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Diversity and IPOs

An empirical analysis of OSE listed firms from 2006-2019

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Abstract

The aim of this master's thesis is to investigate whether top management diversity is associated with short-term firm performance in relation to initial public offerings (IPOs). We use a panel data sample consisting of 113 companies listed on the Oslo Stock Exchange between 2006-2019. For the purpose of our analysis, the chief executive officer (CEO) and the chief financial officer (CFO) represent top management. Diversity is measured by differing attributes between them.

Using regression models, a range of diversity factors, including a total diversity score, and firm and executive controls, we evaluate the extent to which diversity can be associated with firm performance. Our findings suggest that gender-diverse top management teams are correlated with higher returns on equity and assets. Notably, the firms with top management teams which include one NHH alum at the time of listing appear to have a lower share of equity.

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1. Introduction

In September of 2019, former Fed chair and current US Secretary of the Treasury, Janet Yellen, publicly acknowledged a harmful lack of diversity among the top Fed economists (Knutson, 2019). Her statement specifically addressed the shortage of women and individuals with a minority background. Diversity, however, spans an array of further factors. The term, as defined by Merriam-Webster, refers to "the state of having people who are different races or who have different cultures in a group or organization" (Merriam-Webster, 2021). Within organizations, the wider definition of "any attribute that another person may use to detect individual differences" (Williams & O'Reilly, 1998) is commonly applied.

In recent years, focus on diversity has increased in prevalence and magnitude. For instance, the number of multicultural elected parliament representatives in Norway in 2021 has more than doubled since the general election in 2017 (Nordhagen, 2021). Further, in a global context, Goldman Sachs has, as of 2021, exclusively helped clients with a minimum of two diverse[1] board members go public (Goldman Sachs, 2021). The boosted focus on diversity within the initial public offering (IPO) sphere is also reflected in Nasdaq's recently SEC-approved new listing rules, stipulating a comply-or-disclose framework for companies to report on their diversity-status (DeLesDernier, 2021).

While cultures and backgrounds continue to interact in an ever more globalized world, our understanding of how diversity affects not only society in general, but businesses and organizations in particular, adds a meaningful nuance to how we approach this development. The continued research for a better understanding of the effects of diversity is therefore an important topic, and the objective of this paper is to contribute to the growing literature on the association of diversity with firm performance.

Janet Yellen's statement and the policies of Goldman Sachs and Nasdaq are all premised on the assumption that diversity is beneficial. We aim to test diversity's specific association with financial performance in the context of the Norwegian market, by posing the following research question:

[1] Goldman Sachs defines diversity to include people from chronically underrepresented groups due to gender identity, sexual orientation, race, or ethnicity.

Is diversity among top executives associated with short-term financial performance in relation to the IPOs of companies listed on the Oslo Stock Exchange?

We examine this question by investigating firms listed on the Oslo Stock Exchange (OSE) in the period from 2006 to 2019. As follows from the research question, we want to examine whether diverse top management teams are associated with short-term financial performance of newly listed companies. We do this by measuring our chosen diversity factors, age group, degree level, gender, industry, Norwegian School of Economics (NHH) alum[2] and total diversity[3] against our (broadly defined) financial performance measures. The four measures of financial performance are the accounting-based metrics return on equity (ROE), return on assets (ROA) and equity-to-assets ratio (ETA), as well as one-year returns. In the context of this thesis, top management is represented by the CEO and CFO, and diversity defined to be differing characteristics between them.

The results from our empirical analysis show that gender diversity may be associated with a higher ROE and ROA. We also find that degree level diversity may be negatively associated with financial performance. Interestingly, diversity in terms of either CEO or CFO being an NHH-alum shows a negative association with ETA. The total diversity factor is however associated with a higher ETA. Our findings on gender diversity are in line with previous research for instance from Krishnan and Parsons (2008). Their study demonstrates how top management teams with higher degrees of gender diversity are associated with higher returns for Fortune 500 companies. The positive association between gender diversity and financial performance also corresponds with the study "The effect of the board diversity on firm performance" (EmadEldeen, Elbayoumi, Basuony, & Mohamed, 2021).

Our thesis supplements existing literature by exploring diversity effects in executive management on newly listed companies in a market where this topic has not previously been studied. Furthermore, broad metrics for financial performance are utilized to capture potential associations. The chosen diversity factors align with a number of those used in previous studies, including by EmadEldeen et al. (2021), who bases their analysis on the diversifying factors

[2] Diversity in terms of either the CEO or CFO being an NHH-alum.
[3] Total diversity is measured on a scale of 0-5 and is a compound score where all binary characteristic variables, less NHH-alum, are added together. See section 3.2.2 for further details.

age, gender, education, and nationality. To the best of our knowledge, the thesis contributes by expanding the range of these factors and hopefully inspiring further research into the area.

The remainder of the thesis is structured in the following manner. After the introduction, chapter 2 provides a review of the relevant literature for our analysis. We continue in chapter 3 by presenting the data set and the sample selection process, including the identification of the variables of interest. In chapter 4 we elaborate on the methodology applied as well as a presentation of the regression models. The results of our empirical analysis are presented in chapter 5. Finally, in chapter 6, we present our overall conclusion.

2. Literature review

The literature review aims to provide insight into existing theories and previous empirical findings relating to diversity and a range of performance measures. We conduct a summary of relevant existing research on top management diversity, CEO and CFO interaction and select financial metrics, with concluding remarks regarding how these prior studies relate to our empirical findings.

2.1 Top management diversity

For an extended period of time, empirical studies have strived to determine the effect of diversity on firm performance. Particular attention has been paid to gender as the diversifying factor (see i.e., Erhardt, Werbel, & Shrader (2003), Smith, Smith, & Verner (2006), Iren (2016)). The results are mixed. Multiple papers display findings in support of gender diversity being positively linked with financial performance (EmadEldeen et al. (2021), Dezsö & Ross (2012)). Positive links are not exclusive, and Adams and Ferreira (2009) find that mandating gender quotas for directors can reduce firm value for well-governed firms. Simultaneously, Iren (2016) finds no effect from gender diversity at board-level on financial results, and Homberg and Bui (2013) likewise for diversity in the top management team. Our findings support the existence of a positive association with certain performance measures, weakening the case for a negative effect or no effect.

Where a positive effect is suggested, various benefits from diversity are identified. Among the suggested benefits are strengthened team breadth of cognitive competences and perspectives, as well as boosted problem-solving skills (Bantel & Jackson, 1989). Per the definition by Williams and O'Reilly (1998), variations across all executive attributes can be conducive to increasing diversity within the top management group. This is of interest as generally diverse boards are found to be positively associated with financial performance (EmadEldeen, Elbayoumi, Basuony, & Mohamed, 2021), and our thesis explores whether a similar association exists at top management-level.

That managerial background characteristics may affect firm performance is in accordance with the Upper Echelons-theory by Hambrick and Mason (1984). The theory emphasizes how senior executives have decision-making autonomy on the behalf of companies, thus allowing them to have significant impact on company results (Hambrick, Cannella, & Finkelstein, 2008). Robert Strand (2011) finds that the chief executive officer and chief financial officer are commonly regarded to be the two highest ranking executives in the organizational hierarchy. Although top management is frequently defined differently across studies, the findings by Strand and others serve as a basis for the scope of our further analysis.

2.2 CEO and CFO interaction

There appears to be agreement among academics that top management has an impact on firm performance. Peter F. Drucker (1951), Collins & Clark (2003) and Bertrand & Schoar (2003) are only a selection of researchers arguing the importance of top management for firm financials. In accordance with Strand (2011), we have chosen to utilize CEO and CFO to represent the top management team in our study.

Buyl et al. (2010) studies top management teams' functional diversity in relation to firm performance. Their paper investigates the role of the CEO related to three characteristics: background, status, and shared experience with other top management members. The results of the analysis revealed CEO characteristics and top management team to be mutually affected, an interaction that extends to the attributes of the CEO and the CFO being connected. Another paper finds that the CEOs have more influence on firm performance than CFOs (Six, Normann, Stock, & Schiereck, 2013). However, CFOs have greater influence on funding policies (Six, Normann, Stock, & Schiereck, 2013).

The implications of CFOs as strategic partners of CEOs, as well as how the strategic connection could affect a company's financial performance, was investigated by Han, Zhang, and Han (2015). In the paper, the researchers claim that the CFOs value-creating actions have a positive impact on ROA. Indications from our results that ROE, ROA, and ETA could be related to diversity factors within the top management team, substantiates the possibility of an association between individual executives and firm performance existing. Further, results from the study show that similarities in the educational level and tenure (in the firm) of the CEO and CFO

have an indirect positive effect on the firm's financial performance. Our findings suggest that degree level diversity is associated with negative returns on equity and assets. Followingly, the study by Han et al. (2015) to some extent reflects our findings.

2.3 Financial metrics

Welbourne et al. (2007) find that diverse top management teams are positively associated with short-term performance. Our short-term accounting performance indicators include return on equity (ROE) and return on assets (ROA), and there are both positive and negative elements concerning the two. ROE is found to be inferior to economic value added (EVA) in a study by Wet and Toit (2007), however the same study found the linear relationship for all performance measures with shareholder return to be weak. Yee (2007) implies that ROA may provide earnings information, although it fails to deal with earnings capabilities (Jackson, 1996). Still, Harvard Business Review counts both ratios to be financial performance metrics that managers should monitor (Stobiersky, 2020).

Expanding on the metrics, Shergill & Sarkaria (1999) add industry type with firm characteristics to determine possible influences on firm financial performance. Contrarily, Hartmann & Scheifer (2009) show that firm characteristics outperform industry variables by decomposing ROA into year, country, industry, and firm effects. Combined with further studies, the two render inconclusive results as to which elements outside firm characteristics may affect company financials.

The literature in sum does not conclude either way regarding whether the different financial performance measures are well- or ill-suited on general terms. For the purpose of our study the main goal is finding metrics that can be compared between the firms in the sample. By controlling for relevant variables, the identified challenges can in some part be managed. The accounting backed metrics also have the benefit that their components are publicly available information, which for this thesis was important for the data quality.

3. Data and descriptive statistics

The following chapter presents the data that has been applied in the thesis. This chapter is comprised by three parts. First, we present the data set, how it has been sourced, and the background for why this particular data was chosen. Second, we give a thorough explanation of the individual variables. Last, we present relevant descriptive statistics.

3.1 Data

Our data set contains both firm-level and executive-level data observations. The firm-level data was collected through the Institute for Research in Economics and Business Administration (SNF). The executive-level data was collected manually using multiple sources, including annual reports, Brønnøysundregisteret (hereafter Brreg), company filings, ATEKST and LinkedIn. Data on the executive-level consists of characteristics of the top executives at the time of the IPO.

As previously mentioned, the firm-level data was extracted from the SNF database. The database contains daily and monthly stock prices for companies listed in Norway from 1995 to 2020 and accounting figures related to the shares listed from 1980-2011. The data set we received from SNF was an unbalanced panel (incomplete) with 1 408 502 observations. To rid the data set of any blanks, we manually collected these data points. This process entailed collecting annual reports for each firm in the year after listing. The following variables were retrieved: *total equity*, *total assets*, and *net income*. The aforementioned variables were necessary for computing return on assets (ROA), return on equity (ROE) and equity-to-assets ratio (ETA), all used as metrics for financial performance. We further calculated the one-year return using the adjusted daily stock prices. ETA and one-year return are both part of the wider financial performance definition adopted for this thesis. An overview of the firm-level variables can be found in the appendix (table A.1).

The executive-level data is a result of manual data collection from a variety of reliable sources. Combining information provided by the companies at the time of the IPO with other publicly available details has allowed for cross-referencing, ensuring quality and accuracy. The

collected executive-level characteristics include; *birth year, date appointed in firm, date appointed in role, education level, school,* and *previous industry.*

For the identification of executive position-holders at the time of IPO, material and statements issued by the companies themselves or by Oslo Stock Exchange (OSE) were preferred when available. Company annual reports from the year in question, as well as the previous year, were compared to check for prospective management alterations. Should an annual report from the year prior to IPO not prove available, ATEKST was utilized to identify the executive. Most annual reports provided a brief introduction of their executives, with some information on their backgrounds. Where not the case, LinkedIn was explored for matching profiles. These profiles further facilitated the collection of information regarding education, industry experience and tenure. They also acted as a control to be used against other public information. Gender information was compiled by making an assumption after a binary gender-definition, based on name, pictures, and utilized pronouns from article-, report- and company statement mentions. Birth year, in the event it was not provided in other statements or reports, has been collected from Proff Forvalt and checked against Brreg and age references in articles from ATEKST. In this way, it was possible to minimize the risk of wrongful or incomplete executive profiles in the data set. Where the desired reports, and information therein, were accessible, ATEKST was still used afterwards to cross-check information. An overview of the variables collected can be found in the appendix (table A.2).

It is important to note that assumptions have been made regarding gender, based on name, pictures, and textually utilized pronouns. For the purpose of this report, we rely on a binary conception of gender. The scope of this diversity factor is therefore inherently limited, to the extent that it ignores the nuances of gender identity.

The result of the data compilation was a balanced panel data set containing 113 firms listed on the Oslo Stock Exchange (OSE) in the period of 2006-2019. The process of selecting the sample is presented in table A.3 in the appendix, where the final row depicts the values used in the model.

First, we extracted all 1 408 502 observations from the SNF database on existing firms for the period from 1995-2020. Thereafter, we removed firms not listed on the Oslo Stock Exchange between these dates. From the data now left accounting and financial information for the first year after initial listing date was filtered out, so as to eliminate surplus information. The data

that was taken out now consisted of the companies listed between 1995-2020, with their relevant corresponding financial data. Next, we removed the firms listed between 1995 and 2005, due to missing executive-level data. From the firms listed after 2006, we now cleared the data set for companies with other legal forms than SPA and ASA. The following two steps saw us removing share issues, then removing firms that had active operations for less than a full year after listing. After this, the firms listed in 2020 were also removed, on the grounds of lacking future financial data to one-year returns. This process left us our final data set, consisting of 113 firms.

A variety of reasons led to the choice of our sample data. Foremost, availability was an essential factor. Awareness regarding what could be retrieved from the SNF-database further motivated the choice in this respect. Equally, time-restrictions amplified the benefits of being able to use information publishing systems known to us.

3.2 Variables

This section contains an explanation of our chosen variables, a discussion as to their relevance and our argumentation for why these specific variables have been selected. The dependent variables are presented first, before moving on to the independent variables and lastly our control variables.

3.2.1 Firm performance

Our dependent variables are compiled at firm-level. We utilize one-year returns, return on assets (ROA), return on equity (ROE) and equity-to-assets (ETA).

One-year returns are derived from SNF-data. This performance measure is calculated by dividing the adjusted opening price on the listing date (*AdjOpen*), or first available trading date, by the adjusted closing price on the corresponding date the year after (*OneYearAdjLast*) and subtracting 1. For the companies that had no registries of trades exactly one year after (could be weekends, holidays etc.), the data was manually collected by retrieving the first registered trade day after the one-year mark. This quotient can be expressed as a percentage or a ratio and

gives us insight into the share price development over the first year of trading publicly. Positive one-year returns entail a share price increase since listing, and a negative one-year return correspondingly evidences a decrease in share price.

Equity-to-assets (ETA) is calculated by dividing firm equity by total assets. The higher this fraction is, the higher the proportion of the company and its assets is owned by the firm itself and its investors. As a performance measure, the ratio provides an indication about the status of the balance sheet. A high ETA may imply that a company is more financially stable in the long run, but a lower ETA does not necessitate poor financial stability. Certain industries have a higher average share of debt financing. As equity financing is often more expensive, having a certain share of debt financing can be beneficial. In this paper, we have used the average ETA from the listing year and exactly one year after.

We calculate the return on assets from information mostly available within the SNF data, by dividing the company's profit(/loss) of the first post-listing fiscal year by the given year-end total assets, combining the balance sheet and the income statement. For companies listed before 2011, the data was obtained from company annual report filings. ROA is an expression of development in the firm's profitability relative to its assets, usually presented in ratio or percentage form. A higher ROA implies a more efficient use of assets, while a lower ROA suggests a utilization of assets less optimized for returning profits. The ratio usually depends strongly on which industry the firm operates in (Mason, 1939). As characteristics and capitalization within industries tend to be similar and comparing ROA across industries can therefore be problematic (Montgomery & Porter, 1991). However, by implicitly considering debt, the return on assets is left less dependent on leverage than the return on equity.

ROE is in much the same manner as ROA calculated from SNF data, supplemented by annual reports. To determine the return on equity, we divide the company's profit(/loss) by the company's equity. Also like the return on assets, ROE as a profitability measure combines the income statement and balance sheet. Return on equity can provide insight into the financial structure of the company, as it is driven by the ROA and the leverage of the firm. The ROE also denotes the company's ability to generate results from the capital invested by its shareholders, and higher return on equity implies efficiency in a company's ability to allocate capital where it produces the highest profits. In cases of depreciation, long project life, rapid growth, capitalization policies and lagging returns, the ROE may fail to provide a rightful

picture of the financial situation. Varying accounting principles, such as NGAAP, IFRS and variations within these, may also contribute to less comparability across firms.

Despite their disadvantages, both ROA and ROE are widely adopted accounting backed measures and based on the best available data (Hirschey & Wichern, 1984). Together with stock returns, in this paper one-year returns, they are among the six most used organizational performance measures (Crook, Combs, & Shook, 2005). One-year returns are commonly utilized within IPO-research (Ritter & Welch, 2002). Examining this allows us to compare a number that synthesizes factors such as investor expectations, firm size, media coverage of the IPO's and more into one single measure.

Collectively, we believe our four dependent variables provide a broad ranging proxy of the short-term financial performance and health among the firms. In sum, they serve as a solid basis on which potential association with diversity can be studied.

3.2.2 Diversity

We have sampled independent variables at an executive level. After establishing how encompassing the scope of elements that can represent diversity (Williams & O'Reilly, 1998), we decided on six variables representing characteristics of the CEOs and CFOs for our analysis. These are *gender*, *age group*, *industry*, *degree level*, *NHH* and *total diversity.* After collecting this information on an individual level for the CEO and CFO, the elements are combined into a binary variable for use in the regression.

Gender, *age group*, *industry* and *degree level* for the CEO and CFO are combined to yield 0 if alike, and 1 if they are different.

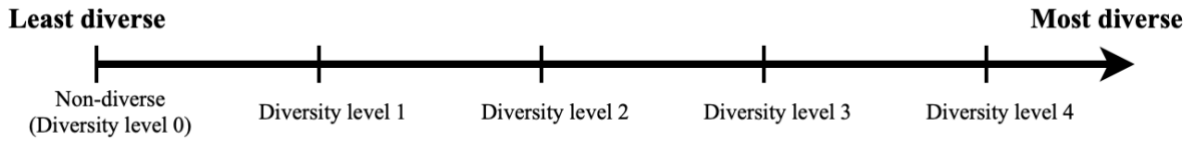
0 = Not diversifying character variable

1 = Diversifying character variable

The Norwegian School of Economics (*NHH)* variable was constructed during the process of collecting data, after having seen that a couple of schools seemed prominently more featured. The variable was therefore included so we could examine how many of the IPOs had a CEO or CFO from the particular school. This binary variable shows 1 when one of the two executives have NHH as their alma mater, and 0 otherwise. While we treat NHH as a diversity factor, we recognize that the sample itself may not conform to traditional forms of diversity through I.e., gender and ethnicity.

Lastly, we decided that it would be valuable for the analysis to be able to explore diversity not only within the single characteristics, but across a combination. The final independent variable is constructed as a diversity level between 0-4 (*Diversity level 1, Diversity level 2,* etc.), adding the previously explained binary scores together for each of the first four variables, excluding the diversity factor NHH. A company on diversity level 1 is diverse by one of the measured characteristics, while a company on diversity level 4 is diverse by all characteristics. Diversity level 0 contains firms that are non-diverse.

Figure 3.1: Total diversity variable



This selection of character-based independent variables made it possible to examine whether, and if so how, diversity and firm performance are associated.

3.2.3 Executive and firm characteristics

To correct for other factors than diversity that could affect firm financial performance, we added control variables at both executive- and firm-level for each regression. While the firm-level controls were kept equal throughout all regressions except total diversity, executive-level controls were altered for all six regressions. This was a natural consequence of the regressions being set up to examine diversity through management characteristics, meaning the characteristic under examination had to be removed from the controls.

The firm-level controls include *CompanyAge*, *CompanyIndustry*, *Active* and *ListingYear*.

CompanyAge denotes the number of years from the company was founded until the year it went public on the Oslo Stock Exchange. There is extensive, albeit inconclusive, literature regarding what, if any, impact age has on financial performance. Some research suggests that company age is arbitrary concept without impact (Ouimet & Zarutskie, 2014), but it is still widely recognized that growth rates tend to decline as companies age (Hosono, Takizawa, & Yamanouchi, 2020). A negative relationship with other performance measures is also suggested. Although previous studies have been inconclusive, the possibility of there being a correlation with performance measures led us to include company age as a control.

CompanyIndustry corrects for correlation between the industry the company operates in and its financial performance. Our performance measures include ROE, ROA, one-year return as well as ETA. A considerable consensus that a company's industry of operation affects firm financial structure, mirrored in studies by scholars like Mason (1939), Montgomery & Porter (1991) and MacKay & Phillips (2005), left this control non-excludable.

Active shows whether the company is still listed on the OSE. While there may be a range of reasons for this, such as bankruptcies, mergers, or strategic delistings, we do not discount that there may be common identifiers that correlate with the firm outcomes.

ListingYear simply denotes the year in which the firms were listed, to control for correlation of performance and market conditions at the time of going public. This also allows us to compare the firms on an adjusted basis.

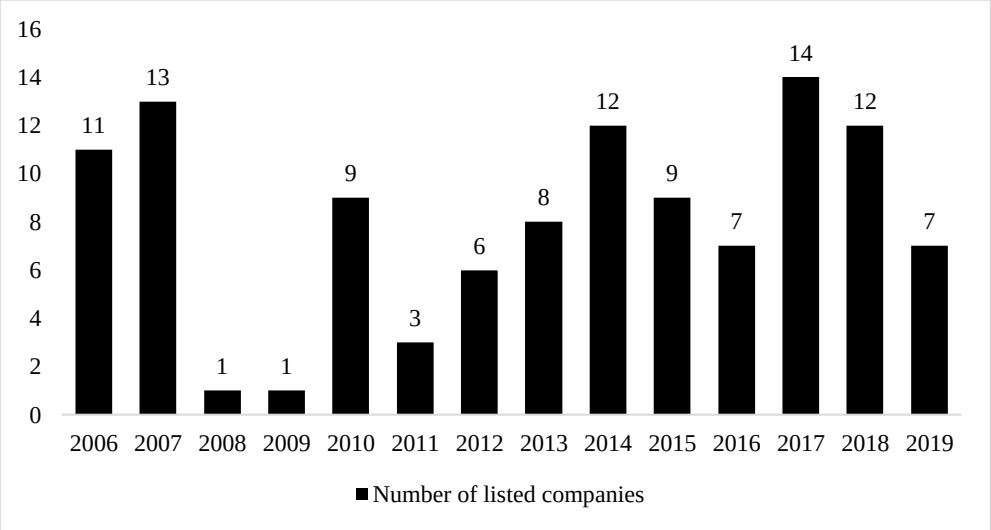
3.3 Descriptive statistics

Here, we present the descriptive statistics related to our data set. First, we look at the characteristics related to the sample. Second, we look at the descriptive statistics for the dependent and independent variables.

3.3.1 Sample characteristics

The number of companies listed each year between the period 2006-2019 can be found in figure 3.2. The distribution of IPOs within our time frame is quite volatile. The graph beneath clearly visualizes the financial crisis of 2008 and its aftermath in 2009, with only one company listed in each of these respective years. Further we see than in the given period on OSE, the year 2017 had the most IPOs.

Figure 3.2: Companies by listing year



The 113 firms in the sample are classified by 9 industries collected from the SNF database. The SNF database has retrieved the Global Industry Classification Standard (GICS) to organize the industries. GICS is a common global classification standard and reflects the current state of industries in the global investment markets (MSCI Inc., 2021). The hierarchical pyramid created by GICS offers 4 levels. In our analysis we chose to retrieve the broadest level, level 1, or sectors. The table below visualizes how the firms are distributed between the 9 industries.

The three largest industries in the sample are Energy, Industrials, and Information Technology. The smallest industry is utilities with mere 2 observations.

Table 3.1: Observation count per industry

Industry	**Frequency**	**Percentage of total**
Consumer Discretionary	6	5.31%
Consumer staples	8	7.08%
Energy	32	28.32%
Financials	16	14.16%
Health Care	8	7.08%
Industrials	21	18.58%
Information Technology	17	15.04%
Materials	3	2.65%
Utilities	2	1.77%
Total	113	100%

The summary statistics for the dependent variables are presented in the table below (table 3.2). The mean of the one-year return is given as a ratio and comes out at -3%. Mean values of ETA, ROE and ROA are also given as ratios, with a mean ETA of 52%, a mean ROE of -5% and a mean ROA of -3%.

Table 3.2: Summary statistics for dependent variables

	n	**Mean**	**SD**	**Min.**	**Max.**
One-year return	113	-0.03	0.46	-0.83	2.34
ETA	113	0.52	0.29	0	2.04
ROE	113	-0.05	0.47	-4.05	0.45
ROA	113	-0.03	0.22	-1.57	0.32

3.3.2 Dependent variables

In tables 3.3 to 3.8, we split the financial performance measures (or dependent variables) by our 6 key diversity variables. We observe that the mean tends toward the negative, hovering around zero, for all measures except ETA. For ETA it moves oppositely, ending around 0.5 both for diverse and non-diverse firms.

Table 3.3 visualizes the summary statistics for age group diversity. We see that the majority of sample firms are age-group diverse (77 diverse and 36 non-diverse). The statistic measures move similarly for all metrics except ETA.

Table 3.3: Summary statistics for dependent variables with diversity factor age group

		N	***Mean***	***SD***	***Min.***	***Max.***
One-year return	*Diverse*	77	-0.03	0.42	-0.82	1.18
	Non-diverse	36	-0.03	0.53	-0.72	2.34
ROE	*Diverse*	77	-0.05	0.53	-4.05	0.45
	Non-diverse	36	-0.03	0.30	-0.90	0.34
ROA	*Diverse*	77	-0.02	0.23	-1.57	0.32
	Non-diverse	36	-0.05	0.22	-0.81	0.27
ETA	*Diverse*	77	0.52	0.31	0.00	2.04
	Non-diverse	36	0.53	0.23	0.08	1.00

Table 3.4 visualizes the summary statistics for gender diversity. A compelling majority of the sample are non-diverse. Specifically, only 15 out of the 113 firms have a CEO and a CFO of opposite sexes.

Table 3.4: Summary statistics for dependent variables with diversity factor gender.

		N	***Mean***	***SD***	***Min.***	***Max.***
One-year return	*Diverse*	15	0.02	0.27	-0.52	0.37
	Non-diverse	98	-0.04	0.48	-0.82	2.34
ROE	*Diverse*	15	0.10	0.18	-0.25	0.42
	Non-diverse	98	-0.07	0.50	-4.05	0.45
ROA	*Diverse*	15	0.03	0.08	-0.23	0.14
	Non-diverse	98	-0.04	0.24	-1.57	0.32
ETA	*Diverse*	15	0.44	0.28	0	1
	Non-diverse	98	0.53	0.29	0.05	2.04

Table 3.5 visualizes the summary statistics for degree level diversity. The distribution between diverse and non-diverse firms is slightly more even than for gender diversity, although non-diverse firms still make up most of the sample (73 non-diverse against 40 diverse).

Table 3.5: Summary statistics for dependent variables with diversity factor degree level

		N	***Mean***	***SD***	***Min.***	***Max.***
One-year return	*Diverse*	40	-0.15	0.41	-0.82	0.57
	Non-diverse	73	0.04	0.47	-0.71	2.34
ROE	*Diverse*	40	-0.20	0.71	-4.05	0.36
	Non-diverse	73	0.04	0.22	-0.83	0.45
ROA	*Diverse*	40	-0.10	0.32	-1.57	0.27
	Non-diverse	73	0.01	0.13	-0.61	0.32
ETA	*Diverse*	40	0.64	0.36	0.05	2.04
	Non-diverse	73	0.46	0.22	0.00	1.00

Table 3.6 visualizes the summary statistics for the diversity factor industry. There is a near even split between firms where CEO and CFO have worked in different industries prior to their current workplace. 61 of the observed companies are diverse and 52 of the companies have executives with backgrounds from the same industries.

Table 3.6: Summary statistics for dependent variables with diversity factor industry

		N	***Mean***	***SD***	***Min.***	***Max.***
One-year return	*Diverse*	61	-0.04	0.40	-0.82	1.01
	Non-diverse	52	-0.03	0.52	-0.71	2.34
ROE	*Diverse*	61	-0.01	0.31	-1.42	0.42
	Non-diverse	52	-0.09	0.61	-4.05	0.45
ROA	*Diverse*	61	-0.04	0.27	-1.57	0.27
	Non-diverse	52	-0.03	0.16	-0.61	0.32
ETA	*Diverse*	61	0.54	0.30	0.08	2.04
	Non-diverse	52	0.50	0.27	0.00	1.00

Table 3.7 visualizes the summary statistics for the diversity factor NHH. 41 companies are diverse after this measure, having one NHH-alum between the CEO and CFO, while 72 are non-diverse. It is important to note that the non-diverse companies may also have both CFO and CEO with background from the Norwegian School of Economics.

Table 3.7: Summary statistics for dependent variables with diversity factor NHH

		N	***Mean***	***SD***	***Min.***	***Max.***
One-year return	*Diverse*	41	0.01	0.51	-0.71	2.34
	Non-diverse	72	-0.05	0.42	-0.82	1.18
ROE	*Diverse*	41	-0.12	0.71	-4.05	0.44
	Non-diverse	72	0.00	0.24	-0.90	0.45
ROA	*Diverse*	41	-0.05	0.30	-1.57	0.27
	Non-diverse	72	-0.02	0.17	-0.81	0.32
ETA	*Diverse*	41	0.46	0.26	0.05	0.93
	Non-diverse	72	0.56	0.30	0.00	2.04

Table 3.8 visualizes the summary statistics for the diversity factor total diversity. The table shows the distribution of observations across diversity levels, with most firms at diversity level 2, meaning they are diverse on two of the diversity measures (non-specified). Diversity level 1 and 3 follow with 32 and 21 observations, respectively. There are 2 observations at level 4 and the non-diverse level has 13 observations.

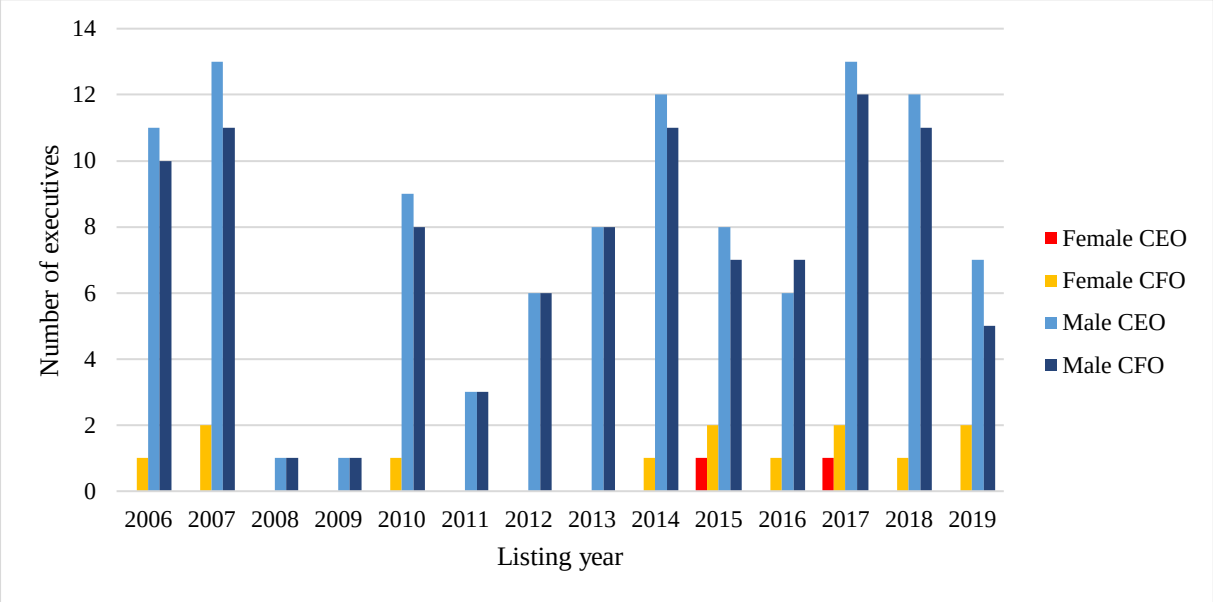
Table 3.8: Summary statistics for dependent variables with diversity factor total diversity

		N	*Mean*	*SD*	*Min.*	*Max.*
One-year return	*Non-diverse*	13	-0.02	0.78	-0.71	2.34
	Diversity level 1	32	0.06	0.37	-0.5	1.18
	Diversity level 2	45	-0.05	0.42	-0.72	1.01
	Diversity level 3	21	-0.15	0.40	-0.82	0.57
	Diversity level 4	2	0.25	0.05	0.21	0.28
ROE	*Non-diverse*	13	-0.09	0.35	-0.83	0.23
	Diversity level 1	32	0.06	0.17	-0.55	0.45
	Diversity level 2	45	-0.11	0.64	-4.05	0.34
	Diversity level 3	21	-0.06	0.42	-1.42	0.42
	Diversity level 4	2	0.04	0.07	-0.01	0.09
ROA	*Non-diverse*	13	-0.08	0.22	-0.61	0.12
	Diversity level 1	32	0.01	0.12	-0.49	0.32
	Diversity level 2	45	-0.2	0.17	-0.81	0.27
	Diversity level 3	21	-0.10	0.39	-1.57	0.24
	Diversity level 4	2	0.02	0.02	0.01	0.04
ETA	*Non-diverse*	13	0.54	0.21	0.19	1.00
	Diversity level 1	32	0.46	0.20	0.08	0.93
	Diversity level 2	45	0.50	0.30	0.00	0.97
	Diversity level 3	21	0.65	0.40	0.24	2.04
	Diversity level 4	2	0.46	0.12	0.38	0.55

3.3.3 Independent variables

In this section, we describe the independent variables used in the analysis. The figure below (figure 3.3) portrays the proportion of female and male executives by listing year. We observe a trend towards the right, in which more females are coming into executive positions. However, in comparison to the male proportion, female executives account for a very low share of total executives, a mere 7.1%.

Figure 3.3: Proportion of female and male executives by year



The education degree levels are presented below (table 3.9), split between the respective executives. The CEOs in the sample have a larger tendency to have no higher education than CFOs. Master's degrees are the most common for both executives with 65.49% of CEOs and 83.19% of CFOs having this level of education.

Table 3.9: Observation count per degree level by executive

Executive	Degree	Frequency	Percentage
CEO	*No education*	8	7.08%
	Bachelor	21	18.58%
	Master	74	65.49%
	PhD	10	8.85%
	Total	113	100%
CFO	*No education*	2	1.77%
	Bachelor	16	14.16%
	Master	94	83.19%
	PhD	1	0.88%
	Total	113	100%

Table 3.10 shows the observation count of the top 3 schools for each executive. The same three schools are represented for both executives: NHH, BI Norwegian Business School (BI) and

Norwegian University of Science and Technology (NTNU). These three schools account for 40% of all CEOs and 60% of all CFOs. Almost 40% of all CFOs are graduates from NHH. This observation was key in the reasoning behind the diversity factor NHH.

Table 3.10: Observation count of top 3 schools by executive

Executive	School	Frequency	Percentage
CEO	*NHH*	22	19,47%
	BI	12	10,62%
	NTNU	12	10,62%
	Total	46	40,71%
CFO	*NHH*	43	38,05%
	BI	20	17,70%
	NTNU	5	4,42%
	Total	68	60,18%

The table below (table 3.11) divides the executives by their respective age groups. The age groups were created by grouping the executives by birth year using the following classifications:

Millennials	1981 – 1996
Gen X	1965 - 1980
Boomers 2	1955 - 1964
Boomers 1	1946 – 1954
Post War	1928 – 1945

There is a tendency towards younger CFOs and older CEOs. The largest age group for CEOs is Boomers 2, whilst the largest for CFOs is Gen X.

Table 3.11: Observation count per age group, after generation, by executive

Executive	Degree	Frequency	Percentage
CEO	*Millennials*	2	1.77%
	Gen X	43	38.05%
	Boomers 2	55	48.67%
	Boomers 1	12	10.62%
	Post War	1	0.88%
	Total	113	100%
CFO	*Millennials*	8	7.08%
	Gen X	71	62.83%
	Boomers 2	30	26.55%
	Boomers 1	4	3.54%
	Post War	0	0%
	Total	113	100%

4. Methodology

In this chapter, we present the methodological approach applied in our analysis to investigate the association between different diversity factors and firm performance. The first part of the chapter presents the theoretical framework, whereas the second part elaborates on the development of the regression models.

4.1 Theoretical framework

The data set we have created is a panel data set. Panel data consists of observations on multiple firms, where each entity is observed at two or more points in time (Yuferova, Lecture 8, 2021). Our data set contains all companies listed between 2006-2019 on OSE, with recorded returns until the first year. There are two common methods connected to panel data analysis: pooled ordinary least squares (OLS) and fixed effects. The pooled ordinary least squares (OLS) model pools together observations, with no assumption on individual differences and estimates a regression line (Yuferova, Lecture 8, 2021). Followingly, the model does not recognize the panel data structure and fails to consider effects such as time or entity and produces consistent parameter estimates. If, on the other hand, the regression contains individual effects, the pooled OLS becomes subject to serial correlation, and in turn will generate biased estimates. The most common type of bias in a panel data set is omitted variable bias (Yuferova, Lecture 5, 2021). Omitted variable bias is when the regressor is correlated with a variable that has been omitted from the analysis and that determines in part, the dependent variable (y) (Yuferova, Lecture 5, 2021). When this happens the error term is correlated with our independent variable (x), and this causes biased coefficients. In our case, failure to account for all relevant factors when evaluating the association between firm performance and diversity might result in systematic bias in estimating disparities owning to omitted variable bias. If the observed explanatory variables' impact on firm performance is constant over time, we can correct for this bias and use fixed effects to consistently estimate their effect.

In the fixed effects model, the individual-specific effect is a random variable that is allowed to be correlated with the explanatory variables. The motivation for using fixed effects on our data set is to allow for unobserved firm specific effects (Woolridge, 2012). Each entity has its unique

traits that may or may not have an impact on the predictor variables. When using the fixed effect model, we assume that anything within the unique traits may influence or bias the predictor or outcome variables that we need to adjust for. The assumption of a correlation between the entity's error term and predictor factors is based on this logic. The model eliminates the effect of time-invariant traits, allowing us to examine the predictors' net effect on the outcome variables. One of the model's key assumptions is that time-invariant qualities are unique to each entity and should not relate to other entity specific attributes. Because each entity is unique, the entity's error term and constant (which captures individual attributes) should not be connected. If the error terms are associated, on the other hand, the fixed effects model should not be applied, as inferences may be skewed.

4.2 Regression models

In the following section, we elaborate on the regression models used in the empirical analysis. We will first explain the core structure of the models, then explain the development of the regressions applied in the analysis.

4.2.1 Structure of the regression models

The core structure of the regression model is assembled by using the pooled OLS model. The model can be written as follows:

$$(1) \qquad y_i = \beta_0 + \beta_1 DIV_i + \beta_k x_{i,k} + \alpha_i + u_i$$

The variable i represents the 113 firms.

y_i represents one of the following five financial performance metrics:

i. One-year return
ii. Equity-to-assets ratio (ETA)
iii. Return on assets (ROA)
iv. Return on equity (ROE)

DIV_i represents one of the diversity factors:

i. Gender diversity (*DIV_GEN*)
ii. Age group diversity (*DIV_AGE*)
iii. Degree level diversity (*DIV_DEG*)
iv. Industry diversity (*DIV_IND*)
v. NHH diversity (*DIV_NHH*)
vi. Total diversity (*DIV_DIV*)

The $x_{i,k}$ variable represents the explanatory variables:

Firm controls:

- Company age
- Company industry
- Currently active on the OSE
- Listing year

Executive controls (CEO and CFO):

- Age of the executive
- Tenure of the executive
- Degree of the executive

β_1 is the estimated regression coefficient that measures the difference in firm performance caused by the diversity factor having the value of 1 (read: diverse). The model's error term, u_i, represents all other variations not explained by the independent variables (firm or executive characteristics). Further, the individual intercept, α_i, is included to control for individual-specific and time-invariant characteristics.

4.2.2 Development of the regression models

In this section we provide the step-by-step approach to creating the 18 regression models. The model collects inspiration from the core structure presented in 4.2.1. For each of the 6 diversity factors the model has a three-step approach. First, a simple single regression, then adding firm controls (*company age, company industry, active, listing year*) and last adding executive controls (*age of executive, tenure of executive, degree of education of executive*). In the last

two regressions, we use the within estimator which allows us to control for the unobserved firm fixed effects. Please note that the controls vary for each diversity factor in regression 3 (adding the executive controls). As a consequence, the beta coefficient will vary in interpretation. We have chosen to thoroughly explain the first diversity factor, age group.

Regression model 1: simple regression

$$FinancialPerformance_i = \beta_0 + \beta_1 DIV\_Age_{i,t} + \alpha_i + u_i$$

We first adopt a simple OLS regression model. The model estimates the association between financial performance (*ROE, ROA, ETA* and *one-year return*) and the diversity of age groups between the CEO and CFO in firm i. β_1 is the estimated regression coefficient that measures the difference in financial performance caused by age group diversity (value of 1). The individual intercept, α_i, is included to control for individual-specific and time-invariant characteristics. u_i represents the error term.

Regression model 2: including firm controls

$$\begin{aligned} FinancialPerformance_i \\ &= \beta_0 + \beta_1 DIV\_Age_i + \beta_2 CompanyAge_i + \delta_s CompanyIndustry_i + \beta_3 Active_i \\ &+ \beta_4 ListingYear_i + \alpha_i + u_i \end{aligned}$$

The second model estimates the association between financial performance (*ROE, ROA, ETA* and *one-year return*) and the diversity of age groups between the CEO and CFO, in firm i, taking into consideration our firm controls. Regression model 2 is therefore a multiple regression model. The first control is company age, or the age between establishment and listing. Followingly, β_2 is the change in financial performance given a 1 unit increase in company age. The second control is the industry in which the company operates, categorized into 9 specific industries. As such, δ_3 represents the expected change in firm performance for a firm belonging in an industry relative to the benchmark industry. The third control variable is active. This variable represents whether the firm in question was active on OSE on the last trade day of 2020. β_4 is the change in financial performance given the company being active. The fourth and final control is listing year and represents the annual trend. β_4 is therefore the expected average increase in firm performance for each year.

Regression model 3: including executive controls

$$FinancialPerformance_i = \beta_0 + \beta_1 DIV\_Age_i + \beta_2 CompanyAge_i + \delta_s CompanyIndustry_i + \beta_3 Active_i + \beta_4 ListingYear_i + \beta_5 Tenure_i + \gamma_k Degree_i + \beta_6 Gender_i + \alpha_i + u_i$$

The third model estimates the association between financial performance (*ROE*, *ROA*, *ETA* and *one-year return*) and the diversity of age groups between the CEO and CFO in firm i taking into consideration firm controls and three executive controls. Regression model 3 is therefore also a multiple regression model. Each of the three executive controls represents both executives. For the control variable tenure (and in other regressions: age), a 1 percent increase in tenure (age) of an executive gives a β_5 change in firm performance. The degree of education is given as one of the following values: no education, bachelor, master, and PhD. As such, γ_k, represents the estimated change in firm performance when an executive in a firm has a k level of education. The last control variable is gender. This variable stands for whether the executives represents both genders. β_4 is the change in financial performance given the company being gender diverse.

5. Results and discussion

In this chapter we present the findings from the empirical analysis. We provide a brief univariate analysis before presenting the regression output for each diversity factor in tables 5.1-5.6. We subsequently provide a qualitative discussion elaborating on the factors' associations to firm performance.

5.1 Univariate analysis

In this section, we look at box plots that show the distribution of values for the dependent variables split by the independent variables. The values are restricted to their respective intervals, thereby hindering any extreme values, and further increasing interpretability. The line within the boxes represents the median and the upper and lower percentiles are represented by the upper and lower portion of the box.

Age group diversity

Figure 5.1: One-year return and age group diversity

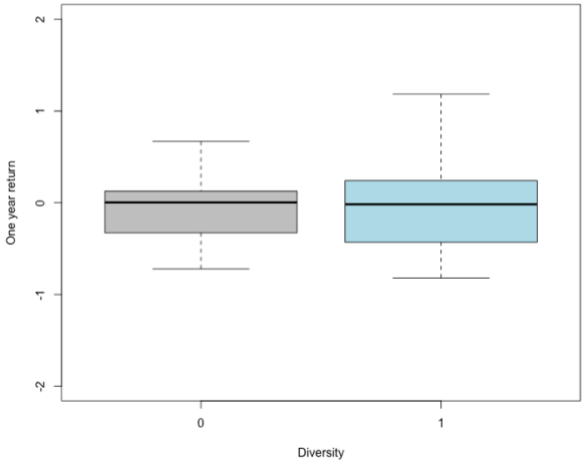


Figure 5.2: ETA and age group diversity

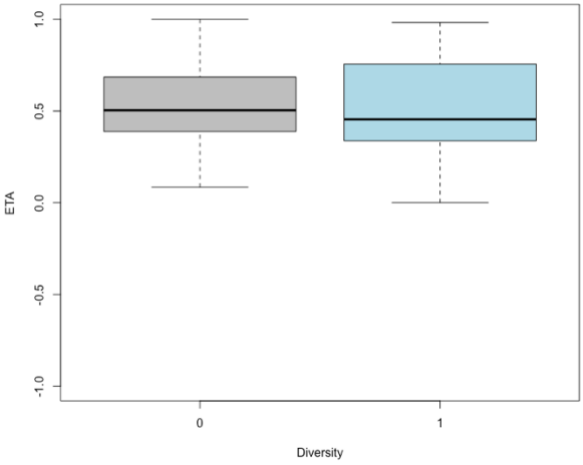


Figure 5.3: ROE and age group diversity

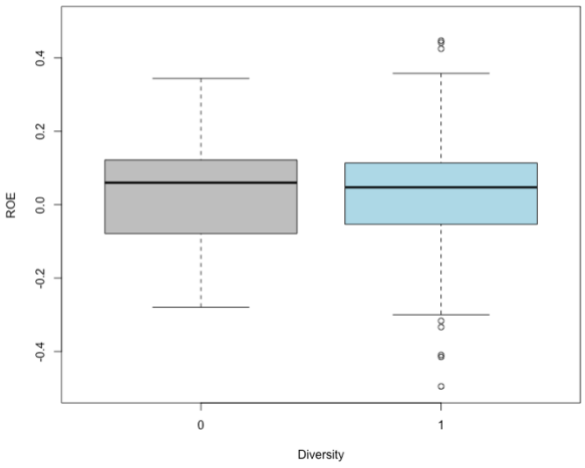
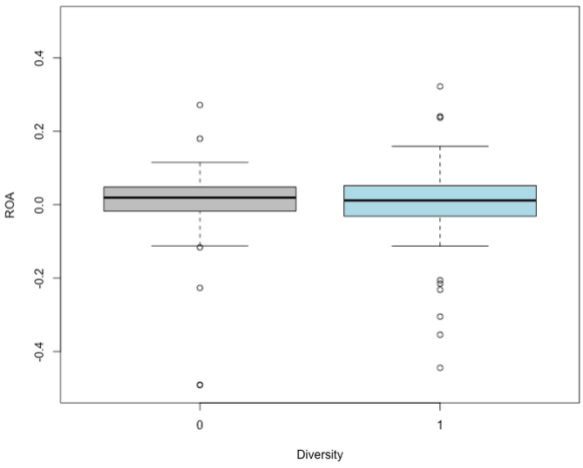


Figure 5.4: ROA and age group diversity



These four figures (figure 5.1-5.4) represent firm performance metrics against age group diversity. We observe a median of 0.5 for ETA, whilst the other variables have a median of approximately 0, thereby representing a higher ETA when there is age group diversity.

Gender diversity

Figure 5.5: One-year return and gender diversity

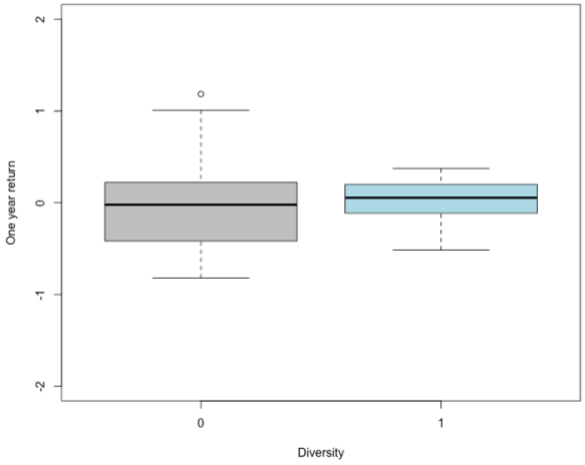


Figure 5.6: ETA and gender diversity

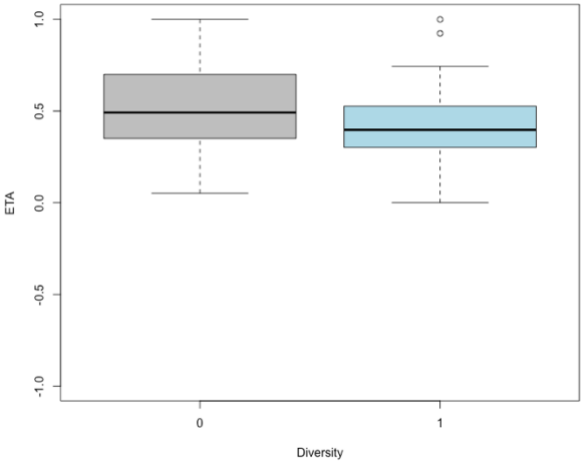


Figure 5.7: ROE and gender diversity

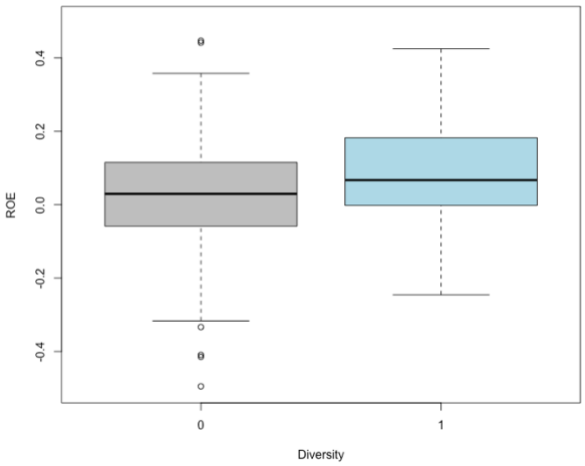
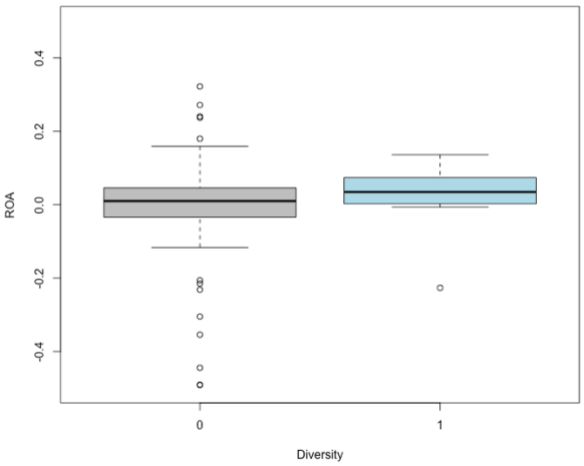


Figure 5.8: ROA and gender diversity



These figures visualize the diversity factor gender in relation to the financial performance metrics. From the one-year return, we see that our sample is tilted towards 0, meaning that we have more non-diverse observations for to this factor. Across the four performance metrics, we observe that gender diverse managements have a slightly higher median than the non-diverse managements. ETA is, as with age group diversity, situated with a median around 0.5.

Degree level diversity

Figure 5.9: One-year return and degree level diversity

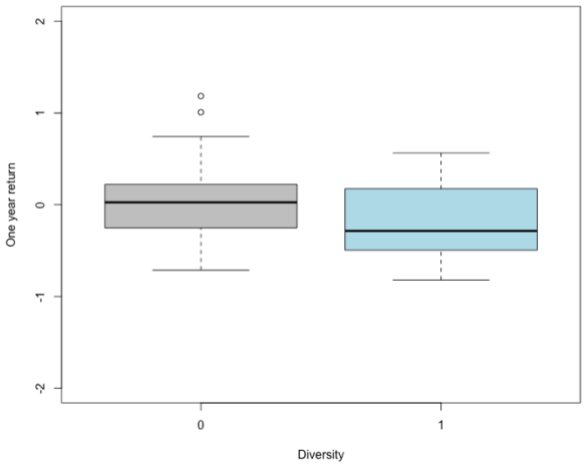


Figure 5.10: ETA and degree level diversity

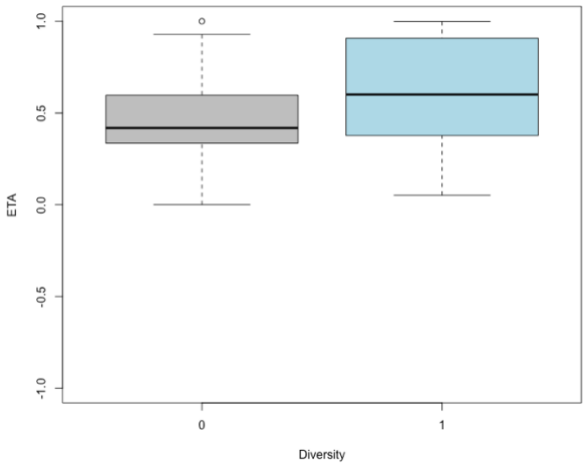


Figure 5.11: ROE and degree level diversity

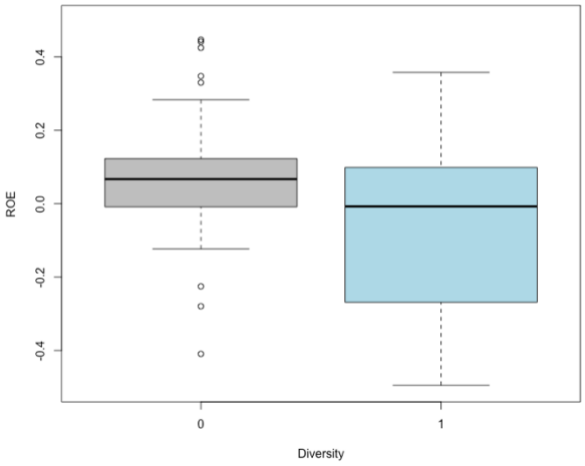
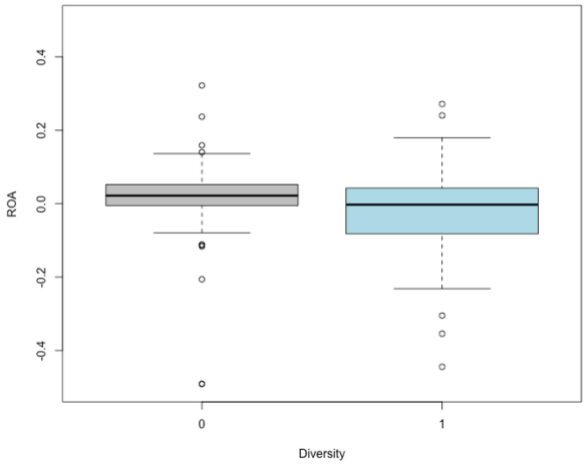


Figure 5.12: ROA and degree level diversity



The tables presented above represent degree level diversity in relation to firm financial performance. Notably, we see that one-year return medians are lower for degree diverse management firms, while ETA on the contrary is higher. ROE is slightly lower for the diverse firms, although both medians are centered around zero.

Industry diversity

Figure 5.13: One-year return and industry diversity

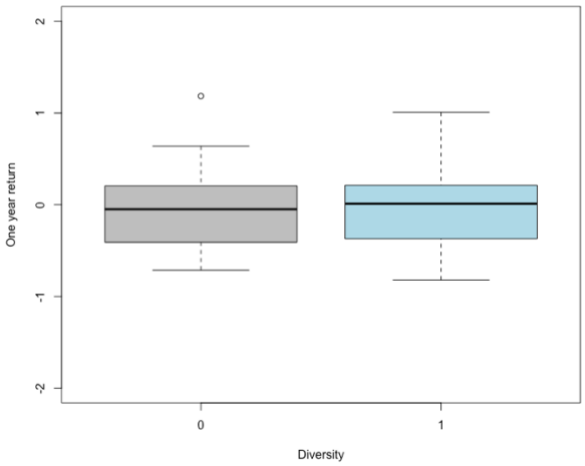


Figure 5.14: ETA and industry diversity

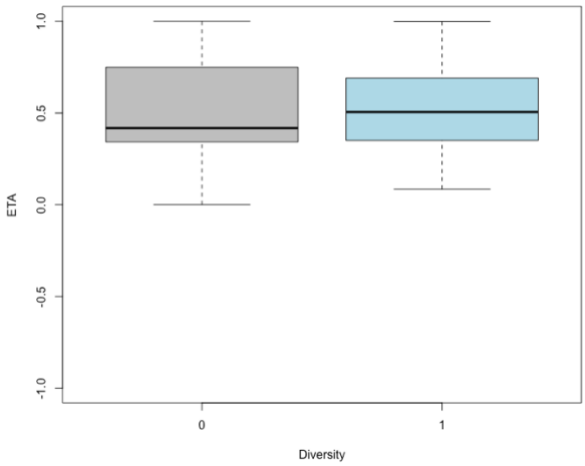


Figure 5.15: ROE and industry diversity

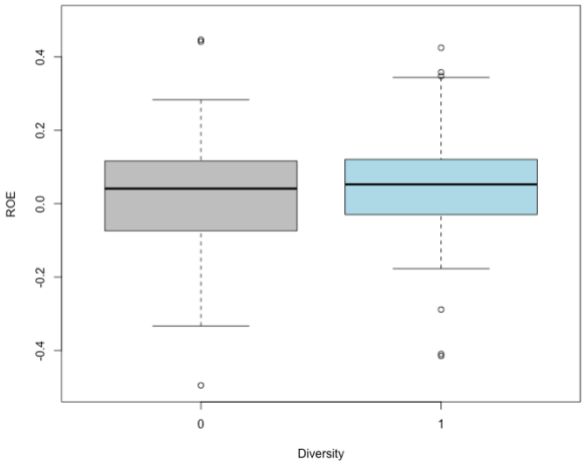
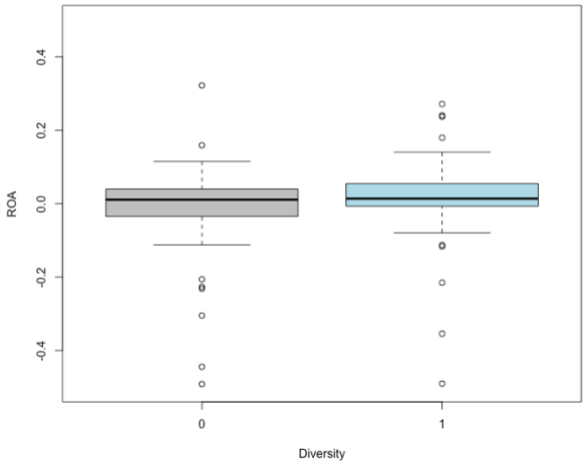


Figure 5.16: ROA and industry diversity



The above figures (5.13-5.16) present the diversity factor industry in relation to the financial performance metrics. For industry we see that the tables are mostly evenly distributed for diverse and non-diverse firms, with most medians centered around zero. However, for ETA, we observe that the median is centered around 0.5 and slightly higher for the diverse firms.

NHH diversity

Figure 5.17: One-year return and NHH diversity

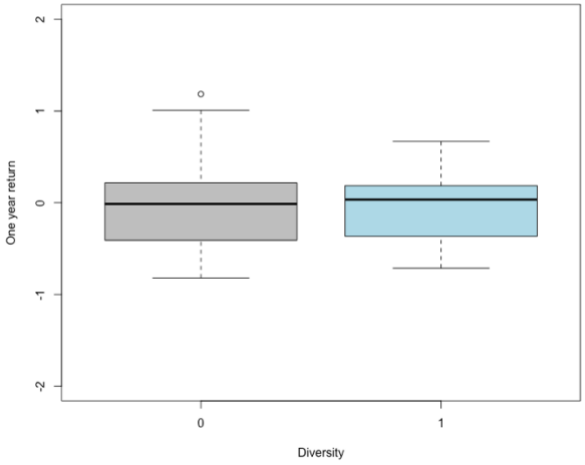


Figure 5.18: ETA and NHH diversity

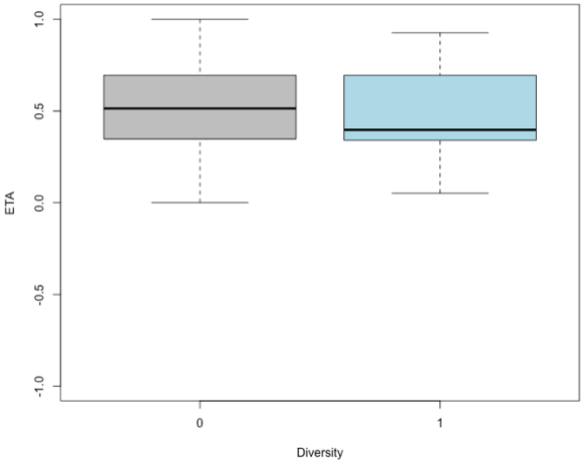


Figure 5.19: ROE and NHH diversity

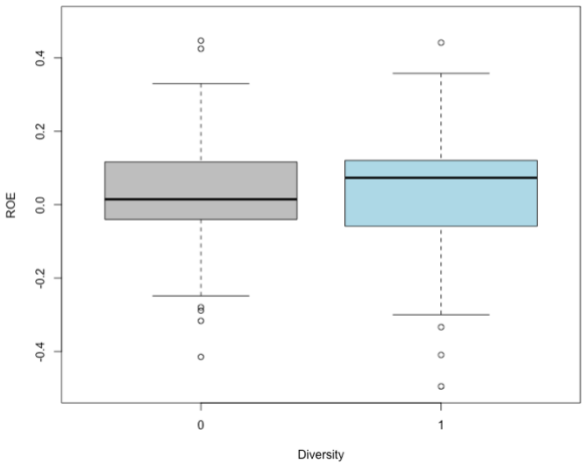
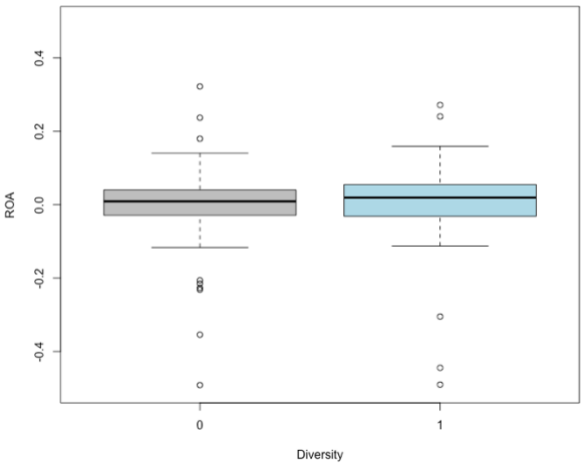


Figure 5.20: ROA and NHH diversity



Tables 5.17-5.20 visualize the diversity factor NHH and the financial performance metrics. Again, we see that the sample sizes are somewhat evenly distributed between non-diverse and diverse firms. ETA is the only measure for which we see that the median lies at 0.5, and not zero as for the other financial factors. It may be noted that the median for all four tables tends toward being situated on the positive side of zero.

Total diversity

Figure 5.21: One-year return and total diversity

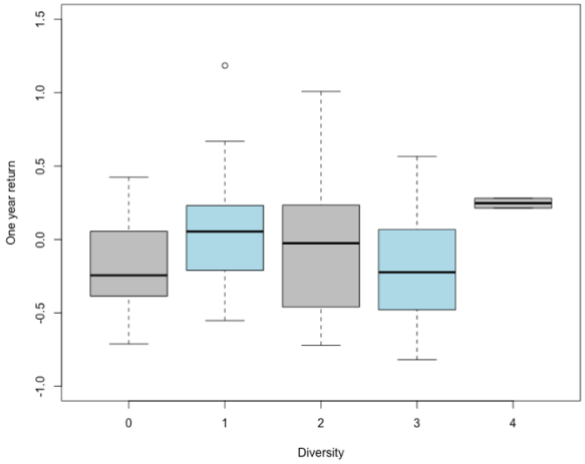


Figure 5.22: ETA and total diversity

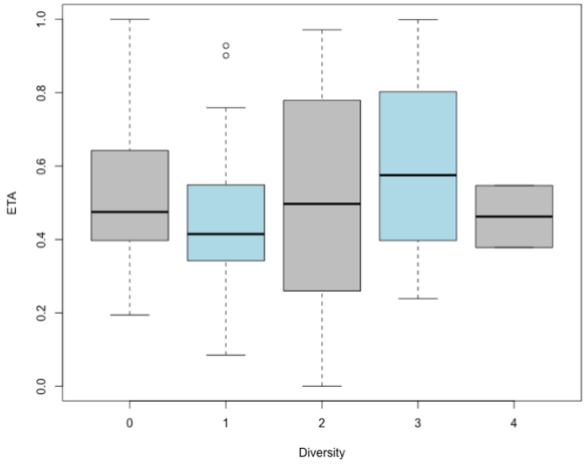


Figure 5.23: ROE and total diversity

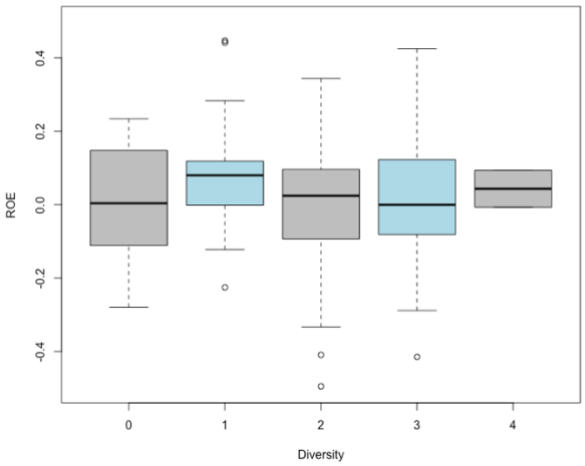
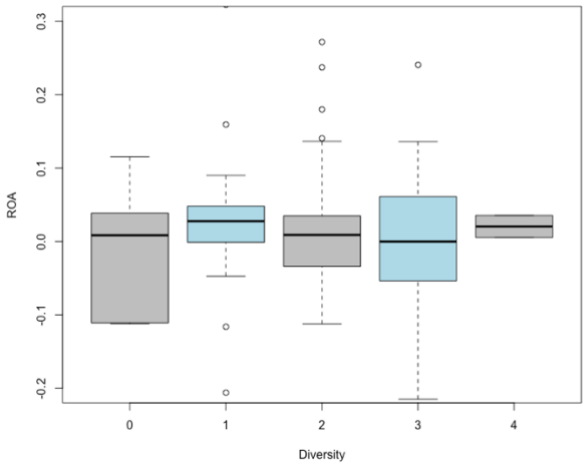


Figure 5.24: ROA and total diversity



In the final univariate analysis, we study the total diversity factor in relation to the financial performance metrics. The smallest sample of firms are those with a diversity factor of 4, while the largest sample has scores of 2 (one-year return and ETA) or 0 (ROE and ROA). Followingly, a majority of the total sample lies between medium and 0 diversity, measured by our chosen factors. We observe more variations in the median compared to the analyses above, with ETA accounting for the largest variation. However, the trend remains that all variables are centered around 0 with the exception of ETA at around 0.

5.2 Regression results

The results from each of the individual regressions are presented in the first rows of the following tables. These six tables display our chosen measures of firm financial performance vertically in the columns, and our variables in the horizontal rows. For each financial performance measure, the results are split into sub-columns (1), (2) and (3). (1) Is the simple regression, (2) is the multiple regression controlled at firm-level, and (3) is the final multiple regression with all control variables at both firm- and executive level included.

All numbers in the tables are decimals, and in the first row, each represents the percentage change of their associated dependent variable, given a one-point change in the likewise associated independent variable. We focus our attention on interpreting this first row, taking special note of the results with star (*) markings. The stars denote different levels of significance, where one star (*) equals significance at a 0.1 level, two stars (**) shows significance at a 0.05 level, and three (***) at the 0.01 level.

5.2.1 Diversity factor: age group

In this section, we present the results of the regression investigating association between the key variable, age group diversity, and firm performance as shown in table 5.1. The coefficients from regressions (1)-(3) do not yield statistically significant results. As such, we do not find evidence of associations with the financial performance metrics between age group diverse and non-diverse firms.

A non-existing association between this top management diversity factor and firm performance stands in contrast to studies at board-level finding age-group diversity to be linked both positively and negatively to various financial metrics (see i.e., EmadEldeen et al. (2021) and Abdullah & Ismail (2013)). The lack of such an association being identified in our results could be the product of a range of factors including sample size, choice of control variables, utilized diversity factors and financial performance metrics, and more.

Table 5.1: Regression models with age group diversity as the key variable

		One-year return			ETA			ROE			ROA		
		(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
Diversity factor		-0.005	-0.026	-0.054	-0.015	0.032	0.047	-0.019	-0.074	-0.120	0.022	0.010	-0.0002
Company age			0.0001	0.0001		-0.002***	-0.001**		0.002	0.002		0.001	0.001
Company industry	*Consumer Staples*		0.024	0.006		0.136	0.140		-0.019	0.037		-0.004	-0.006
	Energy		-0.235*	-0.256		0.148	0.119*		-0.084	-0.005		-0.043	-0.037
	Financials		-0.078	-0.114		-0.096	-0.128		-0.350	-0.266		-0.059	-0.059
	Health Care		-0.179	-0.221		0.418***	0.414***		-0.312***	-0.257*		-0.215***	-0.219***
	Industrials		0.082	0.075		0.220*	0.241**		-0.036	0.068		-0.022	-0.035
	Information Technology		-0.142	-0.227		0.279***	0.281***		-0.328**	-0.329**		-0.279**	-0.302**
	Materials		0.079	0.052		0.257	0.277		-0.013	-0.005		-0.005	-0.020
	Utilities		0.667	0.746		-0.063	0.003		0.157	0.230		0.001	0.007
Active			0.056	0.049		-0.060	-0.029		0.089	0.048		0.070	0.057
Listing year			-0.015	-0.017		0.015	0.014		-0.006	-0.008		0.0001	-0.001
Gender	*CEO*			0.037			0.151			0.217			-0.009
	CFO			-0.093			-0.116*			0.051			0.014
Tenure	*CEO*			0.025**			-0.004			0.016			0.012**
	CFO			-0.021			-0.010			-0.004			-0.002
Degree	*CEO*			0.027			-0.021			0.152			0.0004
	CFO			0.115			-0.032			-0.021			0.054
Constant		-0.028	29.495	34.780	0.532***	-28.774	-27.876	-0.033	11.840	16.762	-0.05	-0.282	1.603
N		113	113	113	113	113	113	113	113	113	113	113	113
$\boldsymbol{R^2}$		0.00002	0.126	0.164	0.001	0.385	0.425	0.0003	0.113	0.168	0.002	0.216	0.241

* p < 0.10, ** p < 0.05, *** p < 0.01. For brevity we are not including t-statistics in table 5.1-5.6, these are available upon request.

5.2.2 Diversity factor: gender

In the following section, we present the results of the regression investigating association between the key variable gender diversity, and firm performance, shown in table 5.2. In the first column (1), the simple regression, we see that the firms with gender diversity, are on average associated with a 0.168 percentage point higher ROE, and 0.068 percentage point higher ROA. The regression with ROE and ROA as firm performance factors, yielded significant result at the 0.01 level. When controlling for firm specific factors, in column (2), the coefficients cease to be significant. Followingly, in this regression, we do not find evidence of association with the financial performance metrics between gender diverse and non-diverse firms.

In summary, the results of the empirical analysis provide a divided answer. On one hand, the single regression suggests a positive association between gender diversity in executive management and the financial metrics ROA and ROE. This association in itself is congruent with Erhardt et al. (2003), who found a positive link between top management gender diversity and firm performance. However, as the R-squared is a mere 0.015 for ROE, and 0.011 for ROA, the diversity factor does not explain much of the variability in the dependent variables. When controlling for firm and executive characteristics, the coefficients cease to be significant. In contrast to Iren (2016) and Homberg & Bui (2013), who observed no significant effect from gender diversity on performance, we do not find evidence of association between the two when adding control variables. The lack thereof can also be viewed against the many studies linking gender diversity positively with firm financial performance, (Erhardt et al. (2003), EmadEldeen et al. (2021), Dezsö & Ross (2012)), or even negatively (Adams & Ferreira (2009)). Our initial regression results, as well as the results in the mentioned studies, would suggest that an association exists in the controlled regressions, but that the added controls in (2) and (3) do not enable us to find evidence of it. From the first regression, we are able to say that there is association, but the results are weak.

Table 5.2: Regression models with gender diversity as the key variable

		One-year return			ETA			ROE			ROA		
		(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
Diversity factor		0.058	-0.084	-0.045	-0.091	-0.069	-0.036	0.168***	0.088	0.087	0.068***	0.013	-0.0002
Company age			0.0001	-0.0002		-0.001***	-0.001**		0.002	0.002		0.001	0.001
Company industry	*Consumer Staples*		0.004	-0.043		0.129	0.103		-0.017	0.011		-0.0002	0.005
	Energy		-0.262*	-0.286*		0.129	0.107		-0.063	0.009		-0.038	-0.034
	Financials		-0.099	-0.127		-0.119	-0.129		-0.317	-0.206		-0.057	-0.065*
	Health Care		-0.201	-0.274		0.406***	0.381***		-0.301***	-0.233		-0.212***	-0.213***
	Industrials		0.082	0.053		0.214*	0.194**		-0.026	0.062		-0.023	-0.034
	Information Technology		-0.165	-0.246		0.259***	0.249***		-0.302**	-0.315*		-0.276**	-0.298**
	Materials		0.051	0.035		0.235	0.285		0.015	0.052		-0.001	-0.028
	Utilities		0.667	0.643		-0.041	-0.066		0.115	0.156		0.004	0.035
Active			0.073	0.052		-0.046	-0.042		0.071	0.030		0.067	0.057
Listing year			-0.014	-0.019		0.013	0.013		-0.004	-0.003		-0.00003	0.0004
Age	*CEO*			0.006			0.003			-0.002			-0.002
	CFO			-0.001			-0.004			-0.007			0.002
Tenure	*CEO*			0.023*			-0.004			0.015			0.012**
	CFO			-0.020			-0.012			-0.003			-0.002
Degree	*CEO*			0.016			-0.017			0.146			-0.002
	CFO			0.126			-0.013			-0.013			0.050
Constant		-0.038	29.154	37.252	0.534***	-26.493	-25.616	-0.068*	7.347	5.295	-0.041*	0.047	-0.814
N		113	113	113	113	113	113	113	113	113	113	113	113
R^2		0.002	0.128	0.167	0.012	0.388	0.417	0.015	0.112	0.168	0.011	0.216	0.247

* p < 0.10, ** p < 0.05, *** p < 0.01.

5.2.3 Diversity factor: degree level

This section presents the results from the regression investigating association between the key variable degree level diversity and firm performance, as measured in table 5.3. In the first column (1), the simple regression, we see that the firms with degree level diversity are, on average, associated with a 0.189 percentage point lower one-year return, significant at the 90% significance level. This is compared to firms without degree level diversity between the top executives. Further, increased diversity among top management is associated with 0.175 percentage point higher ETA. The ETA coefficient is significant at the 99% level. In terms of ROE and ROA, firms with diversely educated top management are on average associated with a 0.244 percentage point lower ROE, and 0.10 percentage point lower ROA. Both coefficients are significant at the lowest level of 90%.

Controlling for firm specific factors, in column (2), the coefficients experience mild changes, mostly pertaining to slight increases in magnitude compared to the first regression. The firms with degree level diversity, are on average, associated with a 0.156 percentage point lower one-year return. Additionally diverse firms are associated with 0.117 percentage point higher ETA. The association with one-year return and ETA are significant at a 95% level. As for ROE and ROA, diverse firms are on average associated with a 0.236 percentage point lower ROE, and 0.088 percentage point lower ROA. These coefficients are both significant at the 90% level.

When controlling for both firm and executive specific factors in column (3), again, the effect on the coefficients remains somewhat alike, with a slight increase in magnitude compared to the second regression. The firms with degree level diversity are on average associated with a 0.206 percentage point lower one-year return. Furthermore, the more diverse firms display a 0.107 percentage point higher ETA Both one-year return and ETA are significant at the 95% level. In terms of ROA, diverse firms are on average associated with a 0.089 percentage point lower return, significant at the 90% level. After adding both firm and executive specific controls, we no longer find evidence of association between education diversity and ROE, weakening this result from the previous regressions in column (1) and (2).

The regressions on degree level diversity left generally strong results, rendering a clear indication of association with our performance metrics. For the first stage, a negative association between degree level diversity and the financial performance measures one-year returns, ROA and ROE, are all significant at the 90% level. This appears in accordance with

EmadEldeen et al. (2021), who finds that degree level diversity within company boards affects financial performance negatively. At the same time, the more financial stability-focused parameter ETA has a positive association for firms where CEO and CFO have different degrees. ETA-findings are significant at a higher level, of 95%, in the third regression stage. High coefficients of determination, as much as 0.451 for ETA, further strengthening the findings across all measures. High equity-to-assets implies a less leveraged firm, and potentially worse profitability (Hall & Weiss, 1967). An opposite effect for ETA than for ROE, ROA, and one-year returns would therefore also be in congruence with large parts of the existing literature.

Table 5.3: Regression models with degree level diversity as the key variable

		One-year return			ETA			ROE			ROA		
		(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
Diversity factor		-0.189**	-0.156*	-0.206**	0.175***	0.117**	0.107**	-0.244**	-0.236*	-0.265	-0.104*	-0.088*	-0.089*
Company age			0.00000	0.00000		-0.002**	-0.001**		0.002	0.002		0.001	0.001
Company industry	*Consumer Staples*		0.036	-0.008		0.129	0.130		-0.007	0.013		0.007	0.014
	Energy		-0.202	-0.260		0.124	0.111*		-0.037	0.009		-0.022	-0.022
	Financials		-0.060	-0.117		-0.111	-0.123		-0.319	-0.254		-0.052	-0.058
	Health Care		-0.133	-0.187		0.384***	0.384***		-0.245*	-0.176		-0.186**	-0.181**
	Industrials		0.125	0.130		0.187*	0.213**		0.032	0.050		-0.001	-0.004
	Information Technology		-0.105	-0.188		0.251***	0.253***		-0.272*	-0.261		-0.259**	-0.279**
	Materials		0.104	0.060		0.239	0.277*		0.024	0.087		0.009	-0.017
	Utilities		0.627	0.622		-0.027	0.022		0.081	0.077		-0.012	0.014
Active			0.049	0.074		-0.054	-0.036		0.078	0.053		0.066	0.062
Listing year			-0.012	-0.018		0.012	0.011		-0.001	-0.002		0.001	0.001
Age	*CEO*			0.008			0.001		0.077	0.002			-0.001
	CFO			-0.002			-0.002		0.053	-0.008			0.001
Tenure	*CEO*			0.021***			-0.004			0.017			0.011**
	CFO			-0.019			-0.010			-0.006			-0.003
Gender	*CEO*			0.053			0.130			0.126			0.007
	CFO			-0.089			-0.096			0.073			-0.004
Constant		0.036	24.021	35.853	0.460***	-24.098	-22.257	0.040	1.932	3.898	0.005	-2.198	-1.900
N		113	113	113	113	113	113	113	113	113	113	113	113
R^2		0.040	0.151	0.196	0.085	0.418	0.451	0.062	0.164	0.191	0.050	0.250	0.271

* p < 0.10, ** p < 0.05, *** p < 0.01.

5.2.4 Diversity factor: industry

This section presents the output of the regression investigating association between the key variable industry, and firm performance as measured in table 5.4. The coefficients from regressions (1)-(3) do not yield statistically significant results. Hence, we do not find evidence of differences in the financial performance metrics between diverse and non-diverse firms in terms of industry experience.

There is a lack of previous studies relating to industry experience and financial performance among Norwegian firms specifically. Pinpointing whether or not the lack of association between this diversity factor and firm financials is in congruence with prior research is therefore somewhat challenging. However, Buyl et al. (2010) found that background and shared experience between CEO and other top management team members affects functionality. In light of this, one might assume that a further association with financial performance could be identified, should it exist. As is the case for age group diversity, the fault in detecting association, if it is present, could stem from our limited data sample, the chosen performance metrics or diversity factors, or the control variables.

Table 5.4: Regression models with industry diversity as the key variable

		One-year return			ETA			ROE			ROA		
		(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
Diversity factor		-0.009	-0.044	-0.047	0.039	-0.0002	-0.019	0.085	0.081	0.075	-0.008	0.012	0.024
Company age			0.00002	-0.0001		-0.002***	-0.001**		0.002	0.002		0.001	0.001
Company industry	*Consumer Staples*		0.022	-0.017		0.142	0.136		-0.038	0.021		-0.003	0.002
	Energy		-0.246*	-0.282		0.150	0.120		-0.073	0.027		-0.039	-0.032
	Financials		-0.091	-0.131		-0.100	-0.124		-0.314	-0.186		-0.056	-0.061*
	Health Care		-0.195	-0.258		0.421***	0.411***		-0.297**	-0.207		-0.211***	-0.211**
	Industrials		0.085	0.082		0.217*	0.236**		-0.029	0.081		-0.023	-0.037
	Information Technology		-0.139	-0.223		0.278***	0.276***		-0.330**	-0.312*		-0.280**	-0.303***
	Materials		0.065	0.029		0.258	0.288		0.013	0.074		-0.001	-0.023
	Utilities		0.650	0.667		-0.050	-0.016		0.137	0.206		0.007	0.039
Active			0.054	0.056		-0.060	-0.033		0.091	0.038		0.070	0.058
Listing year			-0.014	-0.020		0.014	0.012		-0.004	-0.002		-0.00004	0.001
Age	*CEO*			0.006			0.003			-0.003			-0.003
	CFO			-0.001			-0.003			-0.005			0.002
Tenure	*CEO*			0.024**			-0.003			0.014			0.012**
	CFO			-0.017			-0.010			-0.005			-0.003
Gender	*CEO*			0.074			0.135			0.169			-0.011
	CFO			-0.081			-0.093			0.049			0.001
Degree	*CEO*			0.017			-0.013			0.152			-0.001
	CFO			0.113			-0.028			-0.013			0.053
Constant		-0.026	28.729	40.081	0.501***	-27.239	-22.831	-0.092	7.403	4.472	-0.027	0.054	-1.589
N		113	113	113	113	113	113	113	113	113	113	113	113
R^2		0.0001	0.127	0.170	0.004	0.382	0.427	0.008	0.115	0.175	0.0003	0.216	0.250

* p < 0.10, ** p < 0.05, *** p < 0.01.

5.2.5 Diversity factor: NHH

This section presents the results from the regression investigating association between the key variable NHH and firm performance, as measured in table 5.5. In the first column (1), the simple regression, we see that the firms with "NHH-diversity" are on average associated with 0.096 percentage points lower ETA. This is compared to firms without diversity between the university background of the top executives, where one of them includes NHH. The coefficient is significant at the 90% level. When controlling for firm specific factors, in column (2), the firms with industry diversity, are on average, associated with a 0.095 percentage point lower ETA. By adding the firm controls, the ETA coefficient experiences increased significance up to the 95% level. After controlling for firm and executive factors in column (3), the NHH diverse firms are, on average, associated with a 0.101 percentage point lower ETA. The ETA coefficient is still significant at 95%. From the improving significance level from (1) to (2), we see a trend where the control variables increase how effectively the observed outcomes for ETA are replicated by the regression model. We also see R-squared increasing, and for the third regression the explanatory degree is relatively high, at 0.448.

For the NHH diversity regression, results suggest a negative association between the firms' CEO or CFO having attended the Norwegian School of Economics, and firm ETA. The negative association between the diversity factor and firm performance is in accordance with EmadEldeen et al. (2021), who finds that education diversity within company boards affects financial performance negatively. A decrease in ETA implies a more leveraged firm, which may be seen to represent a measure of financial instability. Building on the upper-echelon theory, this could be a result of similarities in the way elements from executive decision-making transfer to the companies they lead (Hambrick & Mason, 1984). While we treat NHH as a diversity factor, we recognize that the sample itself may not conform to traditional forms of diversity through I.e., gender and ethnicity. This study cannot determine which elements are the basis for the association with ETA. Reasons such as NHH alum choosing jobs in less stable firms, that they have a high tolerance for risk or that there are elements of the teaching influencing their approach to financing structures could nonetheless be imagined. An attempt to be more concrete on the reasoning behind the association between NHH-diversity and ETA will require further research.

Table 5.5: Regression models with NHH diversity as the key variable

		One-year return			ETA			ROE			ROA		
		(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
Diversity factor		0.059	0.069	0.097	-0.096*	-0.095**	-0.101**	-0.116	-0.080	-0.068	-0.030	-0.010	-0.001
Company age			0.0001	0.0002		-0.002***	-0.002**		0.002	0.002		0.001*	0.001*
Company industry	*Consumer Staples*		0.050	0.033		0.099	0.087		-0.069	-0.017		-0.007	0.013
	Energy		-0.192	-0.235		0.089	0.066		-0.141	-0.078		-0.049	-0.038
	Financials		-0.053	-0.108		-0.131	-0.144*		-0.368	-0.302		-0.064	-0.067
	Health Care		-0.150	-0.190		0.377***	0.362***		-0.357***	-0.270*		-0.219***	-0.203**
	Industrials		0.122	0.136		0.165	0.183**		-0.072	-0.044		-0.029	-0.024
	Information Technology		-0.119	-0.197		0.247**	0.245***		-0.352**	-0.318*		-0.283**	-0.293**
	Materials		0.114	0.055		0.210	0.258		-0.054	0.002		-0.010	-0.037
	Utilities		0.716	0.783		-0.132	-0.107		0.057	0.115		-0.004	0.045
Active			0.052	0.079		-0.055	-0.037		0.092	0.067		0.071	0.066
Listing year			-0.014	-0.019		0.014	0.012		-0.004	-0.003		-0.0001	0.001
Age	*CEO*			0.005			0.003			-0.003			-0.003
	CFO			0.001			-0.003			-0.004			0.002
Tenure	*CEO*			0.022**			-0.006			0.013			0.010**
	CFO			-0.015			-0.012**			-0.001			-0.001
Gender	*CEO*			0.044			0.143			0.145			0.010
	CFO			-0.125			-0.072			0.050			-0.015
Constant		-0.052	28.583	38.933	0.557***	-27.722	-24.462	-0.004	7.897	5.552	-0.021	0.134	-1.084
N		113	113	113	113	113	113	113	113	113	113	113	113
R^2		0.004	0.130	0.165	0.026	0.404	0.448	0.014	0.115	0.132	0.004	0.216	0.240

* p < 0.10, ** p < 0.05, *** p < 0.01.

5.2.6 Diversity factor: total diversity

In the last section, we present the results of the regression investigating association between the key variable total diversity and firm performance, as shown in table 5.6. In the first column (1), the simple regression, we see that the firms with total diversity, are on average, associated with a 0.039 percentage point higher ETA, significant at the 0.05 level.

The result from the empirical analysis gives a divided answer. On the one hand, the single regression suggests a positive association between total diversity in executive management and the financial metric ETA. This association in itself is congruent with Erhardt et al. (2003) who found a positive link between top management diversity and firm performance. However, as the R-squared is a mere 0.017 for ETA, the diversity factor does not explain much of the variability in the dependent variables. When controlling for firm and executive characteristics, the coefficients cease to be significant. This weakens the result, as neither of the controlled regressions in column (2) and (3) find evidence of association between ETA and total diversity.

Gaps in previous research make it challenging to assess potential congruence with existing literature. The total diversity variable is constructed specifically for this thesis, and we recall that the NHH-diversity factor is not included. Although based on variable-construction utilized for empirical regression analysis in general, the factor for total diversity is to the best of our knowledge unique in terms of what diversity factors it includes, combined with the performance measures and sample area of our study. The lack of evidence that there is an association between total diversity and financial performance could be a result of the diversity factors being oppositely associated with the performance measures, as is the case for ROE between the gender and degree factors. A limited data sample, the specific performance metrics and diversity factors reviewed, and the utilized control variables, are, as mentioned previously in the discussion, possible reasons why further associations, if existent, are not observed.

Table 5.6: Regression models with total diversity as the key variable

		One-year return			ETA			ROE			ROA		
		(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
Diversity factor		-0.044	-0.067	-0.077	0.039**	0.029	0.035	-0.021	-0.046	-0.056	-0.014	-0.016	-0.022
Company age			0.0002	0.0003		-0.002***	-0.002**		0.002	0.002		0.001*	0.001*
Company industry	*Consumer Staples*		0.031	0.018		0.137	0.113		-0.025	-0.013		0.0001	0.006
	Energy		-0.251	-0.280*		0.157*	0.130*		-0.099	-0.095		-0.045	-0.045
	Financials		-0.119	-0.156		-0.081	-0.106		-0.371	-0.373		-0.071	-0.074*
	Health Care		-0.187	-0.214		0.424***	0.382***		-0.323***	-0.307***		-0.216***	-0.208***
	Industrials		0.093	0.069		0.213*	0.194**		-0.023	-0.023		-0.022	-0.023
	Information Technology		-0.143	-0.213		0.279***	0.258***		-0.328**	-0.352**		-0.280**	-0.298**
	Materials		0.046	0.007		0.272	0.303*		-0.037	-0.083		-0.012	-0.041
	Utilities		0.670	0.712		-0.055	-0.048		0.135	0.153		0.008	0.021
Active			0.065	0.062		-0.064	-0.060		0.095	0.090		0.072	0.069
Listing year			-0.015	-0.016		0.014	0.016		-0.005	-0.007		-0.0004	-0.001
Tenure	*CEO*			0.022***			-0.006			0.017**			0.011**
	CFO			-0.018			-0.015*			0.001			-0.0003
Constant		0.044	31.098	32.580	0.455***	-28.488	-31.454	-0.010	10.255	13.379	-0.007	0.859	2.714
N		113	113	113	113	113	113	113	113	113	113	113	113
R^2		0.009	0.143	0.167	0.017	0.391	0.413	0.002	0.117	0.128	0.004	0.220	0.240

* p < 0.10, ** p < 0.05, *** p < 0.01.

6. Conclusion

The aim of this study has been to investigate whether diversity amongst top executives is associated with short-term financial performance for newly listed companies on the Oslo Stock Exchange. Our sample, consisting of 113 firms listed between 2006-2019, has been analyzed using a multiple regression analysis.

We manually constructed a data set consisting of executive-level information in combination with detailed firm-level data to conduct our research. We used one-year returns, ROA, ROE and ETA as broad metrics for short-term financial performance, and looked at the following diversity factors: age group, degree level, gender, industry, NHH and total diversity. Diversity, in this context, is defined as the differing backgrounds or characteristics between top management, herein the CEO and CFO.

The analysis finds that gender diversity, ROE and ROA are positively associated. Diversity in terms of education level is correlated with lower returns in terms of ROE and ROA, but also with a higher ETA. Where one top executive is an NHH-alum, we see that ETA is generally lower, meaning that these firms have a higher debt share compared to the rest of the sample. Simultaneously, a higher total diversity score is correlated with a higher ETA. Consequently, more diverse firms tend towards having higher shares of equity.

Our findings are of interest as they provide insight into the under-investigated topic of IPOs in Norway. We hope that the findings in this thesis may inspire further research, and, albeit in a small way, contribute to a field that is as important as it is topical.

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Appendix

Table A.1: Firm specific variables

Variable	Description
CompanyId	The unique security identifier.
TradeDate	The registered trade dates.
Symbol	The unique abbreviation of the security name.
SecurityName	The name of firm/security.
Market	The market the security was taken public on.
Open	The opening share price on the registered date.
Last	The last share price on the registered date.
AdjOpen	The adjusted opening share price on the registered date.
AdjLast	The adjusted last share price on the registered date.
SharesIssued	The number of shares issued on the registered date.
Return on assets	Measure of financial performance. Computed as net income divided by total assets.
Return on equity	Measure of financial performance. Computed as net income divided by equity.
Equity-to-total assets ratio	Broad measure of financial performance. Computed as equity divided by total assets.

Table A.2: Executive specific variables

Variable	Description
Name	Name of the executive at the time of the IPO.
Gender	Gender of the executive.
Birth year	Birth year of the executive.
Year appointed in role	Represents the year where the executive first assumed the executive position within the firm.
Year appointed in firm	Represents the year where the executive first assumed employment within the firm.
Education level	Divided into four categories: None, Bachelor, Master (including titles that require supplementary education after a bachelor's degree, I.e., accountants and lawyers), and PhD.
School	Depicts the institution where the executive's highest degree was awarded.
Previous industry	The industry, classified after GICS standards, that the executive held employment within before their tenure in the firm.

Table A.3: Sample selection process

	Removed observations	**Remaining observations**
(1) Extracting all observations from the SNF database of firms from 1995-2020.	NA	1 408 502
(2) Removing all firms not listed on OSE.	92 977	1 315 525
(3) Extracting one-year observations.	1 314 900	625
(4) Removing firms listed before 2006.	452	173
(5) Removing firms without the legal forms ASA or SPA.	0	173
(6) Removing share issues.	9	164
(7) Removing firms with active operations for less than one year.	9	155
(8) Removing firms listed in 2020, lacking future financials.	7	148
(9) Removing firms with missing or incomplete variables	15	133
(10) Final data set.	NA	113