term equivalents. This will increase the learning opportunity to understand the effects of the individual variables and their contribution to CAR. The robust standard errors for the corresponding variable are in parenthesis under each variable estimate.

For all the following tables, we have included stars to represent the variable significance, if any, at the statistical significance levels of 10%, 5%, and 1%. These are respectively represented by "*", "**", and "***".

Table 6.1 Regression Results Before COVID-19

	CAR							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Family Firm	-0.239*	-0.226*	-0.214*	-0.198	-0.141	-0.115	-0.154	-0.123
	(0.133)	(0.134)	(0.129)	(0.128)	(0.127)	(0.130)	(0.134)	(0.136)
ln(Assets)		-0.029	-0.075**	-0.091***	-0.083***	-0.085***	-0.097***	-0.110***
		(0.029)	(0.030)	(0.030)	(0.031)	(0.031)	(0.031)	(0.032)
ROA			0.852***	0.778***	0.839***	0.821***	0.591***	0.599***
			(0.176)	(0.177)	(0.175)	(0.177)	(0.184)	(0.183)
Cash/TA				-0.733**	-0.900***	-0.910***	-1.326***	-1.316***
				(0.311)	(0.320)	(0.320)	(0.383)	(0.382)
M/B					0.066**	0.064**	0.071**	0.070**
					(0.031)	(0.031)	(0.031)	(0.031)
ln(Age)						0.076	0.228**	0.236**
						(0.086)	(0.099)	(0.099)
Leverage							-0.333	
							(0.269)	
Short-term Debt								-0.555*
								(0.310)
Long-term Debt								-0.073
								(0.324)
Constant	-0.196	0.452	1.443**	1.876**	1.681**	1.498*	1.695**	1.982**
	(0.264)	(0.707)	(0.712)	(0.730)	(0.735)	(0.764)	(0.807)	(0.830)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	317	316	316	316	312	312	284	284
R^2	0.054	0.057	0.125	0.141	0.156	0.158	0.181	0.187
Adjusted R^2	0.017	0.017	0.085	0.098	0.110	0.110	0.125	0.129

Table 6.2 Regression Results During COVID-19

	CAR							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Family Firm	0.287**	0.296**	0.298**	0.297**	0.317**	0.376***	0.450***	0.445***
	(0.139)	(0.138)	(0.138)	(0.138)	(0.132)	(0.133)	(0.141)	(0.141)
ln(Assets)		-0.061**	-0.068**	-0.068**	-0.036	-0.043	-0.029	-0.033
		(0.031)	(0.031)	(0.032)	(0.031)	(0.031)	(0.032)	(0.032)
ROA			0.257	0.262	0.284	0.239	0.080	0.029
			(0.183)	(0.190)	(0.180)	(0.179)	(0.192)	(0.197)
Cash/TA				0.037	-0.222	-0.280	-0.435	-0.384
				(0.360)	(0.358)	(0.355)	(0.403)	(0.405)
M/B					0.054***	0.048**	0.042**	0.042**
					(0.020)	(0.020)	(0.021)	(0.021)
ln(Age)						0.258**	0.115	0.095
						(0.113)	(0.132)	(0.133)
Leverage							-0.713***	
							(0.247)	
Short-term Debt								-0.859***
								(0.275)
Long-term Debt								-0.473
								(0.318)
Constant	0.318	1.680**	1.825**	1.803**	1.056	0.436	1.070	1.201
	(0.276)	(0.733)	(0.738)	(0.771)	(0.749)	(0.789)	(0.854)	(0.860)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	212	212	212	212	211	211	193	193
R^2	0.126	0.143	0.152	0.152	0.163	0.185	0.219	0.225
Adjusted R^2	0.073	0.087	0.092	0.087	0.094	0.113	0.143	0.145

Table 6.3 Regression Results After COVID-19

	CAR							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Family Firm	-0.095	-0.100	-0.082	-0.094	-0.096	-0.257	-0.214	-0.172
	(0.211)	(0.209)	(0.206)	(0.203)	(0.206)	(0.192)	(0.196)	(0.191)
ln(Assets)		0.073	0.056	0.044	0.044	0.063	0.075*	0.050
		(0.047)	(0.047)	(0.047)	(0.047)	(0.043)	(0.043)	(0.043)
ROA			0.341*	0.235	0.240	0.338*	0.475**	0.530***
			(0.172)	(0.179)	(0.189)	(0.174)	(0.185)	(0.181)
Cash/TA				-0.891*	-0.879*	-0.608	-0.184	-0.136
				(0.483)	(0.512)	(0.471)	(0.556)	(0.541)
M/B					-0.004	0.023	0.051	0.043
					(0.056)	(0.052)	(0.051)	(0.050)
ln(Age)						-0.863***	-1.084***	-1.036***
						(0.198)	(0.218)	(0.212)
Leverage							0.976**	
							(0.413)	
Short-term Debt								0.276
								(0.494)
Long-term Debt								1.574***
								(0.470)
Constant	-0.221	-1.852	-1.459	-1.122	-1.111	1.169	0.895	1.312
	(0.418)	(1.124)	(1.124)	(1.125)	(1.140)	(1.163)	(1.194)	(1.172)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	106	106	106	106	106	106	99	99
R^2	0.273	0.292	0.321	0.346	0.346	0.462	0.523	0.556
Adjusted R^2	0.179	0.191	0.216	0.236	0.228	0.358	0.423	0.456

From **Table 6.2**, we can see that through all models, ranging from just including the *Family Firm* to including all regressors, the presence of family ownership has a significantly positive effect. The model in columns (6), (7), and (8) shows significant results at the 1% level, and when including fewer explanatory variables

(columns 1-5), it is still significant at the 5% level. The significantly positive impact of the *Family firm* variable confirms our expectations through the first hypothesis. The output indicates that, on average, through COVID-19, the family firms achieved between 28.7% and 45% higher CAR than the non-family firms. From column (6), we can interpret that the effects of family presence are strongest for companies that have existed longer, where significance increases as we add the variable for *Company age*. These results come from the difference in CAPM-expected returns and the actual returns achieved by the companies. It is important to remember that family firms will not be an assurance for positive returns through periods of crises and external shocks. Our model has discovered that the family firms achieved better returns than expected, given the market movements through periodically strict COVID-19 restrictions and impacts. This is similar to the results of Amore et al. (2022), who found that family firms, on average, achieved 20-27% higher cumulative returns.

Going deeper into the estimates for all variables included, starting from the second row with the addition of *Total Assets,* we find a negative correlation with CAR. The negative correlation is significant across columns (2) to (4), going from the 5% level to insignificant when adding *M/B,* suggesting a correlation between the regressors. Having a negative effect on CAR, the results suggest that asset-heavy firms achieved lower CAR than the less asset-heavy ones. Next, there are no significant effects for either *ROA* or *Cash/TA*. From this, we learn that there were no vast differences between the firms carrying larger cash reserves and those with fewer cash reserves. In column (5), we can see that *M/B* has a significant positive effect, suggesting that companies with larger market value than book value, on average, had a higher CAR during COVID-19. For the sixth model, which includes *Company age,* we learn that there is a positive effect for older firms. However, after adding *Leverage,* the significance disappears, suggesting that the age variable is correlated with the company's debt and that the variables explain some of the same movements. In column (7), we add the *Leverage* of the companies. Here, we find a strongly significant negative correlation with CAR, suggesting companies bearing higher amounts of debt during COVID-19, on average, achieved a lower CAR.

In column (8), we replace the *Leverage* variable from column (7) with the short- and long-term debt-to-asset ratio. By doing so, we can examine the effects of firms

holding different types of debt. Fahlenbrach et al. (2021) found that firms with greater financial stability would experience a lower drop in stock prices. After splitting the firms' debt into short- and long-term alternatives, we can see that short-term debt has a negative effect on the debt structure during COVID-19. There is significant proof that it was unbeneficial to bear debt during times of uncertainty. Presumably, this is related to firms losing revenues and, therefore, struggling to pay their debts.

The results suggest that the theory of SEW is also relevant for Norwegian companies. The theory states that family firms will act for their benefit, perhaps at the expense of other shareholders, as they prioritize the position of the family dynasty in the firm. As Lins et al. (2013) observed, family firms generally get lower returns and worse financial performance than non-family firms during "normal" times. The effect that will give lower returns in "normal" circumstances is the same as the ones that will help them achieve higher returns during periods of uncertainty. With the family firms performing up to 40% better using the CAR as a measure, we find reason to believe that there is root in the theory of Stuart (2020) that family firms are strong and affected by a joint vision for the company. With such an impressively higher average CAR over just two years, we believe there is evidence for family firms to have shown themselves to be more agile, in line with the findings of Li in 2021.

In addition to looking at the effect of family businesses through COVID-19, we have run the same regression for the period before and after to measure whether these results can be linked with management through a crisis. As **Table 6.1** shows, we can find several of the same significance for model regressors. However, there is a nonsignificant effect on *Family firms* when running the whole model; these are the findings for regressions shown in columns (4) through (8). Columns (1) to (3) suggest a slightly significant negative correlation. In the period before COVID-19, *ROA* was the main driver for returns, with high estimates and a significant effect at the 1% level. Following *ROA* is *Company age*, suggesting that firm experience is important when including leverage. *M/B* was a significant factor for CAR before the pandemic, but it still has a positive effect. Even though there is no proof for either positive or negative effects from family ownership in this period when

running the whole model, it highlights other factors an investor should consider when evaluating a firm.

Comparing the effect of the independent variables (of significance in either period) before and during COVID-19, we find several interesting differences. Firstly, before COVID-19, there was a significant adverse effect on companies being asset-heavy, while during COVID-19, there was also a significant effect on *Total assets* when not accounting for *M/B*. These results suggest that in the 2020-2021 sample, the *M/B* and *Leverage* and, therefore, the financing and market value of assets made the bigger impact on CAR. Next, *Cash/TA* had a negative impact pre-COVID-19, but its significance disappeared during the crisis period. This means that firms with a higher cash reserve than those invested in assets would get lower returns. The rationale is that firms will miss out on projects that would positively affect the company´s stock return by holding cash rather than putting it to use. *M/B* was significantly positive for both periods, but the coefficient was larger in the pre-COVID-19 model, suggesting this had less impact on CAR during COVID-19 than before.
Lastly, when differentiating between short-term and long-term *Leverage*, we find that a higher short-term debt ratio adversely affects performance pre-COVID-19. The other types of leverage (total and long-term) would not have any effect worth noticing. Up until 2020, firms that had large portions of short-term debt would have significantly lower CAR. This could be related to an increase in the policy rates in Norway, from 0.5% in 2017 to 1.5% in 2019 (Endringer i styringsrenten, Norges Bank).

If we compare the results from post-COVID-19 (**Table 6.3**) with the in-sample results, we can immediately see that the significant effect of the *Family firm* is gone at all significance levels. This indicates that even though there might have been some cases and outbreaks worldwide, the shock of COVID-19 has passed. Interestingly, in 2022, there were no effects worth noticing for family firms, and we can see that the estimates go towards values from **Table 6.1**. *ROA* becomes a strong driver of CAR, especially in our whole model, and the estimates also go towards similar numbers and significance of the sample containing the pre-COVID-19 period. *Cash/TA* does not get its significance back for this period when applying the entire model, which defers results from the period before. Not every variable

estimate can be expected to instantly return to its "normal" level after a period of disruption.

Further, the *M/B* coefficient loses significance and impact on CAR for 2022. Interestingly, we find that in 2022, the *Company age* will significantly negatively impact CAR. In both samples for the earlier periods, we have found that it was beneficial for a company to be experienced, while in 2022, the older companies performed worse than the younger ones. In 2022, 17 companies went public (Pareto Securities), and even more got listed on the Norwegian stock exchange if we included companies moving from Euronext Growth to Oslo Børs. With many IPOs and new companies available on the stock exchange and a relatively low policy rate beginning at 0.5% in 2022 and ending the year at 2.75%, these companies got traction in the market.

The last variable with interesting changes is *Leverage*, both for the total and the short- and long-term options. After COVID-19, companies with higher debt performed better, unlike both previous periods. When investigating whether short-term or long-term debt is more beneficial in column (8), we observe that all the positive effects of carrying debt come from the long term. This suggests that firms that took loans with a long perspective during times of low interest rates during COVID-19 stood stronger in the aftermath of the pandemic.

Through these tests of the same model applied over three periods, before, during, and after the shock of the pandemic, we have learned a lot about the impact different aspects of a firm play in three different circumstances. Most importantly, in line with our research question and main hypothesis, we have found evidence that family firms performed better during COVID-19 than non-family firms. Also, the evidence shows that the companies with less assets (*Total assets*) and lower debt levels (*Leverage*) performed stronger.

It is worth mentioning that these results are based on differences in CAPM-expected returns and the actual returns during COVID-19. The pandemic negatively hit all firms, but family firms would exceed the expectations given the market movement through this period. Even though the world has been through several crises and shocks of different types before, COVID-19 is a pretty peculiar example. In 2020-2021, the world had been moving greatly toward a society that relied on a lot

directly affected by restrictions, including travel, on-site work, and effects on import/export.

There is still a need for continuous research within this area, both in Norway and globally, to keep learning about the drivers of returns through times of crisis and for family firms. Through this thesis, we are adding knowledge about Norwegian family firms, which has yet to be done before, and testing if the theory of SEW is still relevant. We have found that all types of debt will hurt CAR during the crisis. However, previous work on loan terms for family firms found that family firms get better terms from financial institutions when issuing bonds (Yen et al., 2015). Columns (7) and (8) in **Table 6.2** have the highest coefficient estimates for the *Family firm*, suggesting a positive effect of being a family firm when accounting for the leverage.

6.2 The effect of large shareholder types on return

To control for the actual effect of the ownership type, we have also identified companies with large shareholders that can be categorized as *Financial Institutions* or *Governmental*. Setting a 15% ownership threshold to be classified as a governmental or financial owner, the stake is large enough for the owner to influence company decisions. When using these variables in the analysis, we will check for effects for any given large shareholder in a Norwegian firm.

Table 6.4 Other Ownerships

Variable	Level	N	Percentage
Financial institution	1	16	15
Financial institution	0	90	85
Government	1	5	5
Government	0	101	95

We will continue investigating the limit of family ownership's significance by including other prominent shareholder positions. To test if the result from our primary model is exclusively from firms owned by a family or if it would occur for other types of owners. We introduce two new dummy variables for this test: *Governmental* and *Financial*. Going further into the impact of having a family as the majority owner, we will test the impact of having another type of large

shareholder. This test will uncover if the effects of family ownership are specific for firms with a family owner or whether it can be found for all companies with an owner holding a significant position.

$$CAR = \beta_0 + \beta_{1i}\, family + \beta_{2i} Financial + \beta_{3i} Governmental + \beta_{4i} \ln(assets) + \beta_{5i}\, ROA + \beta_{6i} \frac{Total\ Debt}{Assets} + \beta_{7i} \frac{Cash}{Assets} + \beta_{8i}\, M/B + \beta_{9i} \ln(firm\ age) + \varepsilon i$$

Formula 5, Effects of Large Shareholders

When testing the findings of the family firm CAR, as presented in **Table 6.2**, we have introduced the variables *Financial* and *Government*, still using CAR as the dependent variable. The period under investigation is during COVID-19. In column (1), we present the results from having just a *Family firm* similar to column (1) in **Table 6.2**, which is for reference. In the second column, we have introduced the variables for the different ownership types, including all control variables similar to column (7) from **Table 6.2**. Lastly, for column (3), we have changed the control variables to column (8) from **Table 6.2**. To identify companies that fit the definition of *Governmental* and *Financial*, we have chosen all firms with these types of owners with a minimum of 15% shareholder stake. Under these thresholds, we have sixteen financial institutions, and five governmental as owners. As **Table 6.4** exhibits, there is skewness for this test, with the larger part not falling under any of these categories.

Table 6.5 Cross-sectional regression of returns by ownership type

	CAR		
	(1)	(2)	(3)
Family Firm	0.287**	0.482***	0.476***
	(0.139)	(0.147)	(0.147)
Financial institution		0.265	0.221
		(0.166)	(0.173)
Government		0.610*	0.606*

		(0.336)	(0.336)
Constant	0.318	2.599***	2.671***
	(0.276)	(0.975)	(0.979)
Control Variables	No	Yes	Yes
Industry dummy	Yes	Yes	Yes
Region dummy	Yes	Yes	Yes
Observations	212	194	194
R^2	0.126	0.236	0.240
Adjusted R^2	0.073	0.157	0.156

During this research, it will be essential to check the importance of ownership within a family or if the positive effects could be found in any large shareholder. For this cross-sectional analysis, we check whether the significance of family involvement will disappear when identifying the large shareholders: states and financial institutions. As **Table 6.5** presents, the *Family firm* retains its significant positive effect. After adding the variables testing for effects from large shareholders, the family variable increases, with a significance at the 1% level. We conclude that our findings on family ownership´s effect in crises such as COVID-19 are specific to having a family owner and cannot be attributed to other large shareholders.

Interestingly, firms with governmental shareholders significantly positively affect CAR. This can be attributed to governments being the main funders of financial care packages for companies during COVID-19. It would be in the state´s best interest to ensure their firms survive the crisis. The potential cost and loss for the state on a company they own would be enormous, not only as a loss in investment but also as a loss of taxpayer money. This is in contradiction to previous findings in China, which found that non-state-owned firms performed better during COVID-19 (Wu & Xu, 2021). Showcasing the importance of conducting studies on firm performance in Norway, as there is no globally standardized evidence that applies to all.

We conclude that firms with family owners are more prepared to handle periods of uncertainties and external shocks than companies with all types of large shareholders. Experiencing no drops and instead an increase in the variable, we find that family firms have distinct attributes that make them outperform expectations. Governments will have a slight positive effect, which we find natural as the government issued massive financial aid totaling several hundred billion NOK (Statens Pensjonsfond Utland; Christensen & Lægreid, 2020).

6.3 Effect of family ownership on other corporate outcomes

After conducting several tests on family ownership to determine if the results are unique and to find any correlations between more prominent shareholder positions and CAR, we will now test the family effect on other variables. We will investigate if family firms had other characteristics during COVID-19 that made them unique. The test is conducted to find how other factors evolve when accounting for the involvement of family owners and discover favorable aspects for the ownership type.

We check for *Capital cost*, *Capex*, *Changes in labor costs*, and *Changes in total assets*.

$$X = \beta_0 + \beta_{1i}\, family + \beta_{2i}\, ROA + \beta_{3i}\frac{Total\ Debt}{Assets} + \beta_{4i}\frac{Cash}{Assets} + \beta_{5i}\, Leverage + \beta_{6i} \ln(firm\ age) + \beta_{7i} M/B + \varepsilon i$$

Formula 6, Effects of Family Presence on Accounting Performance

In **Table 6.6**, we display the results using various dependent variables related to accounting performance. In column (1), CAR is substituted with *Capital cost*, which has been derived by dividing the company's *Capital cost* by its *Total Assets*. In column (2), we applied a similar approach for *Total Capex*, dividing it by the *Total Assets*. For the dependent variables showcased in columns (3) and (4), we have respectively computed the percentage change using *Labor costs* and *Total assets*.

We have included control variables, industry, and region fixed effects, as explained in **sections 4.6 and 5.3**, for all regressions. When running the model for change in

Total Assets, we have removed *ln(Assets)* to avoid multicollinearity that could affect significance by increasing standard errors for the estimates (Daoud, 2017).

Table 6.6 Using different dependent variables in COVID-19

	Capital Cost	Capex	ΔLabor Cost	ΔTotal Assets
	(1)	(2)	(3)	(4)
Family Firm	-0.004**	-0.033**	-1.024**	-0.987*
	(0.002)	(0.015)	(0.427)	(0.558)
Constant	0.034***	0.298***	2.911	0.462
	(0.010)	(0.089)	(2.569)	(2.170)
Control Variables	Yes	Yes	Yes	Yes
Industry dummy	Yes	Yes	Yes	Yes
Region dummy	Yes	Yes	Yes	Yes
Observations	186	186	177	193
R^2	0.150	0.152	0.160	0.046
Adjusted R^2	0.069	0.071	0.076	-0.035

Table 6.6 presents valuable information on the impact of family firm status on the various dependent variables related to accounting. Column (1), which focuses on *Capital Cost*, tells us that family firms on average had lower capital costs than non-family firms, supported by the statistically significant negative coefficient at the 5% level. We find this to be in correspondence with Yen et al. (2015), as they found that family firms got better loan terms. Examining *Capex* in column (2), the significant coefficient of -0.033 shows that family firms reduced capital expenditure relative to non-family firms.

From these results, we can conclude that the family firms managed to have lower capital costs and spent less on maintaining/upgrading their assets (*Capex*). Both variables are calculated relative to the firm size. Assuming the family firms´ assets did not need any crucial upgrades, it would be positive that the firms managed to reduce *Capex*. There is evidence from European countries that family firms are

more averse to investing in high-risk R&D than non-family firms but rather invest more in low-risk capital expenditures (Croci et al., 2011). By significantly cutting down on *Capex*, the family firms show more risk aversion when also cutting down on this. We can also connect these results to several theories regarding family firms sacrificing financial opportunities for the good of the owning family (Gomez-Meija et al., 2007; Lins et al., 2013; Hernández-Perlines et al., 2023).

In column (3), the significant coefficient of -1.024 suggests that family firms experienced a substantially bigger decrease in labor costs than non–family firms. A surprising result regarding the theory about family firms trying to always utilize their employees. The results in column (4) show that family firms experienced a shrinkage in their total assets with a coefficient estimate of -0.987.
As we investigate firm behavior during one of history´s most volatile time periods, we expected, especially for the family firms, to see a decrease in their asset sizes.

The regression results uncover favorable patterns regarding the impact of family firms on cost reduction measures. In line with our hypothesis, we can see that family firms have excelled on financial metrics during COVID-19 and have shown signs of lower *Capital Cost* and *Capex*, as well as a larger reduction in *Labor Costs* compared to non-family firms. All three outcomes are favorable for the firms but not all were expected. We do not know how the family firms managed to decrease their labor costs more than the non-family firms. According to theories like SEW, family firms should prioritize keeping their employees in labor. Family firms have been found to invest less in long-term investments than non-family firms, even though they tend to prefer long-term investments over short-term R&D (Anderson et al., 2012). As it was difficult for businesses to expand during COVID-19, the bigger reduction in *Total Assets* is also beneficial, implying that the firms exploited the existing assets better.

The results suggest that family firms made several strategic decisions that were beneficial for their survival. We find that they, on average, made larger cost-cuttings, and this may be the reason for the financial overperformance and resilience found in sections **6.1** and **6.2**.
We cannot conclude why the family firms had lower labor costs, but it could be related to employees receiving a cut in pay rather than layoffs.

7 Robustness tests

7.1 Robust variables

7.1.1 Ownership

The following robustness test is based on agency theory, which suggests that family ownership can help reduce conflicts of interest by aligning the goals of management and family shareholders. Anderson and Reeb (2003) found that family ownership promotes this alignment, improving monitoring and firm performance. Additionally, Gharbi and Othmani (2021) identified a non-linear relationship between family ownership and firm performance, indicating that ownership below a certain threshold (37.62%) positively influences performance while avoiding entrenchment issues. By establishing the threshold at 15%, we propose that family-owned businesses can take advantage of ownership alignment and still demonstrate superior performance even during the COVID-19 pandemic.

We lower the threshold for family ownership to 15%, which increases the family sample from 27 to 36. This robustness test will check if the family effect will still be reflected in CAR with a lower share and control by the family. Doing a robustness check like this will help us understand at which level of ownership the family effect will be significant.

Table 7.1 Family count with 15% ownership

Family Type	2020	2021
Non-family firm	70	70
Family firm	36	36

7.2 Robustness Tests

In order to verify the accuracy of the findings related to our research question, we have conducted three robustness tests to further clarify the results and the reliability of the estimates. Firstly, we have reduced the family ownership threshold from 25%

to 15% to assess whether the benefits observed during the COVID-19 pandemic persist with broader family involvement. Secondly, we have used a Difference-in-Difference (DiD) approach to separate the impact of family ownership during pre-, during-, and post-COVID-19 periods. Lastly, we have conducted a sensitivity analysis by adjusting vital financial metrics to evaluate their impact on our results. These tests help to thoroughly validate the impact of family ownership on firm resilience during economic crises.

7.2.1 Robustness Test 1

The first robustness test we want to conduct is to lower the threshold of shareholder position from 25% to 15%. Through a test with lower requirements for the family owner, we can check the influence of family in companies where their presence is not as dominant. This test will more closely check the effect of a firm under family ownership by getting more family firms with a lower share of control by the families. By finding significantly positive results in this test, we can confidently say that family ownership will make Norwegian firms more resilient to periods of crisis.

$$CAR = \beta_0 + \beta_{1i}\, family15 + \beta_{2i} \ln(assets) + \beta_{3i}\, ROA + \beta_{4i} \frac{Total\ Debt}{Assets} + \beta_{5i} \frac{Cash}{Assets} + \beta_{6i}\, M/B + \beta_{7i} \ln(firm\ age) + \varepsilon i$$

Formula 7, 15% ownership

To learn more about the Norwegian stock market and how the ownership structure can affect the firms´ sturdiness, we want to investigate closer at which level of involvement the positive effects found in **Table 6.2** occur. For the following analysis, we lower the threshold for a family shareholder position, keeping everything else equal to *Formula 3*. Lowering the threshold increases the number of family firms within the sample. As more companies fit within our definition of family firm, we will also get less skewness in the data, as it is now closer to being balanced. We focus on our main period, which is during COVID-19, as we are challenging the performance findings during times of crisis. Using the same method as before, we have eight columns, introducing a new variable for each column until column (7), and for column (8), we split *Leverage* into short-term and long-term leverage.

Table 7.2 Regression Results During COVID-19 w/ 15% Ownership

	CAR							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Family Firm	0.225*	0.249*	0.248*	0.250*	0.253**	0.305**	0.362***	0.356***
	(0.134)	(0.134)	(0.133)	(0.134)	(0.127)	(0.128)	(0.135)	(0.135)
ln(Assets)		-0.064**	-0.071**	-0.069**	-0.038	-0.045	-0.035	-0.039
		(0.031)	(0.031)	(0.032)	(0.031)	(0.031)	(0.033)	(0.033)
ROA			0.251	0.266	0.286	0.243	0.092	0.041
			(0.183)	(0.190)	(0.181)	(0.180)	(0.194)	(0.198)
Cash/TA				-0.104	-0.130	-0.169	-0.278	-0.229
				(0.362)	(0.359)	(0.356)	(0.407)	(0.408)
M/B					0.049**	0.043**	0.036*	0.036*
					(0.020)	(0.020)	(0.021)	(0.021)
ln(Age)						0.246**	0.129	0.108
						(0.114)	(0.133)	(0.134)
Leverage							-0.683***	
							(0.249)	
Short-term Debt								-0.827***
								(0.277)
Long-term Debt								-0.446
								(0.321)
Constant	0.324	1.745**	1.886**	1.825**	1.095	0.513	1.148	1.275
	(0.277)	(0.737)	(0.743)	(0.774)	(0.753)	(0.793)	(0.862)	(0.868)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	212	212	212	212	211	211	193	193
R^2	0.120	0.139	0.147	0.147	0.155	0.175	0.206	0.212
Adjusted R^2	0.067	0.082	0.086	0.082	0.086	0.103	0.128	0.130

As **Table 7.2** exhibits, the lower threshold ownership at 15% supports the initial findings that family firms outperformed non-family firms during the COVID-19 pandemic. The *Family firm* variable remains consistently significant across all models, with coefficients ranging from 0.225 to 0.362. These results imply that firms with only a 15% stake within one family will perform better than those without during external shocks, as we investigate here. For estimates of *Total Assets*, we still find a significantly negative correlation with CAR for models 2-4, *ROA* and *Cash/TA* are insignificant, *M/B* are exhibiting similar estimates, and *Leverage* has a strongly significant negative effect.
For the Norwegian publicly listed companies, we can conclude that having a family owner holding 15% or more of the shares outstanding was more suited to reach returns higher than the expectations under CAPM during COVID-19.

By comparing the results of the estimates from the 15% - test against the primary model, we see that the estimates of family impact are lower in **Table 7.2**, suggesting that a 25% share with the family means higher CAR. Even though the *Family firm* is still significant and positive, the effect is weaker. This was expected, as more of the firms that were in the "low"-performing group in our first test are now included in the "high"-performing family group. This is similar to the results of Gharbi and Othmani (2022), where the positive effect of family firms has reduced as the threshold has been reduced from 25% to 15%.
Further, firm size, measured as *Total Assets*, has a negative impact on CAR, suggesting that larger firms might have faced greater challenges during the pandemic. This significance goes away when we account for *M/B*, which indicates that size is correlated with *M/B*. *Short-term leverage* continues to significantly negatively impact CAR, reinforcing that higher short-term debt levels negatively affect firm performance. Lastly, we find that the effect of *Company age* is similar at the 15% threshold as for the 25%, with it being positive and significant when not accounting for *Leverage*.

The impact of *ROA* is less consistent and loses significance in the robustness test, unlike in the main analysis, in which it was a strong positive predictor in periods before and after COVID-19. This indicates that the firm's profitability, measured by *ROA*, may not have been a strong determinant of CAR during COVID-19.

Interestingly, during the pandemic, it was less critical to achieve returns on firm assets to drive stock returns.

For the *Company age,* we still see evidence of a connection between how long a firm has existed and the effect of its debt levels. This finding is consistent with the original analysis and suggests that more experienced firms get better loan terms, which is helpful during economic disruptions.

Overall, the significant positive coefficients of the *Family firm* variable across all models suggest that family ownership is a strong predictor of higher CAR during periods of economic uncertainty.

After confirming through a robustness test that even with lower family ownership influence, SEW stands stronger in Norway than initially expected, our findings suggest that there is a culture within these firms that motivates employees to work harder through tough times. After conducting this robustness test, we suggest that the theory of the effects of good culture in the workplace is essential for firm performance (Stuart, 2020; Li et al., 2021).

7.2.2 Robustness Test 2

Wooldridge (2019) defines the Difference-in-Differences (DiD) methodology as a quasi-experimental design used in econometrics to estimate the causal effects of a treatment. The DiD method compares the differences in outcomes over time between a group that is exposed to a treatment (called the treatment group) and a group that is not (called the comparison group). DiD is among the most popular tools for economic research and is based on strong assumptions such as parallel paths for treated and untreated groups (Abadie, 2005). When using a DiD model, it will be possible to compare outcomes based on whether it is treated or not (Callaway & Sant'Anna, 2021). This approach helps to control for confounding factors in datasets that might influence the outcome, assuming these factors affect both groups similarly over time.

The DiD model can be formulated as follows (Wooldridge, 2019):

$$Y_{it} = \alpha + \beta_1 TREAT_i + \beta_2 POST_t + \beta_3 (TREAT_i \times POST_t) + \epsilon_{it}$$

Formula 8, Difference-in-difference estimator, Wooldridge (2019)

In *Formula 8, Y* represents the outcome variable. The variable *TREAT* is a binary variable indicating whether the unit is in the treatment group or not. Similarly, the variable *POST* is a binary variable indicating the post-treatment period. The "TREAT x POST" variable denotes the interaction between the treatment group and the post-treatment period.

The specific DiD model adapted for this study is as follows:

$$\begin{aligned} CAR_{it} = \beta_0 &+ \beta_1 \text{Family}_i + \beta_2 \text{Pre COVID}_t + \beta_3 \text{During COVID}_t \\ &+ \beta_4 \text{Post COVID}_t + \beta_5 \left(\text{Family}_i \times \text{Pre COVID}_t\right) \\ &+ \beta_6 \left(\text{Family}_i \times \text{During COVID}_t\right) + \beta_7 \left(\text{Family}_i \times \text{Post COVID}_t\right) \\ &+ \epsilon_{it} \end{aligned}$$

Formula 9, Difference-in-Difference model run on CAR

Using CAR as the outcome variable, we measure the abnormal returns of Norwegian companies over a specified period, from 2017 to 2022. *Family* is a binary variable indicating whether the company is a family firm (the treatment group). Pre-, during-, and post-COVID are binary variables representing the periods relative to the COVID-19 pandemic. These showcases the "comparison group" results, where the variable is not treated by *Family.* The Interaction Terms (*Family * Period*) capture the impact of being a family firm during the three periods, making it possible to directly compare to the estimates that are not treated. These terms provide insight into whether there are any impacts of family ownership. Creating the treatment effect, which is the difference in the observed outcome minus the potential untreated outcome (Puhani, 2012), the model highlights the incremental effect of using a treatment term. By examining these interactions, we can determine how family firms' performance relative to non-family firms may vary in response to external shocks or changing market dynamics associated with the COVID-19 pandemic.

This model facilitates the isolation of the impact of family ownership on CAR for all phases surrounding the COVID-19 pandemic. By analyzing the coefficients of all interaction terms, we can confirm if family ownership substantially impacted financial performance during any of these periods. We also compare with the untreated results, to conclude if *Family* is the actual reason for effects.

Firms are defined as family if their ownership stake exceeds 25%, similar to the tests in **sections 6.1** and **6.2**.

Table 7.3 Difference-in-Differences Regression Results

	CAR
Family Firm	-0.346*
	(0.207)
Pre-COVID	0.190
	(0.141)
During-COVID	-0.060
	(0.140)
Post-COVID	-0.011
	(0.145)
Family * Pre-COVID	0.193
	(0.249)
Family * During-COVID	0.556**
	(0.249)
Family * Post-COVID	0.336
	(0.287)
Constant	-0.076
	(0.204)
Region dummy	Yes
Industry fixed effects	Yes
Year fixed effects	Yes
Observations	635
R^2	0.030
Adjusted R^2	-0.002

The first variable is the binary *Family firm* that captures family-effect on CAR for the entire period. The table displays a negative coefficient significant at the 10%

level. Indicating that being a family firm is associated with a 0.346-unit decrease in CAR compared to non-family firms.

The model looked at three different periods: before-, during-, and after COVID-19. **Table 7.3** indicates that none of the periods alone have a significant effect on CAR. These are the untreated variables, taking no consideration for ownership structures. We learn that none of the periods experienced any significant results that would imply market conditions weaker or stronger than expected.

Next, we have the three interaction terms to explore whether there is any evidence of family firms outperforming non-family firms when including the treatment variable, *Family*.
We see that the coefficient is not statistically significant for the first interaction term. There is no evidence that family firms experienced a different effect on CAR compared to non-family firms before COVID-19. The second interaction term takes on the pandemic years, where the estimate is statistically significant at the 5% level and positive. This estimate suggests that during this period, being a family firm is associated with CAR averaging 55.6% better compared to non-family firms. By comparing it with the untreated variable, *During-COVID*, we find that the significance is specific for the treated group. This implies that family firms performed better in CAR during the pandemic, corresponding to our main results and earlier literature. The last interaction term is insignificant, indicating that being a family firm after COVID-19 had no unique impact on CAR. We find that all the estimates and their significance support previous findings in **section 6.1**, stating that family ownership is beneficial during external shocks.

We find these results to be consistent with the previous analyses we have presented and to the hypotheses, still supporting the presence of SEW in Norway. **Table 7.3** gives a new aspect on the theme, as the coefficient for *Family firm* over the full period ranging is negative. This suggests that when using a longer perspective, the family firms underperform financially, considering CAR as the measure. Given these findings, we conclude that in the long run, family firms "underperformed" given CAPM expectations, supporting the extensive research conducted by Lins et al. (2013). This further confirms our main hypothesis, as the positive effects of family ownership is expected to be unique during crises.

7.2.3 Robustness Test 3

We aim to conduct a sensitivity analysis of the positive results of family firms. We have selected two of the variables with significant effects on CAR during all periods previously used. We have made minor changes to the dataset sample to see if they affect our results when running the model, as shown in *Formula 3*. We do this to evaluate the reliability of our findings and enhance credibility. According to Leamer (1985), this is a standard method for testing the robustness of empirical findings, and he emphasizes the importance of these tests to validate empirical results.

In the following tables, we present the results of a sensitivity analysis to understand the impact of *Leverage* and *ROA* on the performance of family firms during COVID-19. By splitting our sample into two datasets based on the median values of *Leverage* and *ROA*, we search to find if family ownership is significantly affected by dividing them by these characteristics. "High-leverage" groups include companies with *Leverage* above the median, while "low-leverage" groups consist of those below. Similarly, "high-ROA" groups include companies with *ROA* above the median, and "low-ROA" groups consist of those below. We applied our original regression model, as presented in *Formula 3*, to assess the consistency and robustness of our earlier findings.

Table 7.4 High Leverage During COVID-19

	CAR							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Family Firm	0.502**	0.507**	0.481**	0.487**	0.484**	0.476**	0.461**	0.463**
	(0.192)	(0.194)	(0.195)	(0.196)	(0.194)	(0.188)	(0.183)	(0.182)
ln(Assets)		0.016	0.012	0.007	-0.010	-0.021	-0.025	-0.022
		(0.044)	(0.045)	(0.046)	(0.046)	(0.045)	(0.044)	(0.044)
ROA			0.277	0.277	0.345	0.320	0.019	-0.122
			(0.256)	(0.257)	(0.256)	(0.248)	(0.272)	(0.294)
Cash/TA				-0.368	-0.210	-0.088	0.047	0.238
				(0.715)	(0.711)	(0.691)	(0.674)	(0.689)
M/B					-0.164*	-0.183**	-0.176**	-0.167*
					(0.091)	(0.089)	(0.086)	(0.086)
ln(Age)						0.421**	0.200	0.155
						(0.168)	(0.188)	(0.191)

Leverage							-1.042**	
							(0.437)	
Short-term Debt								-1.221***
								(0.459)
Long-term Debt								-0.771
								(0.488)
Constant	0.151	-0.230	-0.150	0.026	0.537	-0.556	1.179	1.223
	(0.388)	(1.101)	(1.103)	(1.159)	(1.178)	(1.222)	(1.394)	(1.389)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	97	97	97	97	97	97	97	97
R^2	0.171	0.172	0.184	0.186	0.218	0.275	0.323	0.336
Adjusted R^2	0.064	0.054	0.056	0.047	0.073	0.129	0.178	0.183

In **Table 7.4**, we see that for companies with high levels of debt, the variable for family ownership remains significant across all models. The coefficients for the *Family Firm* are consistently positive and significant at the 5% level, with values ranging between 0.461 and 0.507. Suggesting a strong positive impact of family ownership on CAR explicitly for firms bearing relatively more debt. However, variables such as the *M/B* ratio show deviating estimates from those presented in **Table 6.2**. There is a commonly known negative correlation between leverage and market-to-book ratio (Chen & Zhao, 2006). The *M/B* ratio has a varying significant negative impact, implying that firms with growth potential and high debt will give less returns to their owners. We find this under our expectations as these firms would focus on their growth and reinvestment rather than giving instant returns to shareholders. *Leverage* itself has a strong negative impact, indicating that high debt levels generally hinder performance during COVID-19. In column (8), we can observe that the negative impact of short-term debt findings is consistent with our main results, as shown in **Table 6.2**. As *Leverage* consistently has shown a negative impact, we expected to get this result for the companies carrying more debt relative to firm size.

Table 7.5 Low Leverage During COVID-19

	CAR							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Family Firm	0.517**	0.592**	0.718***	0.712***	0.714***	0.708***	0.706***	0.696***

	(0.258)	(0.248)	(0.254)	(0.256)	(0.234)	(0.238)	(0.239)	(0.241)
ln(Assets)		-0.146***	-0.177***	-0.181***	-0.111**	-0.109**	-0.109**	-0.097*
		(0.050)	(0.052)	(0.053)	(0.050)	(0.052)	(0.052)	(0.056)
ROA			0.565*	0.504	0.487	0.495	0.448	0.466
			(0.307)	(0.352)	(0.318)	(0.323)	(0.369)	(0.372)
Cash/TA				-0.207	-0.520	-0.506	-0.606	-0.619
				(0.582)	(0.539)	(0.547)	(0.664)	(0.667)
M/B					0.063***	0.064***	0.062***	0.064***
					(0.021)	(0.022)	(0.023)	(0.023)
ln(Age)						-0.037	-0.024	-0.032
						(0.202)	(0.208)	(0.210)
Leverage							-0.210	
							(0.783)	
Short-term Debt								0.089
								(0.935)
Long-term Debt								-0.530
								(0.954)
Constant	0.460	3.670***	4.363***	4.463***	2.877**	2.936**	2.990**	2.742**
	(0.442)	(1.179)	(1.222)	(1.260)	(1.188)	(1.239)	(1.262)	(1.334)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	97	97	97	97	96	96	96	96
R^2	0.211	0.283	0.311	0.312	0.339	0.340	0.340	0.343
Adjusted R^2	0.119	0.190	0.212	0.204	0.225	0.216	0.207	0.200

In the "low-leverage" category (**Table 7.5**), the positive effect of family ownership on CAR is even more pronounced, with coefficients for the *Family firm* ranging from 0.517 to 0.718 and significance levels at 1% or 5% across all models. This suggests that family firms with low leverage benefit more from their ownership structure, potentially due to greater flexibility and fewer financial constraints. The *M/B* ratio consistently exhibits a positive and significant effect on CAR. The impact of *Total Assets* is notably negative and significant in this category, implying larger firms with low leverage might face difficulties, unlike their smaller counterparts. We do not find any significant effect from *Leverage* for this group, and we

understand that the full negative effect comes from the "high-leverage" companies when using the full dataset.

The sensitivity analysis shows that family firms consistently outperformed non-family firms during the pandemic, regardless of debt level. Family ownership seems to offer a significant advantage in both high- and low-leverage firms, with the model exhibiting significantly positive coefficients. Previous literature on the topic of leverage in family firms found that family firms with the founder as CEO experienced a significantly lower leverage ratio (Ampenberger et al., 2013).

Table 7.6 High ROA During COVID-19

	CAR							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Family Firm	0.228	0.241	0.242	0.244*	0.299**	0.297*	0.378**	0.390**
	(0.158)	(0.159)	(0.146)	(0.147)	(0.149)	(0.150)	(0.170)	(0.171)
ln(Assets)		0.035	0.021	0.018	0.026	0.027	0.048	0.060
		(0.042)	(0.039)	(0.039)	(0.039)	(0.040)	(0.043)	(0.046)
ROA			-1.362***	-1.356***	-1.351***	-1.386***	-1.212***	-1.173***
			(0.320)	(0.321)	(0.318)	(0.357)	(0.429)	(0.434)
Cash/TA				-0.224	-0.555	-0.548	-0.960	-0.991
				(0.444)	(0.481)	(0.485)	(0.635)	(0.638)
M/B					0.042*	0.043*	0.040	0.041
					(0.025)	(0.026)	(0.035)	(0.036)
ln(Age)						-0.035	0.055	0.035
						(0.155)	(0.199)	(0.201)
Leverage							-0.801	
							(0.487)	
Short-term Debt								-0.617
								(0.551)
Long-term Debt								-1.006*
								(0.565)
Constant	0.345	-0.455	-0.056	0.048	-0.155	-0.088	-0.297	-0.500
	(0.287)	(1.006)	(0.929)	(0.955)	(0.953)	(1.004)	(1.054)	(1.094)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Observations	106	106	106	106	106	106	95	95
R^2	0.161	0.167	0.304	0.306	0.327	0.328	0.355	0.359
Adjusted R^2	0.062	0.059	0.206	0.199	0.215	0.207	0.222	0.218

Table 7.6 shows that *Family firm* has positive effects in various models, with coefficients increasing from 0.228 to 0.390. The variable attains statistical significance in models 4-8, implying that family businesses continue to outperform non-family firms. This resilience emphasizes the added value of family ownership in delivering superior returns during crises. Conversely, *ROA* itself displays a significant negative impact, indicating that high operational returns do not necessarily result in higher abnormal returns during a crisis, perhaps due to market expectations. As these companies have high values for *ROA*, they will have higher expectations of returns, and we find this result as expected. Lastly, we see that it is the long-term option for *Leverage* that gives a slightly significant reduction in CAR for these companies.

Table 7.7 Low ROA During COVID-19

	CAR							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Family Firm	0.344	0.395*	0.442**	0.433**	0.446**	0.452**	0.474**	0.423*
	(0.212)	(0.212)	(0.210)	(0.210)	(0.204)	(0.220)	(0.228)	(0.227)
ln(Assets)		-0.077	-0.099**	-0.092*	-0.074	-0.074	-0.066	-0.066
		(0.047)	(0.048)	(0.048)	(0.047)	(0.048)	(0.051)	(0.051)
ROA			0.516**	0.600**	0.762***	0.754**	0.699**	0.501
			(0.249)	(0.270)	(0.277)	(0.301)	(0.329)	(0.343)
Cash/TA				0.412	0.136	0.132	-0.019	0.131
				(0.498)	(0.510)	(0.515)	(0.544)	(0.543)
M/B					0.064*	0.063*	0.059	0.045
					(0.035)	(0.036)	(0.038)	(0.038)
ln(Age)						0.014	-0.206	-0.326
						(0.189)	(0.225)	(0.232)
Leverage							-0.421	
							(0.336)	
Short-term Debt								-0.809**
								(0.396)
Long-term Debt								-0.012
								(0.402)
Constant	0.062	1.727	2.232*	2.029*	1.656	1.623	2.596*	3.045**

	(0.456)	(1.121)	(1.128)	(1.156)	(1.127)	(1.211)	(1.399)	(1.403)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	106	106	106	106	105	105	98	98
R^2	0.343	0.361	0.390	0.394	0.330	0.330	0.355	0.380
Adjusted R^2	0.258	0.271	0.296	0.293	0.208	0.199	0.217	0.238

In **Table 7.7**, the coefficient for the *Family Firm* is higher compared to **Table 7.6**. The variable is also significant for all models except the one only including *Family firm*. We also see a contrast to **Table 7.6** for the reported estimates of *ROA*, as it is significantly positive for this sample. From these two variables, we understand that family involvement for the firms reporting lower returns on assets is significantly positive and that family ownership may have helped them outperform the expectations. We find another contrast, as it is short-term *Leverage* that has the negative impact on company debt. Nevertheless, we find significant positive effects of family ownership when splitting the datasets into two groups based on *ROA* observations.

A study conducted in Colombia found that family firms would achieve significantly better *ROA* than non-family firms but that this effect would diminish with an increase in firm size (González et al., 2012). We find that family ownership will have a significantly positive effect on CAR for companies with both low and high *ROA*.

8 Conclusion

8.1 Conclusion

Continuous work on asset pricing, factor effects, firm behavior, and other aspects that interest investors will always be necessary. As the world changes constantly, so do both external and internal factors affecting firms and their stock prices. In line with society's evolution, macroeconomic relations are vulnerable to events all over the world, like war, import/export restrictions, and pandemics, to mention some.

Through a thorough investigation using several firm-specific factors during COVID-19 for Norwegian firms, emphasizing the effects of family ownership, we conclude that the family firms **outperformed** the non-family firms. Over the two-year pandemic, family firms achieved up to **45% higher CAR**. Using the market movements to predict stock returns, we have found evidence that family firms achieved higher CAR and, therefore, outperformed market expectations. These findings are also consistent when using a more advanced model to predict stock returns, the Fama-French 3-factor model, implying that the results are not limited to the CAPM theory.

Further analysis of our chosen regressors helps explain essential factors driving and limiting CAR during COVID-19. The most important takeaway from the explanatory variables is that companies with a higher level of debt performed worse than those with less debt, with short-term debt being the main limitation of CAR. We find this to correspond with a previous study that found short-term debt to have a negative impact on several measures (ROA, ROE, and EPS) for financial performance (Salim & Yadav, 2012). *Market-to-book* value had a positive impact on CAR, meaning that the firms with higher *M/B* ratios performed better. We can interpret this as investors paying a premium for a company and receiving more security in their financial performance.

The positive effects of family ownership, as presented in **section 6.1**, are solely specific to the crisis period, COVID-19. During the robustness tests, through a Difference-in-differences estimator, we found a significant negative effect of family ownership for the period 2017-2022, meaning that the positive effect is

solely connected to crisis management. We use these results to add to previous literature, finding evidence for SEW in Norwegian firms. Our thesis has found evidence for family firms having distinct features for management during COVID-19. We interpret the results as family firms being more agile to adjust to external conditions like the pandemic, which is in line with the theory presented by Li et al. (2021). We expect this to come from family firms that have a more welcoming culture and employees who are motivated to reach a joint vision for the company (Stuart, 2020). The superior findings for CAR can be attributed to family firms having their business decisions taken, with greater consideration to the best for maintaining family control, as Hernández-Perlines et al. (2023) suggest.

When comparing results from regressions performed before and after COVID-19, we find that the positive effects of family ownership are limited to the pandemic. This, again, supports the previous theory of family firms being willing to sacrifice financial investments and business decisions to preserve family interests, which is in line with the findings of Lins et al. (2013).

8.2 Further research

For our thesis, we have only conducted a quantitative analysis without reaching out to companies for interviews. We propose that the literature on financial performance in Norway during the COVID-19 pandemic gets a qualitative analysis that includes companies supplying their actual strategies through the shock. This could further confirm our conclusions about SEW being present for Norwegian firms and build on the characteristics of family firm behavior for companies in Norway.

Another suggestion for further research on a Norwegian sample is to investigate firm performance during other previous crises, e.g., the financial crisis in 2008-2009. By studying other crises, it would be possible to draw a stronger conclusion about the relationship between family ownership and firm performance, especially during shocks.

9 Additional results

In this section, we will present several other tests we have conducted. These tests have various significance in their results; however, they bring more insights into the factors surrounding our research question and hypotheses. This will give more knowledge to the subject and be a further addition to the literature on ownership structures, family involvement, and management of firms in times of shocks/crises.

9.1 Family Involvement

To test whether the effect of the family variable is stronger or weaker if the family is represented as the CEO, Chairperson of the Board, or representative for the board, we have gathered information on the 25%-family firms. Looking at every family firm's board and CEO, we find that seven companies have a family member as the CEO, ten companies have a family member as the board's Chairperson, and eight families were represented through a position on the board. For these variables, we have only chosen to acknowledge the actual family members in these positions, excluding people acting as family representatives. This will add to the theory of Villalonga and Amit (2006) that the positive effect of family ownership will only be present with the founder as CEO or Chair of the board.

To compare the performance of family-owned companies with and without a large minority shareholder, we focused on our main sample. We then used the same method as explained in **section 4.6** to identify owners with at least a 10% ownership stake in the same firm as a family. This allows us to analyze and understand whether a firm with another large shareholder tends to achieve higher or lower returns. This robustness test will help us determine the impact of having another significant shareholder and how it may interfere with family control.

Table 9.1 Family Ownership Style

Variable	Yes/No	#	Percentage
Board	Yes	8	30
Board	No	19	70
CEO	Yes	7	26

CEO	No	20	74
Chair	Yes	10	37
Chair	No	17	63
Minority shareholder	Yes	7	26
Minority shareholder	No	20	74

These extra variables will allow for a more thorough investigation of the family firm's performance and extend the literature on family involvement. Comparing the share of companies with family CEOs with the Italian sample Amore et al. (2022) used, we can find considerable differences. Where only 26% of Norwegian public companies have CEOs from owning families, the Italian sample has 49%. If we compare the number of minority shareholders, Norwegian companies have 26%, while there is 17% in Italy.

We understand from these gaps between our study on Norway and the one conducted in Italy that there are differences in corporate governance in the two countries. Where the owners and investors in Norway seem to let other, and possibly more suited, people fill the positions of CEO and on the board of directors.

Table 9.2 presents the results from the robustness test regarding further family involvement. This table shows the results from the COVID-19 period only. For this hypothesis test, we have changed the dummy variable from *Family* to *CEO*, *Chair*, *Board*, and *Minority Shareholder*. *Minority Shareholders* is a dummy variable that equals 1 for all companies that have a significant minority shareholder position, which is not related to family ownership. Column (1) shows the results for only including the *CEO*, column (2) has the *Chair*, column (3) has the *Board*, and column (4) is *Minority shareholders*. All regressions have been conducted with the other control variables and include fixed effects.

Table 9.2 Cross-sectional regression with family characteristics

	CAR			
	(1)	(2)	(3)	(4)
CEO	0.209			

	(0.231)			
Chair		-0.081 (0.225)		
Board			0.177 (0.244)	
Minority Shareholder				0.396* (0.238)
Constant	1.712* (0.907)	1.685* (0.908)	1.718* (0.909)	1.667* (0.901)
Control Variables	Yes	Yes	Yes	Yes
Industry dummy	Yes	Yes	Yes	Yes
Region dummy	Yes	Yes	Yes	Yes
Observations	194	194	194	194
R^2	0.177	0.174	0.176	0.186
Adjusted R^2	0.103	0.099	0.101	0.112

We analyze the different structures of family ownership and the family's degree of control. We have performed tests on whether companies with direct involvement from the owners as CEO, Chairperson of the board, or as a board member give better returns. **Table 9.2** shows that having a family member as either has no significant effect during COVID-19.

We consider this to be in line with previous work on the topic, as evidence from Denmark shows better results for firms with an externally hired CEO (Bennedsen et al., 2007). We see similar results in the Italian market as Cucculelli and Micucci (2008) presented. The exception is the findings of Villalonga and Amit (2006), where the company's founder will increase the firm's value by holding one of the titles. For many of the firms within this Norwegian sample, the family with majority ownership has bought stocks to achieve this position rather than founding the company themselves.

From this analysis, we can conclude that having a family member as the Chair of the board, member of the board, or CEO on CAR has no significant effect.

These findings align with the conclusions of Gomez-Meija et al. (2007), who assert that family firms are often willing to prioritize the preservation of their ownership position and other family interests over financial performance. This underscores the unique dynamics and considerations that influence the performance of family-owned businesses.

Further, we examine the effect of having a large minority shareholder unrelated to the family. For this variable, we have set the threshold of a large minority stake at 10%, including every type of owner. The regression shows that a large minority shareholder will have a slightly significant, positive effect on a company´s CAR. This can be attributed to the shareholders both being interested in making the company profitable and being able to steer it in the right direction. The low level of significance also suggests that the correlation between family firms and minority shareholders is weak.

9.2 Fama-French 3 – factor model

In 1992, Eugene Fama and Kenneth French presented their theory about stock and bond prices being affected by more than just the correlation with market movements, as the CAPM theory states. Introducing a model for predicting asset prices that involves several variables, Fama and French introduced the factors High-minus-low and Small-minus-big, see *Formula 2* under **section 4.5**.
Fama and French conducted a cross-sectional study on average stock returns in the period from 1963 to 1990. Their findings did not support the previous findings of Black, Jensen, and Scholes (1972), who found that average stock returns are correlated to the market beta.

The following table show the results of running the main model on the COVID-19 sample, similar to **column (7)** and **(8)** in **Table 6.2**, except the CAR is calculated using expected returns from the FF3 model.

Table 9.3 Fama-French CAR, during COVID-19

	CAR	
	(1)	(2)
Family Firm	0.370**	0.367**

	(0.173)	(0.173)
ln(Assets)	-0.024	-0.026
	(0.040)	(0.040)
ROA	0.054	0.021
	(0.236)	(0.242)
Cash/TA	-0.558	-0.525
	(0.495)	(0.499)
M/B	0.060**	0.060**
	(0.026)	(0.026)
ln(Age)	0.068	0.055
	(0.162)	(0.163)
Leverage	-0.710**	
	(0.304)	
Short-term Debt		-0.803**
		(0.339)
Long-term Debt		-0.556
		(0.392)
Constant	1.128	1.211
	(1.050)	(1.060)
Industry dummy	Yes	Yes
Region dummy	Yes	Yes
Observations	193	193
R^2	0.156	0.157
Adjusted R^2	0.073	0.070

Table 9.2 has similar results as **Table 6.2**, exhibiting a significantly positive correlation between CAR and *Family firms*. The estimates imply that family firms, on average, achieved more than 35% higher CAR than non-family firms. From this test, we learned that when we predicted the returns for the Norwegian companies, using the factors *HML* and *SMB* as well, family firms still outperformed. If we compare the results of **Table 6.2** and **Table 9.2**, we find a drop in size and significance for the *Family firm*. We find this normal, as the FF3 – model has the extra variables to explain the asset returns. This seems to have given lower expected returns than under CAPM.

For the other independent variables, beginning in the second row, we see that *Total Assets* loses its significance. The estimate still shows negative trends, but no CAR movements can be directly linked with this variable. *ROA* has almost no change between the two models, with it being insignificantly positive. *Cash/TA*, *M/B,* and *Company Age* also have coefficient estimates similar to those under the CAPM – CAR. Comparing the final variable, *Leverage*, the FF3 – version exhibits a negative effect of almost identical size but is only significant at 5%.

This is consistent with our hypothesis and with previous literature on the subject. Even though the variables experience some deviations in significance, we find that the family firms still performed better with the FF3 method.
We present tables on before- and after COVID-19 in the appendix.

9.3 Testing multiple variables' effect on CAR

To further investigate drivers of CAR during COVID-19, we split several variables into two, categorizing them as above- and below-median. Through this analysis, we will uncover whether firms with above-median observations will achieve higher CAR. We hypothesize that the variables we test, *M/B*, *Company age*, *ROA,* and *Leverage,* will have higher CAR than those defined below the median.

We test the impact of these variables to analyze further what drives their effects and to find variables where family owners gain advantages that make the company stronger in crisis. When checking for effects on binary variables, e.g., for high/low leverage, we have split the companies in two based on the median value for the variable. We can ensure an equal distribution and avoid any skewness by using the median. We have used this method for *Market-to-book value*, *Leverage*, *Company age*, and *ROA.* For all these tests, the companies with a value higher than the median have received a "1", and the ones below get a "0".

Firstly, we test the effect of being overvalued compared to the book value. For this test, we have calculated the median of the M/B ratio and defined the companies with a larger for overvalued. The firms get the value 1 for being *Overvalued*, meaning the model tests if companies that investors value higher than the firms´ book values achieve better CAR.

$$CAR = \beta_0 + \beta_{1i} Overvalued + \beta_{2i} \ln(assets) + \beta_{3i} ROA + \beta_{4i} \frac{Total\ Debt}{Assets} + \beta_{5i} \frac{Cash}{Assets} + \beta_{6i} \ln(firm\ age) + \varepsilon i$$

Formula 10, M/B effect on CAR.

Next, we test for firms´ profitability, using the return on assets as the proxy. Firms with higher *ROA* than the median are classified as highly profitable, while those with less are defined as less profitable.

$$CAR = \beta_0 + \beta_{1i} Profitability + \beta_{2i} \ln(assets) + \beta_{3i} \frac{Total\ Debt}{Assets} + \beta_{4i} \frac{Cash}{Assets} + \beta_{5i} M/B + \beta_{6i} \ln(firm\ age) + \varepsilon i$$

Formula 11, ROA effect on CAR

When conducting the test for *Company age,* we have split them into two: *Old* and *Young*. The firms having existed longer than the median of the sample get the value 1. We are testing to find any correlation between the experience longevity of a firm and the financial performance measured in CAR during COVID-19.

$$CAR = \beta_0 + \beta_{1i} Age + \beta_{2i} \ln(assets) + \beta_{3i} \frac{Total\ Debt}{Assets} + \beta_{4i} \frac{Cash}{Assets} + \beta_{5i} M/B + \beta_{6i} ROA + \varepsilon i$$

Formula 12, Company Age Effect on CAR

Lastly, we test for the effect of firms having high leverage, meaning that debt is a bigger part of the firms' structure. Again, companies above the median are defined as having high leverage, and those with lower than the median have low leverage. We want to perform this test to see if the financial structure has a significant effect through the COVID-19 pandemic. As interest rates dropped, and companies received favorable terms for new "COVID-19 loans", this is of high interest. Higher than the median would mean that the firms have a relatively higher amount of debt, so the variable is called "Debt Heavy".

$$CAR = \beta_0 + \beta_{1i} Debt\ Heavy + \beta_{2i} \ln(assets) + \beta_{3i} ROA + \beta_{4i} \frac{Cash}{Assets} + \beta_{5i} M/B + \beta_{6i} \ln(firm\ age) + \varepsilon i$$

Formula 13, Capital Structure Effect on CAR

For this robustness test, we are taking a closer look at the other variables we have used thus far. We will achieve results that are unaffected by having more observations within one group. Here, we are looking into *Leverage, M/B, Company age,* and *ROA*; these are respectively referred to as *Debt heavy*, *Overvalued*, *Experience*, and *Profitability*. Every observation above the median has received a "1", and the estimates represent companies being above the median. These tests are performed during the COVID-19 period.

Table 9.4 Over-median tests on CAR

	CAR			
	(1)	(2)	(3)	(4)
Debt Heavy	-0.254**			
	(0.125)			
Overvalued		0.259**		
		(0.118)		
Experience			0.221*	
			(0.124)	
Profitability				0.325***
				(0.121)
Constant	-0.846**	-0.313	1.285*	0.189
	(0.373)	(0.702)	(0.745)	(0.678)
Control Variables	Yes	Yes	Yes	Yes
Observations	194	211	194	194
R^2	0.061	0.078	0.088	0.118
Adjusted R^2	0.041	0.055	0.064	0.099

Beginning with *Debt Heavy*, we find a negative correlation with CAR, which is significant at the 5% level. The findings show that companies with higher debt levels during the pandemic achieved lower CAR. We expected this outcome, as previous regressions have found that all types of leverage variables have had a significantly negative effect.

The *Overvalued* variable refers to companies with a market-to-book value higher than the median. We have classified these as overvalued for this test, using a name that generalizes that investors pay more for the companies in the market than the firms´ book value states they should. The results suggest that companies with a higher *M/B* performed better, with the estimate being significant at a 5% level and positive. We find this interesting, as it seems that the firms' investors found it worth paying the above book value price for better performance. It seems that investors paid a higher price for achieving better CAR during COVID-19.

Next, we examine the effect of the company's age. Column (3) shows a positive significant effect, suggesting that it was the older firms that achieved higher average CAR. This was in line with our expectations, even though previous models have shown that *Company age* is not the main driver of CAR. Firms with more experience amongst investors in their respective markets and employees were better set for the pandemic. Younger firms may have been considered to have too little experience for customers to rely on them in times of uncertainty, and they might have struggled more with price increases from their suppliers. There could be several reasons why the younger firms performed worse than the older ones, which we have not investigated further.

Lastly, we found that *Profitability* was strongly significant at a positive level of 1%. As it is based on firms achieving revenues and returns, we are not surprised as this is a big part of what is building the CAR, even though *ROA* has been insignificant in previous models. Stock prices will closely follow the return a firm achieves on its assets.

We can conclude that companies bearing high amounts of debt experience lower CAR, and companies that can be considered to be overvalued may imply paying for financial stability. Experience is good, as it provides more traditions and history, more experienced employees, and greater ties with customers. These results are helpful for investors when considering firms in Norway to invest in.

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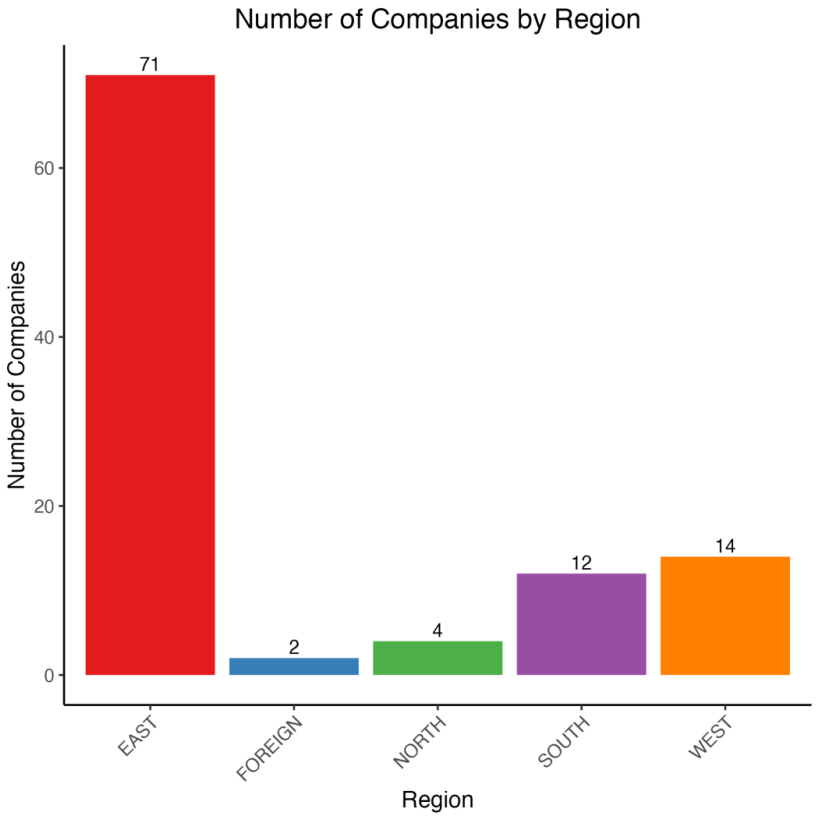
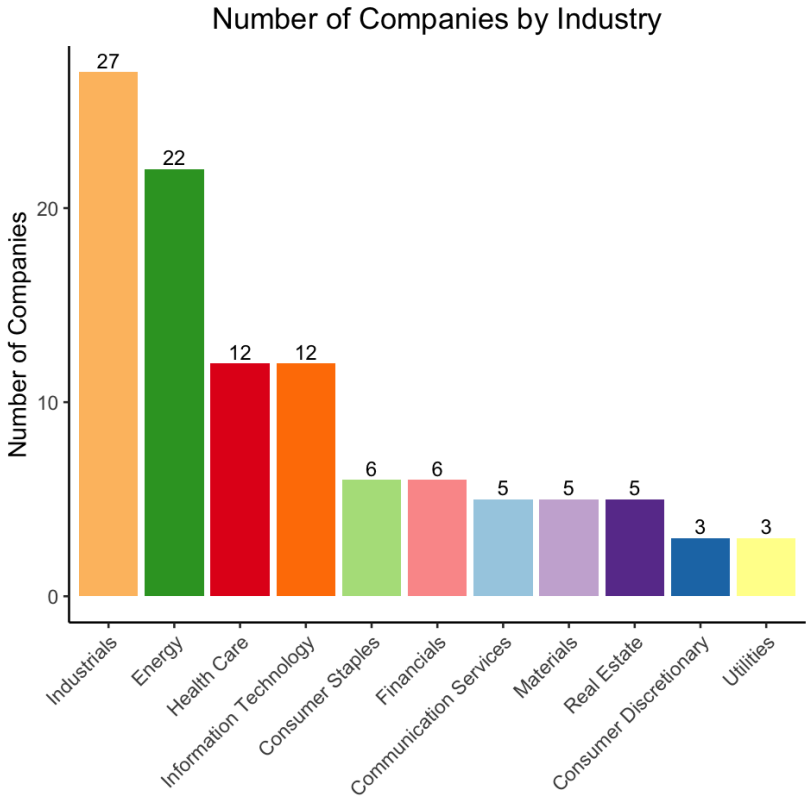
Appendix

Appendix 1. *Figure 1 Postal codes geographic limits in Norway (source Erik Bolstad, snl.no)*

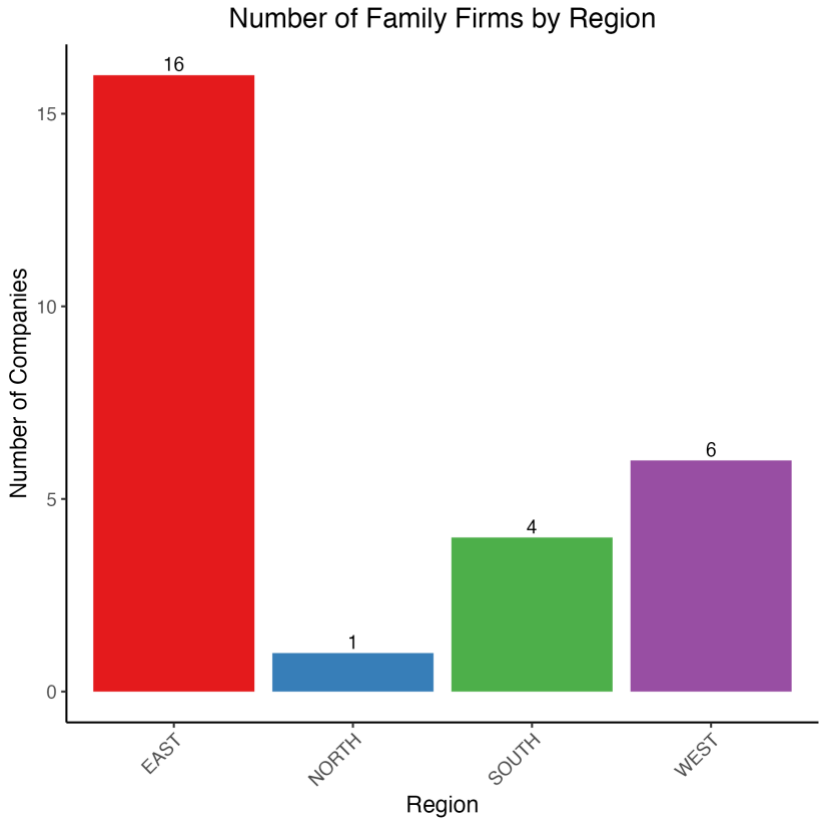
Appendix 2. *Figure 2 Companies location divided by North-, South-, West-, and East Norway*



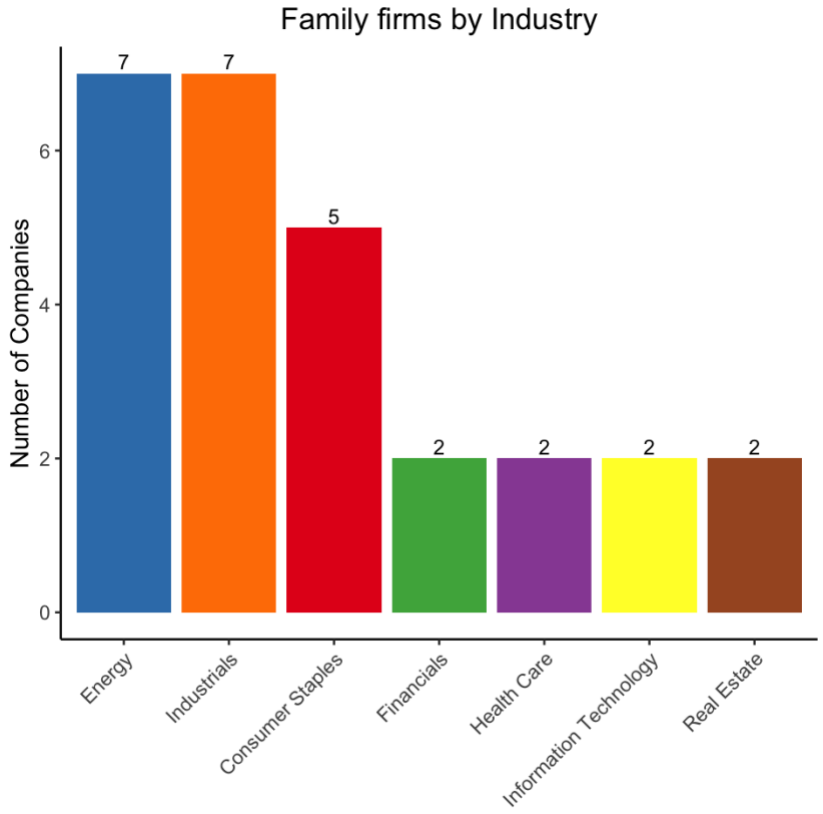
Appendix 3. Number of companies by industry



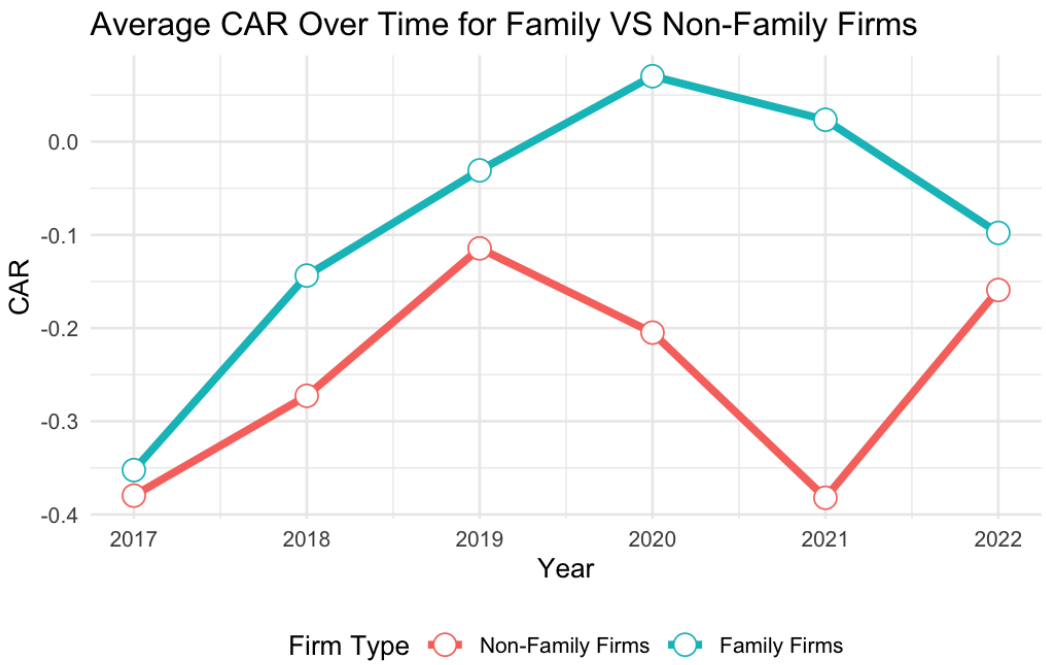
Appendix 3. *Figure 0-1 Companies location divided by North-, South-, West-, and East Norway*



Appendix 4. *Figure 0-2 Family firms divided by industry*



Appendix 5. Average CAR through full sample.



Appendix 6. A1: Results Before COVID-19 w/ 15% Ownership

	CAR							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Family Firm	-0.106	-0.088	-0.087	-0.079	-0.039	-0.012	-0.034	-0.005
	(0.128)	(0.130)	(0.125)	(0.124)	(0.121)	(0.124)	(0.127)	(0.128)
ln(Assets)		-0.031	-0.077**	-0.093***	-0.085***	-0.087***	-0.100***	-0.115***
		(0.030)	(0.030)	(0.031)	(0.031)	(0.031)	(0.031)	(0.033)
ROA			0.858***	0.781***	0.844***	0.822***	0.584***	0.593***
			(0.176)	(0.178)	(0.176)	(0.177)	(0.184)	(0.184)
Cash/TA				-0.753**	-0.927***	-0.935***	-1.402***	-1.380***
				(0.312)	(0.319)	(0.319)	(0.379)	(0.378)
M/B					0.070**	0.067**	0.074**	0.074**
					(0.031)	(0.031)	(0.031)	(0.031)
ln(Age)						0.091	0.235**	0.245**
						(0.086)	(0.100)	(0.099)
Leverage							-0.383	
							(0.267)	
Short-term Debt								-0.621**
								(0.306)
Long-term Debt								-0.093
								(0.323)
Constant	-0.197	0.497	1.490**	1.932***	1.734**	1.516**	1.775**	2.090**
	(0.265)	(0.713)	(0.717)	(0.735)	(0.738)	(0.767)	(0.811)	(0.833)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Region dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Observations	317	316	316	316	312	312	284	284
R^2	0.046	0.050	0.119	0.136	0.153	0.156	0.177	0.185
Adjusted R^2	0.009	0.009	0.078	0.092	0.107	0.107	0.121	0.126

Appendix 7. Results After COVID-19 w/ 15% Ownership

	CAR							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Family Firm	-0.092	-0.112	-0.095	-0.136	-0.137	-0.281	-0.285	-0.242
	(0.202)	(0.201)	(0.198)	(0.197)	(0.198)	(0.183)	(0.186)	(0.182)
ln(Assets)		0.074	0.057	0.046	0.046	0.066	0.081*	0.055
		(0.047)	(0.047)	(0.047)	(0.047)	(0.043)	(0.043)	(0.043)
ROA			0.340*	0.230	0.233	0.326*	0.465**	0.521***
			(0.172)	(0.179)	(0.189)	(0.174)	(0.183)	(0.180)
Cash/TA				-0.920*	-0.911*	-0.676	-0.239	-0.184
				(0.485)	(0.513)	(0.470)	(0.554)	(0.539)
M/B					-0.003	0.027	0.054	0.045
					(0.056)	(0.051)	(0.051)	(0.050)
ln(Age)						-0.866***	-1.101***	-1.052***
						(0.196)	(0.217)	(0.212)
Leverage							0.978**	
							(0.410)	
Short-term Debt								0.293
								(0.490)
Long-term Debt								1.564***
								(0.468)
Constant	-0.224	-1.886*	-1.489	-1.155	-1.147	1.103	0.815	1.237
	(0.418)	(1.126)	(1.126)	(1.124)	(1.140)	(1.156)	(1.186)	(1.166)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Region dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Observations	106	106	106	106	106	106	99	99
R^2	0.273	0.292	0.321	0.347	0.347	0.466	0.529	0.561
Adjusted R^2	0.179	0.192	0.217	0.239	0.230	0.362	0.431	0.462

Appendix 8. High Age During COVID-19

	CAR							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Family Firm	0.392	0.356	0.354	0.368	0.342	0.340	0.367	0.370
	(0.257)	(0.256)	(0.261)	(0.262)	(0.246)	(0.247)	(0.257)	(0.257)
ln(Assets)		-0.083	-0.083	-0.071	-0.025	-0.020	-0.016	-0.030
		(0.052)	(0.053)	(0.054)	(0.053)	(0.053)	(0.056)	(0.059)
ROA			0.018	0.094	0.222	0.218	0.226	0.266
			(0.437)	(0.445)	(0.442)	(0.444)	(0.456)	(0.460)
Cash/TA				0.606	0.562	0.580	0.404	0.345
				(0.655)	(0.645)	(0.647)	(0.715)	(0.720)
M/B					0.015	0.015	0.010	0.012
					(0.033)	(0.033)	(0.035)	(0.035)
ln(Age)						-1.105	-1.350	-1.291
						(1.639)	(1.748)	(1.754)
Leverage							-0.412	
							(0.474)	
Short-term Debt								-0.627
								(0.547)
Long-term Debt								-0.144
								(0.583)
Constant	0.392	2.169*	2.172*	1.795	0.797	4.247	5.240	5.357
	(0.400)	(1.189)	(1.198)	(1.267)	(1.222)	(5.262)	(5.688)	(5.703)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	103	103	103	103	102	102	97	97
R^2	0.162	0.184	0.184	0.192	0.174	0.178	0.172	0.178
Adjusted R^2	0.071	0.086	0.076	0.074	0.041	0.034	0.018	0.014

Appendix 9. Low Age During COVID-19

	CAR							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Family Firm	0.284*	0.308*	0.327*	0.353**	0.361**	0.432***	0.488***	0.489***
	(0.163)	(0.165)	(0.165)	(0.167)	(0.164)	(0.159)	(0.166)	(0.167)
ln(Assets)		-0.037	-0.048	-0.061	-0.027	-0.012	0.016	0.014
		(0.041)	(0.041)	(0.043)	(0.046)	(0.044)	(0.045)	(0.045)
ROA			0.229	0.162	0.186	0.129	-0.216	-0.277
			(0.186)	(0.195)	(0.192)	(0.185)	(0.208)	(0.229)
Cash/TA				-0.476	-0.717*	-0.833**	-1.083**	-1.021**
				(0.404)	(0.418)	(0.402)	(0.454)	(0.466)
M/B					0.071*	0.072**	0.067*	0.065*
					(0.037)	(0.035)	(0.035)	(0.036)
ln(Age)						0.409***	0.160	0.114
						(0.133)	(0.155)	(0.171)
Leverage							-0.952***	
							(0.285)	
Short-term Debt								-1.080***
								(0.348)
Long-term Debt								-0.812**
								(0.359)
Constant	0.388	1.263	1.501	1.858*	1.040	-0.363	0.278	0.423
	(0.405)	(1.042)	(1.057)	(1.098)	(1.164)	(1.204)	(1.236)	(1.261)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	109	109	109	109	109	109	96	96
R^2	0.215	0.222	0.234	0.245	0.274	0.341	0.432	0.435
Adjusted R^2	0.126	0.125	0.129	0.133	0.157	0.227	0.317	0.312

Appendix 10. High M/B During COVID-19

	CAR							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Family Firm	0.192	0.159	0.166	0.170	0.244	0.253	0.316	0.341
	(0.232)	(0.231)	(0.232)	(0.234)	(0.236)	(0.246)	(0.266)	(0.274)
ln(Assets)		-0.093	-0.099	-0.101*	-0.084	-0.086	-0.094	-0.098
		(0.058)	(0.060)	(0.060)	(0.061)	(0.062)	(0.065)	(0.066)
ROA			0.126	0.079	0.106	0.098	0.056	0.061
			(0.290)	(0.322)	(0.320)	(0.326)	(0.359)	(0.361)
Cash/TA				-0.173	-0.352	-0.363	-0.573	-0.568
				(0.512)	(0.519)	(0.528)	(0.673)	(0.677)
M/B					0.041	0.040	0.031	0.031
					(0.026)	(0.026)	(0.029)	(0.029)
ln(Age)						0.040	0.068	0.075
						(0.277)	(0.304)	(0.306)
Leverage							-0.596	
							(0.606)	
Short-term Debt								-0.759
								(0.724)
Long-term Debt								-0.393
								(0.780)
Constant	-0.040	2.072	2.203	2.264	1.802	1.703	2.067	2.142
	(0.539)	(1.420)	(1.458)	(1.476)	(1.491)	(1.645)	(1.737)	(1.755)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	105	105	105	105	105	105	97	97
R^2	0.058	0.084	0.086	0.087	0.113	0.113	0.118	0.120
Adjusted R^2	-0.065	-0.047	-0.056	-0.067	-0.048	-0.060	-0.072	-0.083

Appendix 11. Low M/B During COVID-19

	CAR							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Family Firm	0.394**	0.393**	0.368**	0.368**	0.378**	0.457***	0.514***	0.508***
	(0.161)	(0.162)	(0.161)	(0.159)	(0.162)	(0.158)	(0.160)	(0.160)
ln(Assets)		0.005	0.001	-0.016	-0.015	-0.022	0.002	0.003
		(0.038)	(0.038)	(0.039)	(0.039)	(0.037)	(0.038)	(0.038)
ROA			0.412*	0.415*	0.398*	0.368*	0.021	-0.154
			(0.222)	(0.220)	(0.226)	(0.217)	(0.232)	(0.271)
Cash/TA				-1.124	-1.115	-1.090	-0.852	-0.444
				(0.692)	(0.695)	(0.667)	(0.699)	(0.771)
M/B					0.116	0.039	-0.154	-0.130
					(0.322)	(0.310)	(0.314)	(0.313)
ln(Age)						0.357***	0.150	0.107
						(0.120)	(0.138)	(0.141)
Leverage							-0.888***	
							(0.279)	
Short-term Debt								-1.091***
								(0.322)
Long-term Debt								-0.621*
								(0.351)
Constant	0.435	0.314	0.371	0.926	0.852	-0.018	0.882	0.918
	(0.287)	(0.897)	(0.886)	(0.942)	(0.969)	(0.974)	(1.021)	(1.018)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	106	106	106	106	106	106	96	96
R^2	0.195	0.195	0.224	0.246	0.247	0.315	0.416	0.427
Adjusted R^2	0.101	0.091	0.115	0.130	0.122	0.192	0.297	0.302

Appendix 12. High Cash During COVID-19

	CAR							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Family Firm	0.359	0.362	0.367	0.400	0.457*	0.579**	0.656***	0.655***
	(0.243)	(0.240)	(0.242)	(0.245)	(0.240)	(0.233)	(0.245)	(0.246)
ln(Assets)		-0.091*	-0.092*	-0.099*	-0.064	-0.078	-0.064	-0.065
		(0.053)	(0.054)	(0.055)	(0.055)	(0.053)	(0.054)	(0.055)
ROA			0.058	-0.033	-0.038	-0.187	-0.305	-0.318
			(0.242)	(0.260)	(0.253)	(0.247)	(0.260)	(0.273)
Cash/TA				-0.576	-0.899	-1.017*	-1.246**	-1.242*
				(0.601)	(0.608)	(0.584)	(0.626)	(0.630)
M/B					0.061**	0.046*	0.039	0.039
					(0.027)	(0.026)	(0.027)	(0.027)
ln(Age)						0.573***	0.433**	0.429**
						(0.192)	(0.208)	(0.211)
Leverage							-0.693*	
							(0.350)	
Short-term Debt								-0.720*
								(0.388)
Long-term Debt								-0.630
								(0.518)
Constant	0.822	2.720**	2.757**	3.066**	2.365*	1.045	1.792	1.832
	(0.553)	(1.248)	(1.264)	(1.305)	(1.295)	(1.317)	(1.396)	(1.424)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	106	106	106	106	105	105	99	99
R^2	0.285	0.306	0.307	0.314	0.274	0.341	0.366	0.366
Adjusted R^2	0.201	0.217	0.209	0.208	0.152	0.221	0.242	0.233

Appendix 13. Low Cash During COVID-19

	CAR							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Family Firm	0.154	0.149	0.069	0.064	0.080	0.075	0.198	0.220*
	(0.133)	(0.133)	(0.120)	(0.121)	(0.123)	(0.127)	(0.128)	(0.123)
ln(Assets)		0.037	0.009	0.009	0.014	0.014	0.053	0.056*
		(0.034)	(0.030)	(0.031)	(0.031)	(0.032)	(0.033)	(0.032)
ROA			1.388***	1.393***	1.388***	1.388***	1.262***	0.967***
			(0.278)	(0.279)	(0.280)	(0.281)	(0.298)	(0.308)
Cash/TA				0.807	0.876	0.861	-0.093	0.119
				(1.627)	(1.633)	(1.644)	(1.773)	(1.709)
M/B					0.034	0.035	0.031	0.051
					(0.042)	(0.042)	(0.047)	(0.046)
ln(Age)						-0.022	-0.392**	-0.292*
						(0.124)	(0.166)	(0.164)
Leverage							-0.352	
							(0.333)	
Short-term Debt								-1.042**
								(0.413)
Long-term Debt								-0.046
								(0.341)
Constant	0.070	-0.777	-0.185	-0.243	-0.404	-0.346	0.115	-0.260
	(0.245)	(0.804)	(0.726)	(0.738)	(0.766)	(0.836)	(0.865)	(0.845)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	106	106	106	106	106	106	94	94
R^2	0.135	0.147	0.330	0.332	0.337	0.337	0.439	0.487
Adjusted R^2	0.024	0.026	0.227	0.221	0.218	0.209	0.314	0.364

Appendix 14. FF3 Before COVID-19

	CAR						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Family Firm	-0.159	-0.206	-0.198	-0.170	-0.140	-0.354	-0.363
	(0.262)	(0.262)	(0.262)	(0.261)	(0.268)	(0.284)	(0.288)
ln(Assets)		0.107*	0.078	0.050	0.048	0.065	0.068
		(0.058)	(0.061)	(0.062)	(0.062)	(0.064)	(0.067)
ROA			0.541	0.407	0.389	0.303	0.301
			(0.357)	(0.360)	(0.363)	(0.389)	(0.389)
Cash/TA				-1.312**	-1.331**	-1.088	-1.093
				(0.632)	(0.634)	(0.788)	(0.790)
ln(Age)					0.088	0.224	0.221
					(0.179)	(0.209)	(0.210)
Leverage						-0.019	
						(0.576)	
Short-term Debt							0.050
							(0.663)
Long-term Debt							-0.101
							(0.692)
Constant	-0.119	-2.462*	-1.833	-1.058	-1.283	-2.123	-2.205
	(0.519)	(1.385)	(1.443)	(1.483)	(1.554)	(1.681)	(1.728)
Industry dummy	Yes						
Region dummy	Yes						
Observations	317	316	316	316	316	288	288
R^2	0.051	0.062	0.069	0.082	0.083	0.095	0.095
Adjusted R^2	0.013	0.021	0.025	0.036	0.034	0.038	0.035

Appendix 15. FF3 After COVID-19

	CAR						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Family Firm	-0.159	-0.206	-0.198	-0.170	-0.140	-0.354	-0.363
	(0.262)	(0.262)	(0.262)	(0.261)	(0.268)	(0.284)	(0.288)
ln(Assets)		0.107*	0.078	0.050	0.048	0.065	0.068
		(0.058)	(0.061)	(0.062)	(0.062)	(0.064)	(0.067)
ROA			0.541	0.407	0.389	0.303	0.301
			(0.357)	(0.360)	(0.363)	(0.389)	(0.389)
Cash/TA				-1.312**	-1.331**	-1.088	-1.093
				(0.632)	(0.634)	(0.788)	(0.790)
ln(Age)					0.088	0.224	0.221
					(0.179)	(0.209)	(0.210)
Leverage						-0.019	
						(0.576)	
Short-term Debt							0.050
							(0.663)
Long-term Debt							-0.101
							(0.692)
Constant	-0.119	-2.462*	-1.833	-1.058	-1.283	-2.123	-2.205
	(0.519)	(1.385)	(1.443)	(1.483)	(1.554)	(1.681)	(1.728)
Industry dummy	Yes						
Region dummy	Yes						
Observations	317	316	316	316	316	288	288
R^2	0.051	0.062	0.069	0.082	0.083	0.095	0.095
Adjusted R^2	0.013	0.021	0.025	0.036	0.034	0.038	0.035