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The effect of gender in firms' top management on corporate profitability

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The effect of gender in firms' top management on corporate profitability

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Abstract

In this paper, we investigate how gender in firms' top management affects firm profitability, using a large data sample on Norwegian private limited liability firms (AS firms) from 2000 to 2018. We find evidence that female CEOs have a negative impact on profitability in firms without board gender diversity and in small firms, while having a positive effect in larger firms. When dividing into family and non-family firms, the results mostly stay consistent for family firms, in particular those with family CEOs. Female directors have a negative impact on all our profitability measures in small firms and no effect in medium-to-large firms. The negative effect was slightly less negative after the Gender Balance Law, and stronger for family firms than non-family firms. Our findings suggest that the effect gender has on profitability depends on a range of factors, highlighting the importance of looking at gender issues through multiple lenses.

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1.0 INTRODUCTION AND BACKROUND

This paper examines how gender in firms' top management affects firm profitability in Norwegian private limited liability firms (AS firms). Many scholars have studied gender and firm performance in recent years, as the world is facing increasing pressure to choose female directors on the board (Adams & Ferreira, 2009). Today, more women are taking higher education than before and entering earlier male-dominated workforces (Matsa & Miller, 2013). Despite this, business leadership remains male-dominated (Nadeem et al., 2019).

To increase gender diversity in corporate management, different European governments have adopted or considered adopting quotas (Matsa & Miller, 2013)**.** Norway, which is considered one of the world's most gender-equal countries (Schwab et al., 2019), was the first country to implement a gender quota by the Gender Balance Law (Bech, 2013). The law required Norwegian public limited companies (ASA companies) to have at least 40% representation of both genders on their boards by 2008, or 2006 for new companies (*Allmennaksjeloven [Public Limited Liability Companies Act]*, 1997).

Though AS firms were not obliged to follow the law, we still see an increase in female presence in AS firms in the last decades, potentially from increased societal pressure for gender equality. Illustrations 1 and 2 below show the increase of female directors and female Chief Executive Officers (CEOs) on Norwegian ASA and AS firms from 2004–2020. ASA firms experienced a substantial increase in female directors after the Gender Balance Law was implemented, while AS firms had an increase from 15.40% to 19%. Illustration 1 shows that the number of female CEOs increased from 13% to 16.6% in AS firms and from 4.6% to 7.7% in ASA firms.

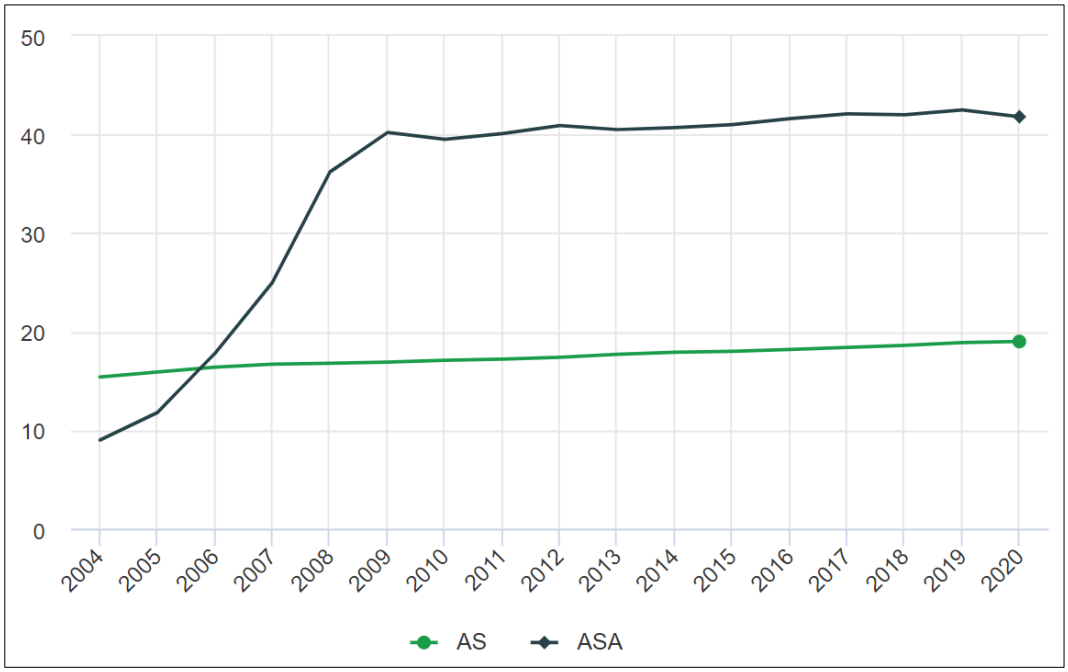

Illustration 1: The illustration shows the percentage of female directors on board in Norwegian limited liability companies for 2004-2020. The green line (circle ending) shows the increase for AS companies, while the black line (square ending) shows the increase for ASA companies. (Hoang & Fjærli, 2020)

Illustration 2: The illustration shows the percentage of female CEOs in Norwegian limited liability companies for 2004-2020. The green line (circle ending) shows the increase for AS companies, while the black line (square ending) shows the increase for ASA companies. (Hoang & Fjærli, 2020)

The effect gender can have on profitability can be distinctly different for firms affected by a mandatory quota from firms not affected. Therefore, we choose to focus on AS firms in this paper to examine the impact of a natural increase of female presence. We question whether firms' top management should be more gender-balanced because it is considered ethically right and politically correct or because it shows to be economically beneficial for firms. Many studies point at fundamental differences in men and women and that these differences affect their decision-

making and managing of firms (Matsa & Miller, 2013). Some researchers doubt that there are significant gender differences among people in top management (Adams & Ferreira, 2009), as directors may stand out from the general population because of their education and experience (Nadeem et al., 2019).

Some researchers point at how gender differences may be present in family firms if the top managers or directors are appointed due to nepotism and dynastic management (González et al., 2020). There is no universal definition of family firms. Fėlix and David (2019, p. 2) mention several definitions that can be put together as; "the heart of most definitions of a family business is the significant power wielded by the family, due to its degree of ownership concentration and occupying fundamental positions that affect management and decision-making processes."

Empirical evidence of gender diversity and its effect on corporate financial performance is complex and shows inconsistent results across studies (González et al., 2020). Most studies linking gender and profitability focus on gender diversity in the Board of Directors (BoD) in widely held firms. The few studies examining gender and profitability in Norwegian firms mainly focus on the impact the gender quota has had on ASA firms. In addition, research regarding the gender of the CEO and gender in family firms seems to be particularly limited. Hence, further research on the topic is called for.

In this thesis, we use a large data sample on Norwegian AS firms in the period 2000–2018 to examine the effect of gender on firm performance. In particular, we look into how the gender of the CEO and how female presence on BoD affect profitability, as well as how these effects can differ between family firms and non-family firms. As studies show that societal pressure for appointing female directors may affect how females perform (Fėlix & David, 2019), we also examine whether the quota has had an indirect effect on how gender may impact performance in AS firms. To investigate how gender effects on firm profitability can vary in different circumstances, we carry out several tests with suitable regression methods.

We find evidence that female CEOs have a negative impact on profitability in firms without board gender diversity and in small firms, while having a positive effect in larger firms. When dividing into family and non-family firms, the results mostly stay consistent for family firms, in particular those with family CEOs. Female

directors have a negative impact on all our profitability measures in small firms and no effect in medium-to-large firms. The negative effect was slightly less negative after the Gender Balance Law, and stronger for family firms than nonfamily firms. Our findings suggest that the effect gender has on profitability depends on a range of factors, highlighting the importance of looking at gender issues through multiple lenses.

The paper is divided into the following parts; section 2 gives insight into previous literature, which lays the foundation for our hypothesis presented in the same section. Section 3 describes our process of gathering and preparing our data and descriptive statistics to get familiar with the sample. In section 4, we describe the methodology used to estimate our main models and robustness tests. Our results are presented and discussed in section 5, before a conclusion is given in section 6, together with some limitations and suggestions for further research.

2.0 LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

There is a growing literature which examines the effect of gender in firms' top management on observable firm outcomes. However, the existing literature remains inconclusive as it shows mixed results (González et al., 2020). Moreover, the field is particularly unexplored in family firms (Sonfield & Lussier, 2009). Research regarding CEO gender and research on gender in Norwegian AS firms also seem to be limited. As González et al. (2020) suggest, the relationship between gender diversity and corporate financial performance is complex and calls for further empirical evidence.

2.1 CEO gender and profitability

While most existing literature on gender and profitability focuses on gender diversity in firms' BoD, some researchers examine the impact of the gender of the CEO. This could be an important area for other aspects of research on gender, as it is suggested that the leader's gender may determine female directors' influence on board decisions (Nielsen & Huse, 2010). In support of this statement, Torchia et al. (2011) found a positive link between a critical mass of at least three female directors and innovation and a negative link between innovation and male CEOs. They

studied a sample of 317 Norwegian firms based on a survey conducted in 2005/2006 (Torchia et al., 2011).

Studying 394 French firms over the period of 2001–2010, Nekhili et al. (2018) examined the link between firm performance and the appointment of women to CEO or Chair positions. They found that hiring a female CEO increases firm performance, measured by Tobin's q (Nekhili et al., 2018). Huang and Kisgen (2013) state that investors react better to financial decisions taken by firms with female executives than firms with male executives. Their evidence suggests that females make better decisions for shareholders, as men tend to be overconfident and are more likely to exercise value-destroying acquisitions (Huang & Kisgen, 2013).

Using various econometric techniques to study a sample of privately-held and publicly-traded European firms, Faccio et al. (2016) found that female CEOs had a negative impact on value-added growth but increased the chances of firm survival. Their study documents that female CEOs are associated with lower leverage, less volatile earnings and reductions in risk-taking. However, they recognize that differences between the genders may not be as visible among top executives, given the skills needed to climb up the corporate ladder to such high positions (Faccio et al., 2016).

Khan and Vieito (2013) examined the relationship between gender on the CEO, firm risk and firm performance, using a panel of new and old economy U.S. firms over the period of 1992 to 2004. The empirical results showed that firms with a female CEO are associated with increased performance, despite lower firm risk, compared to firms managed by male CEOs (Khan & Vieito, 2013). The authors claim that they are among the first to focus on how the CEO's gender affects firm profitability. This calls for further research on the topic and brings us to our first hypothesis:

Hypothesis 1: *The gender of the CEO has an effect on profitability*

2.2 Board gender diversity and profitability

As well as studying the effect of CEO gender on firm risk and performance, Khan and Vieito (2013) show that having a mix of men and women in top management

positions leads to better firm performance and higher returns to shareholders in a longer time perspective. Nadeem et al. (2019) found a significant positive impact of women on board on observable dynamics of the board and that this may reduce risk but improve profitability. The authors studied the risk and return implication of women on boards and group dynamics, using a relatively large dataset in the UK from 2007 to 2016 (Nadeem et al., 2019). In addition, Adams and Ferreira (2009) found that the gender composition of the board is positively related to measures of board effectiveness and that female directors behave differently than their male counterparts. This is consistent with Hillman et al.'s (2007) findings of female directors bringing different perspectives and experiences than male directors, consequently improving board decisions.

Adams and Ferreira's (2009) results show that the effect of gender diversity on firm performance is positive in firms with otherwise weak governance but negative in firms with strong governance. The paper uses a sample consisting of 1,939 firms from the period 1996–2003 (Adams & Ferreira, 2009). Đặng et al. (2020) investigated the relationship between board gender diversity and firm profitability using the control function approach on a sample from S&P 500 over the period 2004–2015. They find women on corporate boards to have a positive and significant impact on firm profitability (Đặng et al., 2020). Liu et al. (2014) also found a positive and significant relationship between board gender diversity and firm performance. Their sample consisted of 2000 listed firms in China from 1999 to 2011 (Liu et al., 2014).

Looking at large European firms, Green and Homroy (2018) found evidence supporting an economic rationale for including more women on firms' BoD, as this increased firm performance. However, this was only when the female directors were actively involved in corporate governance, measured by having membership on board committees. The authors refer to previous research on board gender diversity as finding no effect, or a negative effect, on firm performance of having women on board (Green & Homroy, 2018).

Carter et al. (2010) examined the link between female directors, ethnic-minority directors, board committees and firm performance and found no impact on profitability of increased women and ethnic minorities on board. Consistent with a contingency explanation, their evidence indicates that the effect of board diversity

may vary depending on circumstances and time. The authors suggest that appointing more female or ethnic-minority directors should be based on criteria other than profitability. (Carter et al., 2010)

After multiple European governments have adopted or considered adopting gender quotas for firms' BoD (Matsa & Miller, 2013), several researchers have investigated the effect of quotas on profitability. Though finding evidence that female directors have value-relevant impact on board structure for firms where governance is weak, Adams and Ferreira (2009) suggest that establishing quotas for company boards may not increase firm performance on average. Bøhren and Staudbo (2014) found that forcing gender diversity on boards leads to increased board independence as female directors are more often independent than male directors, which is associated with reduced firm value. The effect is strongest for small, young and profitable unlisted firms (Bøhren & Staubo, 2014). The authors studied Norwegian AS and ASA firms in the period 2003–2008 (Bøhren & Staubo, 2014).

Looking at annual reports of the 248 Norwegian ASA from 2003 to 2009, Ahern and Dittmar (2012) found that the quota led to a decline in firm value, as the affected firms hired younger directors with less experience than their male counterparts. Matsa and Miller (2013) argue that the reduced profit resulted from a change in the affected firms' employment policies. They found that affected firms reduced short-term profits through increased labor costs but that revenues and non-labor costs stayed the same, indicating that an increase of female directors did not lead to less profitable business decisions overall (Matsa & Miller, 2013). The authors compared financial data for publicly listed ASA firms in Norway with a matched sample of unlisted firms in Norway and listed and unlisted firms in other Nordic countries (Matsa & Miller, 2013).

Kyaw et al. (2015) suggest that the effect of board gender diversity is fostered by the level of women's rights empowered by the institutional setup, not the proportion of female board members nor the gender regulations. Using data from 970 European companies for the period from 2002 to 2013, they found that female directors mitigate earnings management where gender equality is high (Kyaw et al., 2015). As gender equality will vary between countries, we argue that research with samples from other countries is not directly transferable to Norway. According to

Liu et al. (2014), a majority of studies concerning gender diversity and firm profitability are based on the U.S. This emphasizes the need for more research on the field in Norway, leading to our next hypothesis:

Hypothesis 2: *Gender diversity in the BoD has an effect on profitability*

The existing literature on Norwegian firms mainly focuses on the gender quota for ASA firms, where the majority show a negative impact of the quota on profitability. As suggested in our introduction, the increase of female presence in AS firms might be partly caused by societal pressure stemming from the mandatory quota in ASA firms. Fėlix and David (2019) state that, when appointed due to societal pressure, female directors negatively impact firm profitability. Hence, we question whether the quota has indirectly affected how females are affecting firm performance. Thus, our third hypothesis is as follows:

Hypothesis 3: *The Gender Balance Law has changed how female directors impact profitability in AS firms*

2.3 Gender in family firms

Family firms and their impact on financial performance have received growing attention in business literature (Miller et al., 2007). Family firms account for the majority of publicly held firms in the United States and Western Europe (Maury, 2006), including the majority of all limited liability companies in Norway (Berzins et al., 2018). According to Maury (2006), family-controlled firms in Western Europe are associated with higher valuations and profitability than firms with non-family owners. Analysis of public U.S. companies indicates that family firms outperform non-family firms (Miller et al., 2007). Miller et al. (2007) suggest that the enhanced performance might be due to concentrated ownership and voting rights. Family firms have unique agency problems related to ownership patterns, governance structure and management (Sarkar & Selarka, 2021). The question is whether these mechanisms give gender diversity a different impact on profitability in family firms than in non-family firms.

Nekhili et al. (2018) compared the effects on profitability of hiring a female CEO between non-family and family firms. They found that female CEOs perform better in non-family firms than in family firms (Nekhili et al., 2018). Their findings

suggest that the effect depends on the organization, culture and task-related positions, consistent with the contingency theory of leadership (Nekhili et al., 2018).

Pérez-González (2006) studied publicly traded U.S. firms with concentrated ownership or firms with the founding family involved to examine the impact inherited control has on firm performance. He found that newly appointed CEOs related to the departing CEO, founder or large shareholders performed worse than CEOs with no such relations (Pérez-González, 2006). The author's results also show that family CEOs are on average eight years younger than non-family CEOs (Pérez-González, 2006). Bennedsen et al. (2007) found that family succession decreases firm performance, in particular, operating profitability on assets. Their findings indicate that first-child males are more likely to take over the CEO position of the firm than first child females but that the gender of the first child does not impact profitability (Bennedsen et al., 2007). The authors used a dataset containing financial information on limited liability companies in Denmark for the period 1994–2002 (Bennedsen et al., 2007).

Consistent with the literature related to nepotism and dynastic management in family firms (Pérez-González, 2006), González et al. (2020) found that female family directors have a negative impact on financial performance. However, outside female directors were found to have a positive impact on firm performance. The study was conducted by collecting a sample of 523 closely held Colombian family firms, with 4907 board members, whereas 833 board members were female (González et al., 2020). Fėlix and David (2019) looked at data from 199 Portuguese family companies from 2006 to 2014. They showed that the presence of women in family firms has positive impacts on their performance.

Sarkar and Selarka (2021) provide empirical evidence on the effect of women directors on performance of family firms in the context of an emerging economy. They collected data from India, covering periods before and after the implementation of gender quotas. The authors found evidence that when the appointment of women was voluntary, the presence of women directors on board led to higher firm performance (Sarkar & Selarka, 2021). The motivation for this paper was to focus on the growing scholarship documenting that ownership and governance structures of family firms are distinctly different from those of widely

held firms, giving rise to corporate governance challenges that are specific to family firms (Sarkar & Selarka, 2021).

The effect of gender in family firms' management continues to be an important area for family business literature (Fèlix & David, 2019). To the best of our knowledge, there is no research on gender's impact on firm performance in Norwegian family firms. Thus, we want to examine how the results related to our two initial hypotheses differ between family and non-family firms. Our final hypotheses are as follows:

Hypothesis 4: *The effect of the CEO's gender on profitability is not equal for family firms and non-family firms*

Hypothesis 5: *The effect of gender diversity in the BoD on profitability is not equal for family firms and non-family firms*

3.0 DATA AND DESCRIPTIVE STATISTICS

3.1 Sample and data processing

Our sample consists of data on Norwegian AS firms retrieved from the Centre for Corporate Governance Research (CCGR) database. CCGR aims to produce high-quality data and research about listed and unlisted firms, family firms and the general corporate landscape of Norway (CCGR, 2020). With the help of our supervisor, we have gained access to a substantial sample of data, consisting of 4,451,774 observations distributed among 81 variables for the years 2000–2018. The data contains high-quality and detailed accounting information and a diverse set of corporate governance variables on Norwegian firms (CCGR, 2020).

The data sample went through an adjustment process to make it credible and suitable for answering our hypotheses. The sample consisted of both consolidated and unconsolidated firms. To avoid firms showing up twice, we omitted unconsolidated accounting variables where consolidated accounting variables were available. We then removed outliers at the 1st and 99th percentiles in our accounting variables.

Further, we removed specific observations in our data sample to make it applicable to answer our hypotheses. We removed firms where the CEO had a tenure of less

than one year to avoid observations where there has been appointed a new CEO in the current year. We then removed all inactive firms, meaning firms with zero employees, total assets equal to zero and operating revenues equal to zero. Subsidiaries and non-independent firms were removed since the BoD and the CEO's effect on profitability are represented in the parent and independent firms. All ASA firms and other firms that were not AS registered were removed from the sample to avoid firms with differing and uninteresting purposes for our thesis. Further, firms with inconsistent accounting were removed, meaning firms where the sum of assets does not equal the sum of total liabilities and equity, as well as firms with negative fixed assets, negative current assets, negative current liabilities, negative long-term liabilities, negative dividends and negative depreciation. All currencies except the Norwegian Krone (NOK) were also removed. Due to their special capital requirements and accounting rules, all financial and insurance companies were taken out of the sample. We kept the data on firms leaving and entering the dataset, since we consider it valuable to see how CEOs and BoD manage businesses with different prerequisites.

Variable dummies for each industry were created to control for the effects different industries can have on our dependent variables[1]. These were created by using public industry definitions from Statistics Norway. Statistics Norway (Statistics Norway, 2019, n.d.a, n.d.b) had three different definitions of industries over the years. Consequently, the earlier industry codes were decoded as we best saw fit to the current standards. Firms were then put in firm size categories taken from the definition of Berzins et al. (2018). Berzins et al. (2018) define small firms as having over 10 million NOK in sales and over 10 employees, medium firms to have between 10 and 100 million NOK in sales and between 10 and 100 employees and large firms to have over 100 million NOK in sales and over 100 employees. Berzins et al.'s (2018) definition is set in 2015 Kroners. Thus, we adjusted the numbers for inflation using Norges Bank's price calculator (2014). In addition, due to a large number of missing values on employees, we decided to divide the firms into sizes only according to sales, where we use operating revenue as a proxy. As the number of observations were substantially lower for large firms and medium firms than for small firms, we merged medium and large firms. We then generated new variables, both dependent and independent, deemed necessary to answer our hypotheses.

[1] An overview of the industries is presented in appendix 1.

Lastly, our dependent and independent variables were trimmed at suitable percentiles to remove the remaining outliers[2].

After the adjustment process, we ended up with an unbalanced panel data set of 900,268 observations from Norwegian AS firms from 2000 to 2018. The majority of the firms are family-owned, with 735,269 of the observations. After removing and generating new variables, we ended up with three dependent variables and several independent variables in our regressions. We believe our dataset contains sufficient observations over a substantial period to answer our hypotheses.

3.2 Profitability variables

To look at the profitability of Norwegian AS firms, we created several financial measures from the available accounting variables from the CCGR-database. We have chosen to use the financial performance measures return on assets (*ROA*), *Adjusted ROA* and return on equity (*ROE*). Performance measures are often used in business sectors as benchmarks (Kopecká, 2018). Researchers have previously used many different methods to measure profitability and the area is rather vast (Kopecká, 2018). *ROE* is one of the most widely used measures for financial performance and has been stated to be an essential measure an investor should consider (du Toit & Wet, 2007). *ROE* solely focuses on the equity component of the investment and indicates a firm's ability to create profits based on the firm's share capital (Azis et al., 2018). *ROE* is calculated as follows:

$$ROE_{i,t} = \frac{Net\ income_{i,t}}{\frac{Total\ equity_{i,t} + Total\ equity_{i,t-1}}{2}}$$

However, *ROE* has the disadvantage of being affected by a firm's debt levels (du Toit & Wet, 2007). Higher leverage can increase *ROE*, even if the firm is experiencing decreased overall firm value (du Toit & Wet, 2007). This highlights the importance of looking at several financial measures when evaluating a firm's performance. Unlike *ROE*, *ROA* uses total assets for measuring a firm's capability to generate future profits (Azis et al., 2018). *ROA* is, together with *ROE*, seen as one of the most common and useful measures of profitability (Jewell & Mankin,

[2] *ROA* and *Adjusted ROA* were trimmed at 0.5 and 99 percentiles and *ROE* on 2 and 98 percentiles. *Directors' mean age* were trimmed at 1 and 99 percentiles, *Owners*, *Employees* and *Board size* at the 0 and 99 percentiles, *CEO share* and *Leverage* on the 0 and 98 percentiles, *Independent board members %* at the 0 and 97 percentiles and *CEO salary log* at the 1 and 85 percentiles.

2011). There are many ways to define *ROA*. We have chosen to define it the following way:

$$ROA_{i,t} = \frac{Net\ income_{i,t}}{\frac{Total\ assets_{i,t} + Total\ assets_{i,t-1}}{2}}$$

The above definition of *ROA* is the second most used definition but considered the most accurate according to Jewell and Mankin (2011). This definition of *ROA* compares the returns to equity investors to average total assets, meaning assets funded by both equity and debt providers (Jewell & Mankin, 2011). When using this measure, debt levels should be taken into account, as the measure will decrease with increased interest expenses (Jewell & Mankin, 2011). Another way to calculate *ROA* is to use *Adjusted ROA*, measured by net operating income after taxes instead of net income. *Adjusted ROA* has the advantage of being able to compare firms with different debt policies, as the measure is unaffected by differences in non-operating income (Jewell & Mankin, 2011). We calculate *Adjusted ROA* as following:

$$Adjusted\ ROA_{i,t} = \frac{Net\ operating\ income_{i,t} * (1 - Tax\ rate_{i,t})}{\frac{Total\ assets_{i,t} + Total\ assets_{i,t-1}}{2}}$$

3.3 Gender and governance variables

To try and answer our hypotheses, we use several variables that we believe to have an impact on our profitability variables.

The main explanatory variables of interest are our gender variables. The dummy variable *Female CEO* takes the value 1 if the CEO is a female and the value 0 otherwise. *Female directors %* indicates the percentage of female directors relative to total board members. This diversity measure is used in a number of the literature on how gender affects profitability. As an alternative measure to *Female directors %*, we created a dummy variable for board gender diversity, *BGD*, that accounts for diversity for both genders. This variable takes the value 1 if there are at least 40% of both genders on the BoD and 0 otherwise. To control for the Gender Balance Law, we created the dummy variable *Quota* taking the value 1 if the year is 2008 or after and the value 0 otherwise. To examine if the quota has affected how gender impacts profitability, we created an interaction variable between *Female directors %* and *Quota*.

Besides the gender of the CEO and directors, we control for several other characteristics concerning leadership and ownership. Adams and Ferreira (2009) found that the effect of gender diversity on firm performance is positive in firms with otherwise weak governance but negative in firms with strong governance, making it important for us to control for several governance mechanisms. In line with previous literature, we control for *CEO duality*, which has been suggested to impact profitability (Đặng et al., 2020). *CEO duality* is a dummy variable that takes the value 1 if the CEO is sitting in the BoD. According to Chen et al. (2017), firms with female directors are more likely to have CEO duality than firms without female directors.

CEO tenure shows how long the current CEO has been in their position. It is reasonable to assume that CEOs with longer tenure might make better decisions based on experience and having more influence on the rest of the board and employees. The study of Simsek (2007), found that the skills, knowledge and experience make the CEO more competent and confident in strategic risk-taking. Some studies have suggested that the impact gender has on profitability might be because of age differences (Ahern & Dittmar, 2012). Age can serve as a proxy for cognitive frames that impact firm performance (Đặng et al., 2020). Therefore, we control for *Directors' mean age* and *CEO age*. *Directors' mean age* measures the average age of the BoD, while *CEO age* is calculated by subtracting the CEO's birth year from the current year.

The study of Ikäheimo et al. (2018) stated that performance-based incentives are shown to be positively correlated to *ROA*, *ROE* and profit margin ratios of firms in white-collar jobs. Adams and Ferreira (2009) state that principal-agent theory predicts a higher total pay to compensate for the additional risk associated with the equity-based pay (Adams & Ferreira, 2009). Thus, we include the variables *CEO salary log* and *CEO share* to control for the effects on our performance measures. *CEO salary log* is measured as the logarithm of the CEO's salary, while *CEO share* shows what percentage of the company is ultimately owned by the CEO.

According to Yermack (1996), smaller BoD are more effective, meaning they exhibit more favorable financial ratios and provide stronger CEO performance incentives. Thus, *Board size* is included as a control variable and shows the number of directors on a firm's board. Oswald and Jaheira's (1991) empirical studies found

that higher levels of inside ownership resulted in higher returns for firms. Therefore, the number of owners (*Owners*) are controlled for, though this variable does not differentiate between active and passive ownership.

As literature on corporate governance has suggested that family firms perform better than non-family firms (Memili, 2015), the dummy variable *Family firm* is included. Following Berzins and Bøhren's (2013) definition, this variable takes the value 1 if one family owns at least 50% of the firm. Miller et al. (2014) suggest that CEOs who are not a part of the family might perform better than family CEOs. Thus, in the cases where the firm is a family firm, we compare our results with the dummy variable *Family CEO*. The variable takes the value 1 if the CEO is in the family with the largest ultimate ownership and 0 otherwise. Previous studies reveal that whether the director is independent or executive and has family ties or not influences the effect on performance (González, 2013; Liu et al., 2014; Sarkar & Selarka, 2021). Therefore, we find it interesting to control for *Independent board members %*. This variable shows the percentage of board members, not employee elected and not related to owners or the CEO.

3.3 Accounting and firm specific variables

Variables concerning fundamental firm characteristics are also included. Financial literature has revealed a negative relation between leverage and corporate performance (González, 2013). Further, Frank and Goyal (2007) state that differences among CEOs account for variation in leverage and Faccio et al. (2016) found that firms run by female CEOs are associated with lower leverage. *Leverage* is thus included and is calculated as total liabilities divided by total assets. In financial literature, there are several findings that risk and profitability are positively correlated (Ghysels et al., 2005). Several studies have also investigated a relationship between gender and firm risk (Khan & Vieito, 2013; Lenard et al., 2014; Sila et al., 2016). Following Garcia de Olalla (2014), our variable *Firm risk* is calculated as the standard deviation of the growth in operating revenue. In accordance with previous literature, we additionally control for firm size. The variable *Firm size ln(assets)* is calculated as the logarithm of total assets. Considering that *Employees* were suggested as a proxy for firm size in the definition set by Berzins et al. (2018), we include this variable in our regressions. As discussed

under section 3.1, we divide our sample into two categories: Firm size small and firm size medium-to-large.

3.4 Descriptive statistics

Table 1 summarizes the basic descriptive statistics for the variables relevant to our thesis. The table is divided into three panels; panel A shows statistics for our whole sample and the difference between our two firm size categories. Panel B shows the difference between firms with female CEOs and male CEOs and firms with less than 40% female directors and firms with at least 40% female directors. Panel C shows the difference between family firms and non-family firms and firms with board gender diversity and firms without board gender diversity. We define firms with board gender diversity to have at least 40% of both genders in their BoD.

Table 1: The following table presents the descriptive statistics for our data sample. The table is divided into three panels; Panel A shows the difference between our three firm size categories. Panel B shows the difference between firms with female CEOs and male CEOs and firms with less than 40% female directors and firms with at least 40% female directors. Panel C shows the difference between family firms and non-family firms and firms with board gender diversity and firms without board gender diversity. We define firms with board gender diversity to have at least 40% of both genders in their BoD. The information in each table shows the number of observations (N), the estimated mean values (MEAN), the median value (MEDIAN), the standard deviation (STD. DEV.) and the minimum and maximum value (MIN and MAX). *ROA* is measured as net income divided by average total assets. *Adjusted ROA* is measured as net operating income after tax and divided by average total assets. *ROE* is measured by taking the net income divided by average total equity. *Leverage* is measured by taking total liabilities divided by total assets. *Firm size ln(assets)* is measured by taking the natural logarithm of total assets. *Firm risk* is measured as the standard deviation of operating revenue's growth in percentage. *Employees* are the number of employees. *Firm age* is the foundation year subtracted by the current year. *Family firms* are firms where one family owns more than 50% of the company. *Female CEO* is a dummy variable, taking the value 1 if the CEO is female and 0 if the CEO is male. *Female directors %* is measured as the number of female directors divided by board size. *BGD* is a dummy variable taking the value 1 if there are at least 40% of both genders in the BoD. *CEO duality* is a dummy variable, taking the value 1 if the CEO is in the BoD and 0 otherwise. *CEO tenure* is the consecutive years since the CEO was appointed to the position. *CEO age* is the age of the acting CEO. *CEO age Male* and *CEO age Female* is the age for the acting CEO when the CEO is male or female. *Directors' mean age* is the mean age of the directors on board. *Mean male director age* and *mean female director age* is the mean age of the male and female directors. *Family CEO* is when the CEO is a member of the family with the largest ultimate ownership. *Female family CEO and Male family CEO* is when the family CEO is female or male. *Independent board members %* is measured by the number of independent board members divided by board size. *Board size* is the total number of directors on board. *Male directors* and *Female directors* are the numbers of male and female directors. *Owners* are the number of owners. *CEO share* is the number of shares owned directly by the CEO. *CEO salary log* is the logarithm of the CEO's salary.

Panel A:

	ALL FIRMS						SMALL FIRMS						MEDIUM TO LARGE FIRMS					
	N	MEAN	MEDIAN	STD.DEV.	MIN	MAX	N	MEAN	MEDIAN	STD.DEV.	MIN	MAX	N	MEAN	MEDIAN	STD.DEV.	MIN	MAX
PROFITABILITY																		
Adjusted ROA	389879	.103	.072	.169	-.542	.83	315590	.101	.067	.176	-.542	.83	74289	.113	.09	.131	-.539	.83
ROA	389879	.103	.073	.198	-.751	.998	315513	.101	.068	.208	-.751	.998	74366	.11	.088	.146	-.745	.998
ROE	403447	.251	.164	.753	-2.97	3.415	326862	.217	.138	.759	-2.97	3.415	76585	.398	.273	.711	-2.965	3.412
FIRM SPECIFIC																		
Leverage	884663	.688	.702	.374	0	2.967	725445	.683	.688	.399	0	2.967	159218	.71	.745	.224	0	1.603
Firm size ln(assets)	900268	14.327	14.343	1.62	6.908	19.705	740250	13.953	14.004	1.474	6.908	19.626	160018	16.058	15.912	1.04	6.908	19.705
Firm risk	424852	.009	-.196	.976	-1.296	6.913	345072	.005	-.206	.994	-1.296	5.086	79780	.028	-.159	.895	-1.252	6.913
Employees	609117	6.272	3	9.544	1	123	466217	3.437	2	3.089	1	20	142900	15.523	11	15.663	1	123
Firm age	488584	16.551	14	13.616	2	169	377938	16.116	13	13.616	2	169	110646	18.036	15	13.513	2	166
GENDER & GOVERNANCE																		
Family firm	782115	.94	1	.237	0	1	655358	.946	1	.226	0	1	126757	.908	1	.289	0	1
Female CEO	863959	.174	0	.379	0	1	707161	.189	0	.391	0	1	156798	.104	0	.306	0	1
Female directors %	776176	.18	0	.317	0	1	624815	.192	0	.332	0	1	151361	.13	0	.238	0	1
BGD	776176	.092	0	.289	0	1	624815	.095	0	.293	0	1	151361	.081	0	.273	0	1
CEO duality	845431	.852	1	.356	0	1	694292	.869	1	.337	0	1	151139	.772	1	.42	0	1
CEO tenure	845431	7.184	6	5.402	1	24	694292	7.065	6	5.405	1	24	151139	7.732	7	5.35	1	24
CEO age	859551	49.434	49	11.355	18	100	704962	49.628	49	11.655	18	100	154589	48.549	48	9.821	19	100
CEO age Male	687539	49.823	50	11.26	18	100	551317	50.093	50	11.578	18	100	136222	48.734	49	9.797	19	100
CEO age Female	143335	47.309	47	11.017	18	100	127549	47.342	47	11.182	18	100	15786	47.039	47	9.575	20	88
Director mean age	849418	49.761	49.667	9.848	28	73.667	693715	49.801	49.667	10.164	28	73.667	155703	49.581	49.667	8.295	28	73.667
Mean male director age	775351	50.299	50	10.119	28	75	624702	50.374	50	10.452	28	75	150649	49.985	50	8.597	28	75
Mean female director age	276153	48.291	48	10.944	25	76	229760	48.273	48	11.112	25	76	46393	48.383	48	10.073	25	76
Family CEO	782115	.804	1	.397	0	1	655358	.822	1	.383	0	1	126757	.71	1	.454	0	1
Female family CEO	769122	.141	0	.349	0	1	643407	.155	0	.362	0	1	125715	.072	0	.258	0	1
Male family CEO	769122	.676	1	.468	0	1	643407	.682	1	.466	0	1	125715	.644	1	.479	0	1
Independent board members %	734537	.306	0	.413	0	1	591322	.294	0	.416	0	1	143215	.352	.25	.397	0	1
Board size	774350	1.98	2	1.236	1	12	622989	1.795	1	1.081	1	6	151361	2.739	3	1.511	1	12
Male directors	774350	1.601	1	1.149	0	11	622989	1.418	1	1	0	6	151361	2.354	2	1.39	0	11
Female directors	862511	.419	0	.702	0	8	704746	.425	0	.701	0	8	157765	.391	0	.704	0	8
Owners	838139	2.187	2	2.04	1	28	688445	2.03	1	1.68	1	15	149694	2.909	2	3.11	1	28
CEO share	658626	71.889	80	29.86	0	100	562183	73.734	93.75	29.209	0	100	96443	61.133	51	31.315	0	100
CEO salary log	441702	12.478	12.78	1.1	1.609	14.323	326028	12.279	12.628	1.08	1.609	13.424	115674	13.038	13.16	.953	1.792	14.323

Panel B:

	CEO MALE						CEO FEMALE						FEMALE DIRECTORS % < 40%						FEMALE DIRECTORS % ≥ 40%					
	N	MEAN	MEDIAN	STD.DEV.	MIN	MAX	N	MEAN	MEDIAN	STD.DEV.	MIN	MAX	N	MEAN	MEDIAN	STD.DEV.	MIN	MAX	N	MEAN	MEDIAN	STD.DEV.	MIN	MAX
PROFITABILITY																								
Adjusted ROA	312803	.105	.073	.166	-.542	.83	66527	.1	.072	.169	-.542	.83	267870	.104	.074	.164	-.542	.83	122009	.102	.07	.178	-.542	.83
ROA	312807	.105	.074	.195	-.751	.998	66533	.098	.072	.197	-.749	.997	267815	.104	.074	.193	-.751	.998	122064	.102	.07	.208	-.749	.997
ROE	323771	.263	.17	.748	-2.97	3.415	68342	.224	.15	.754	-2.97	3.412	277869	.265	.173	.751	-2.97	3.415	125578	.221	.143	.758	-2.97	3.412
ACCOUNTING & FIRM SPECIFIC																								
Leverage	702992	.685	.703	.363	0	2.967	147217	.712	.707	.391	0	2.967	604933	.687	.707	.362	0	2.967	279730	.691	.69	.397	0	2.967
Firm size ln(assets)	714019	14.456	14.484	1.602	6.908	19.705	149940	13.931	13.894	1.511	6.908	19.567	614804	14.501	14.542	1.603	6.908	19.705	285464	13.954	13.925	1.594	6.908	19.598
Firm risk	340466	.019	-.193	.985	-1.296	6.913	72081	-.023	-.196	.866	-1.296	6.913	292218	.008	-.195	.974	-1.296	6.913	132634	.012	-.197	.98	-1.296	6.913
Employees	477669	6.481	3	9.88	1	123	108190	5.789	3	8.303	1	123	397793	7.301	4	10.442	1	123	211324	4.335	2	7.179	1	123
Firm age	389474	16.721	14	13.462	2	167	76762	16.039	13	14.191	2	154	342847	16.513	14	13.079	2	166	145737	16.64	13	14.805	2	169
GENDER & GOVERNANCE																								
Family firm	634889	.942	1	.234	0	1	134233	.934	1	.248	0	1	536036	.943	1	.233	0	1	246079	.935	1	.247	0	1
Female CEO	714019	0	0	0	0	0	149940	1	1	0	1	1	592021	.058	0	.234	0	1	271938	.425	0	.494	0	1
Female directors %	620867	.086	0	.199	0	1	126879	.639	.667	.379	0	1	614804	.033	0	.096	0	.375	161372	.737	.667	.24	.4	1
BGD	620867	.072	0	.259	0	1	126879	.192	0	.394	0	1	614804	0	0	0	0	0	161372	.444	0	.497	0	1
CEO duality	676420	.864	1	.343	0	1	139460	.827	1	.378	0	1	581773	.892	1	.31	0	1	263658	.762	1	.426	0	1
CEO tenure	676420	7.388	6	5.477	1	24	139460	6.34	5	5.052	1	24	581773	7.452	6	5.435	1	24	263658	6.594	5	5.279	1	24
CEO age	687539	49.823	50	11.26	18	100	143335	47.309	47	11.017	18	100	592825	49.535	49	11.191	18	100	266726	49.21	49	11.707	18	100
CEO age Male	687539	49.823	50	11.26	18	100	0	.	.	.	.	.	541768	49.646	50	11.089	18	100	145771	50.48	51	11.853	18	100
CEO age Female	0	.	.	.	.	.	143335	47.309	47	11.017	18	100	33036	47.078	47	10.932	18	100	110299	47.378	47	11.041	18	100
Directors' mean age	677456	49.936	50	9.81	28	73.667	141128	48.73	48.5	9.752	28	73.667	605975	50	50	9.949	28	73.667	243443	49.165	49	9.569	28	73.667
Mean male director age	667207	50.186	50	10.008	28	75	80396	50.968	51	10.651	28	75	605462	50.067	50	10.039	28	75	169889	51.123	51	10.36	28	75
Mean female director age	145629	49.01	49	11.358	25	76	120470	47.334	47	10.287	25	76	69448	48.655	48	11.625	25	76	206705	48.169	48	10.703	25	76
Family CEO	634889	.819	1	.385	0	1	134233	.811	1	.392	0	1	536036	.797	1	.402	0	1	246079	.818	1	.386	0	1
Female family CEO	634889	0	0	0	0	0	134233	.811	1	.392	0	1	527135	.038	0	.192	0	1	241987	.366	0	.482	0	1
Male family CEO	634889	.819	1	.385	0	1	134233	0	0	0	0	0	527135	.772	1	.419	0	1	241987	.466	0	.499	0	1
Independent board members %	592135	.294	0	.407	0	1	118951	.281	0	.402	0	1	581773	.313	0	.416	0	1	152764	.277	0	.398	0	1
Board size	619456	1.988	1	1.246	1	12	126548	1.98	2	1.206	1	11	613464	1.948	1	1.243	1	12	160886	2.102	2	1.202	1	11
Male directors	619456	1.759	1	1.113	0	11	126548	.859	1	1.044	0	9	613464	1.832	1	1.117	1	11	160886	.721	1	.787	0	6
Female directors	686416	.264	0	.566	0	8	143313	1.165	1	.806	0	8	614804	.117	0	.337	0	5	247707	1.167	1	.806	0	8
Owners	670353	2.239	2	2.107	1	28	138308	2.084	2	1.764	1	28	576786	2.199	1	2.103	1	28	261353	2.159	2	1.892	1	28
CEO share	548588	72.251	80	29.829	0	100	110038	70.087	66.66	29.953	0	100	451060	72.492	86	29.948	0	100	207566	70.579	70	29.628	0	100
CEO salary log	350122	12.525	12.819	1.099	1.609	14.323	78668	12.35	12.631	1.041	5.247	14.323	306426	12.544	12.827	1.093	1.609	14.323	135276	12.328	12.646	1.103	3.497	14.323

Panel C:

	FAMILY						NON-FAMILY						NO BOARD GENDER DIVERSITY						BOARD GENDER DIVERSITY					
	N	MEAN	MEDIAN	STD.DEV.	MIN	MAX	N	MEAN	MEDIAN	STD.DEV.	MIN	MAX	N	MEAN	MEDIAN	STD.DEV.	MIN	MAX	N	MEAN	MEDIAN	STD.DEV.	MIN	MAX
PROFITABILITY																								
Adjusted ROA	328131	.107	.076	.168	-.542	.83	20125	.08	.053	.159	-.541	.821	308321	.104	.074	.165	-.542	.83	31991	.096	.067	.158	-.536	.83
ROA	328133	.107	.077	.197	-.751	.998	20100	.078	.051	.191	-.75	.996	308267	.103	.074	.194	-.751	.998	31993	.094	.066	.186	-.746	.996
ROE	339556	.265	.174	.754	-2.97	3.414	20505	.181	.109	.708	-2.961	3.408	319728	.26	.17	.751	-2.97	3.415	33096	.239	.154	.711	-2.968	3.412
ACCOUNTING & FIRM SPECIFIC																								2.964
Leverage	723716	.688	.701	.367	0	2.967	46097	.682	.692	.378	0	2.964	693074	.689	.706	.366	0	2.967	70587	.688	.702	.367	0	
Firm size ln(assets)	735269	14.254	14.291	1.528	6.908	19.693	46846	14.737	14.745	1.716	6.908	19.705	704562	14.42	14.447	1.598	6.908	19.705	71614	14.313	14.335	1.55	6.908	19.515
Firm risk	357514	.007	-.195	.959	-1.296	6.913	21476	.074	-.181	1.057	-1.296	6.913	336247	.001	-.196	.958	-1.296	6.913	34650	-.03	-.199	.876	-1.296	6.913
Employees	504051	5.609	3	7.837	1	123	30223	7.956	4	11.121	1	123	459686	7.079	4	10.12	1	123	44165	8.029	5	10.488	2	123
Firm age	387784	16.316	14	12.784	2	167	28733	17.346	13	17.154	2	166	387345	16.591	14	13.285	2	166	39735	17.945	15	14.797	2	141
GENDER & GOVERNANCE																								
Family firm	735269	1	1	0	1	1	46846	0	0	0	0	0	616243	.944	1	.23	0	1	63238	.931	1	.254	0	1
Female CEO	723490	.173	0	.379	0	1	45632	.194	0	.395	0	1	678327	.151	0	.358	0	1	69419	.352	0	.478	0	1
Female directors %	640597	.181	0	.323	0	1	38884	.183	0	.289	0	1	704562	.148	0	.316	0	1	71614	.493	.5	.026	.4	.571
BGD	640597	.092	0	.289	0	1	38884	.113	0	.316	0	1	704562	0	0	0	0	0	71614	1	1	0	1	1
CEO duality	690097	.895	1	.306	0	1	44578	.703	1	.457	0	1	667194	.895	1	.306	0	1	67343	.891	1	.311	0	1
CEO tenure	690097	7.457	6	5.474	1	24	44578	6.459	5	5.14	1	24	667194	7.383	6	5.413	1	24	67343	7.326	6	5.537	1	24
CEO age	703246	49.513	49	11.369	18	100	44690	49.258	49	11.492	19	100	679436	49.429	49	11.234	18	100	67534	50.491	50	11.323	18	100
CEO age Male	576929	49.924	50	11.317	18	100	35337	49.774	50	11.451	19	96	559306	49.736	50	11.126	18	100	42743	52.129	52	11.168	19	100
CEO age Female	119972	47.409	47	11.03	18	100	8433	46.905	47	10.939	20	100	99166	47.427	47	11.005	18	100	23036	47.261	47	10.664	18	100
Directors' mean age	698116	49.732	49.5	9.958	28	73.667	45893	50.085	50	9.217	28	73.667	695733	49.765	49.75	9.992	28	73.667	71614	50.057	50	9.559	28	73.667
Mean male director age	634088	50.256	50	10.232	28	75	43201	50.731	50.75	9.539	28	75	624336	50.151	50	10.117	28	75	71083	51.574	52	10.646	28	75
Mean female director age	220661	48.336	48	11.076	25	76	17954	48.031	47.5	10.462	25	76	159206	48.171	48	10.964	25	76	71614	48.506	48	10.807	25	76
Family CEO	735269	.823	1	.382	0	1	46846	.501	1	.5	0	1	616243	.803	1	.398	0	1	63238	.831	1	.374	0	1
Female family CEO	723490	.144	0	.351	0	1	45632	.102	0	.303	0	1	606147	.123	0	.329	0	1	62350	.287	0	.452	0	1
Male family CEO	723490	.693	1	.461	0	1	45632	.412	0	.492	0	1	606147	.693	1	.461	0	1	62350	.556	1	.497	0	1
Independent board members %	604793	.208	0	.357	0	1	37189	.467	.5	.394	0	1	667194	.309	0	.417	0	1	67343	.266	0	.364	0	1
Board size	639815	1.861	1	1.13	1	12	38529	2.815	3	1.512	1	11	703152	1.918	1	1.228	1	12	71198	2.59	2	1.15	2	11
Male directors	639815	1.499	1	1.067	0	11	38529	2.316	2	1.458	0	10	703152	1.629	1	1.184	0	11	71198	1.331	1	.663	1	6
Female directors	706490	.398	0	.67	0	7	46170	.555	0	.82	0	6	704562	.291	0	.613	0	8	71614	1.272	1	.538	1	6
Owners	686619	2.224	2	1.936	1	28	40918	4.1	3	3.569	1	28	661986	2.153	1	2.028	1	28	66808	2.274	2	1.795	1	28
CEO share	640123	72.986	87	29.35	0	100	17743	31.705	33.33	17.846	0	100	520657	72.736	90	29.794	0	100	53204	63.761	50	27.704	0	100
CEO salary log	367828	12.457	12.76	1.078	1.609	14.323	23527	12.563	12.874	1.186	4.533	14.322	354455	12.517	12.805	1.089	1.609	14.323	34559	12.449	12.74	1.091	3.912	14.321

From *panel A*, we see a large span between the means of the dependent variables. Gaio and Henriques (2018) state that large firms are on average more profitable than small and medium firms measured by *ROA* and *ROE*. Since we have chosen to merge medium and large firms, it is difficult to make a precise comparison, however it is an indication that larger firms tend to be more profitable than smaller firms. This matches our dependent variables, as their means increase from small firms to medium-to-large firms. The change is most significant for *ROE*, with a jump from 21.7% for small firms to an average of just under 40% for medium-to-large firms. *ROA* and *Adjusted ROA* have a mean around 10% for firm size small and around 11% for firm size medium-to-large. The drastic change in *ROE* may partly result from the variable *Leverage* as it is positively correlated with firm size, making equity lower relative to total assets, thus increasing *ROE*. Higher leverage ratios may give higher financial expenses, which can negatively impact *ROA* and *ROE*. *Adjusted ROA* will be unaffected, making *Adjusted ROA* somewhat larger than *ROA*. When comparing small firms to larger firms, we see that medium-to-large firms take higher operational risk than small firms, as shown by the averages of the variable *Firm risk.*

On average, females account for 17% of all CEOs and 18% of all BoD, where the numbers are higher for small firms than for larger firms. Female CEOs and directors have a lower average age than their male counterparts, which is coherent with the findings of Withisuphakorn and Jiraporn (2017). The variable *BGD* has a mean of 9.2%, showing that approximately one out of every ten firms have diversity on behalf of both genders. 94% of the firms in our data set are defined as family firms and about 80% of all firms have appointed a CEO from the family. About 68% of the family CEOs are male. *CEO duality* has a mean close to 1, indicating that most CEOs are in the BoD. However, it decreases as the firm gets larger, shown in the table for medium-to-large firms. The average *Board size* and number of *Owners* are around two, displaying that most of the firms in our sample are small. When firms get larger, there tend to be more owners and directors on board and consequently, the shares per CEO decreases. *CEO share* shows that the acting CEO owns on average 71.9% of the shares of the firm. Though *CEO share* is higher for small firms than for larger firms, *CEO salary log* increases with firm size. *Independent board members %* increases as firm size increases, depicting a positive correlation. Small firms have very few owners on average, potentially resulting in a higher

number of family CEOs and thus a lower number of independent board members than in larger firms.

From panel B, we observe that firms run by male CEOs have slightly higher profitability measures than firms run by female CEOs. We see that firms with less than 40% female directors have better performance measures than firms with 40% female directors or more. This may indicate that males perform better than females when it comes to financial performance, contradicting some of the existing literature on the subject. We see that firms with female CEOs have slightly higher levels of leverage than firms with male CEOs, contradicting the study done by Faccio et al. (2016). We see that firms with less than 40% female directors have lower levels of leverage but higher levels of firm risk, than firms with at least 40% female directors. The *Firm risk* variable is higher for firms with male CEOs than with female CEOs, indicating that females take fewer corporate risks, conforming with the study of Faccio et al. (2016).

The *Female directors %* variable shows that when the CEO is male, there are on average 8.6% female directors, in contrast to firms with female CEOs, where there are on average 63.9% female directors. In firms with less than 40% female directors, the variable *Female CEO* shows an average of 5.8%, while firms with 40% female directors or more show an average of 42.5% of the CEOs being female. This may indicate that male top management is self-selective, while female management is more willing to adopt female CEOs or female directors. However, the tables also show that firms tend to select male CEOs, despite having many female directors. Firms with female CEOs also have a higher mean for *BGD* than firms with male CEOs, indicating that female CEOs are more open to a diverse board on behalf of both genders.

Further, panel B shows that female CEOs and female directors are associated with lower levels of independent board members, though *Board size* tends to increase with female directors. The variables *CEO share* and *CEO salary log* have higher means in firms with male CEOs than with female CEOs. Previous studies have shown a pay gap between most levels of executives, however, the findings are conflicting (Bugeja et al., 2012). The study of Bugeja et al. (2012) finds no association between CEO pay and gender. Their results indicate that women who rise through the “glass ceiling”, reaching the CEO position, receive the same pay

as male CEOs. As we saw in panel A, there are more female CEOs in small firms, which tend to have lower CEO salaries, indicating that the pay gap may be due to differences in firm sizes where female CEOs are appointed.

From panel C, we observe that family firms have better averages for the profitability measures than non-family firms. This may indicate that family firms, on average, outperform non-family firms, which is in line with the previous studies of Maury (2006) and Miller et al. (2007). *Firm risk* is almost non-existent for family firms, while non-family firms show slightly higher levels of risk. We see that non-family firms are slightly bigger than family firms for the variables *Firm size ln(assets)*, *Employees*, *Board size* and *Owners*. Family firms are associated with a higher average of *CEO tenure, CEO duality* and *Family CEO*. Approximately 82% of all CEOs in family firms are appointed from the family with the largest ultimate ownership. In non-family firms, 50% of the CEOs come from the family with the highest ultimate ownership. However, the level of ownership from families is not high enough to let the firm be defined as a family firm. Family firms are associated with fewer independent board members than non-family firms, which is logical since non-family firms have more owners and relatively less family involved than family firms. Family firms also have slightly lower means for *Female CEO* and *Female directors %* than non-family firms. This can be seen as surprising, as one might believe that the corporate ladder for women is easier to climb through family ties. However, Bennedsen et al. (2007) found that family firms are more likely to pass down the CEO position to first born males.

Panel C further shows the difference between firms with board gender diversity on behalf of both genders and firms without. Firms with diversity have lower means in the performance measures than firms without board gender diversity. The means for firms with board gender diversity are also lower than for firms with at least 40% female directors and for the firms with less than 40% female directors. This may indicate that male-dominated boards or female-dominated boards perform better than gender-diverse boards.

Lastly, we present a correlation matrix to see how our regressions' dependent and independent variables are related to each other.

Table 2: The table below shows the Pearson correlation coefficient for pairs of variables. *ROA* is measured as net income divided by average total assets. *Adjusted ROA* is measured as operating income after tax and divided by average total assets. *ROE* is measured by taking the net income divided by average total equity. *Female CEO* is a dummy variable, taking the value 1 if the CEO is female and 0 if the CEO is male. *Female directors %* is measured as the number of female directors divided by board size. *BGD* is a dummy variable taking the value 1 if there are at least 40% of both genders in the BoD. *CEO duality* is a dummy variable, taking the value 1 if the CEO is in the BoD and 0 otherwise. *CEO tenure* is the consecutive years since the CEO was hired. *CEO age* is the age of the acting CEO. *Directors' mean age* is the mean age of the sitting directors. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the number of shares owned directly by the CEO. *Employees* are the number of employees. *Leverage* is measured by taking total liabilities divided by total assets. *Firm size ln(assets)* is measured by taking the natural logarithm of total assets. *Firm risk* is measured as the standard deviation of operating revenue's growth in percentage. *Family firms are* firms where one family owns more than 50% of the company. *Independent board members %* is measured by taking the number of independent board members divided by board size. *Board size* is the total number of directors on BoD. *Owners* are the number of owners.

Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
(1) Adjusted ROA	1.000																				
(2) ROA	0.927	1.000																			
(3) ROE	0.604	0.618	1.000																		
(4) Female CEO	-0.011	-0.013	-0.020	1.000																	
(5) Female directors %	-0.014	-0.015	-0.020	0.655	1.000																
(6) BGD	-0.014	-0.013	-0.008	0.155	0.315	1.000															
(7) CEO duality	0.040	0.036	0.032	-0.039	0.004	-0.004	1.000														
(8) CEO tenure	-0.056	-0.031	-0.027	-0.073	-0.032	-0.003	0.204	1.000													
(9) CEO age	-0.045	-0.025	-0.034	-0.084	-0.013	0.027	0.049	0.408	1.000												
(10) Directors' mean age	-0.053	-0.033	-0.041	-0.046	-0.054	0.009	-0.038	0.399	0.758	1.000											
(11) CEO salary log	0.058	0.049	0.095	-0.062	-0.055	-0.018	-0.057	0.045	-0.075	-0.043	1.000										
(12) CEO share	0.046	0.053	0.000	-0.027	-0.039	-0.088	-0.003	0.046	0.028	0.031	-0.039	1.000									
(13) Employees	-0.036	-0.037	0.029	-0.028	-0.015	0.026	-0.166	-0.002	-0.034	-0.011	0.232	-0.176	1.000								
(14) Leverage	0.030	-0.031	-0.061	0.028	0.012	-0.001	-0.007	-0.161	-0.160	-0.162	-0.008	-0.041	0.036	1.000							
(15) Firm size ln(assets)	-0.024	0.000	0.123	-0.124	-0.103	-0.019	-0.074	0.178	0.090	0.108	0.322	-0.159	0.461	-0.083	1.000						
(16) Firm risk	0.204	0.205	0.130	-0.016	-0.022	-0.009	-0.020	-0.117	-0.075	-0.079	-0.012	0.003	-0.029	0.048	0.005	1.000					
(17) Family firm	0.039	0.035	0.026	-0.013	-0.001	-0.017	0.143	0.044	0.005	-0.009	-0.023	0.224	-0.067	0.004	-0.074	-0.016	1.000				
(18) Board size	-0.073	-0.072	-0.016	-0.002	0.059	0.157	-0.289	-0.091	-0.033	-0.047	0.150	-0.581	0.432	0.002	0.313	0.002	-0.188	1.000			
(19) Independent board members %	-0.026	-0.023	-0.031	-0.012	-0.028	-0.030	-0.223	-0.084	-0.046	-0.032	0.027	0.186	0.100	0.006	0.025	0.007	-0.166	0.067	1.000		
(20) Owners	-0.044	-0.044	-0.011	-0.029	-0.024	0.017	-0.113	-0.014	0.025	0.031	0.062	-0.703	0.150	-0.010	0.188	0.006	-0.205	0.487	-0.121	1.000	
(21) Quota	-0.028	-0.012	-0.091	0.050	0.044	0.021	-0.028	0.146	0.059	0.101	0.069	0.152	-0.008	-0.122	-0.005	-0.003	0.056	-0.049	-0.006	-0.050	1.000

Collinearity can make parameter estimation problematic and lead to the wrong identification of relevant predictors in regression models (Dormann et al., 2013). We check for collinear relationships in our explanatory variables by looking at their sample correlation coefficients, as suggested by Hill et al. (2018, p. 290). The sample correlation coefficients describe whether or not there are strong linear relationships between the variables (Hill et al., 2018, p. 290). The values for our independent variables shown in the pairwise correlation matrix are within what is seen as acceptable values, diminishing potential problems with parameter estimation in our regression models (Dormann et al., 2013). The highest correlations are between *Female CEO* and *Female directors %* and between *CEO age* and *Directors' mean age*. Though these correlations are within acceptable ranges, we choose to separate *Female CEO* and *Female directors %* in different hypotheses, together with *CEO age* or *Directors' mean age*, respectively.

4.0 METHODOLOGY

In the following section, we will elaborate on the chosen research approach and the main models used in this paper, as well as on the empirical estimation methods. The data set contains observations from multiple variables over multiple time periods for a number of firms, making it an unbalanced panel data set.

4.1 Main models and estimation methods

In this thesis, we have used available longitudinal archival data from the CCGR database as the starting point for our analysis, resulting in this being a mono method quantitative study (Saunders et al., 2016). Our research has a deductive approach together with empirical analysis of results from a number of regressions. We aimed at using archival data to be able to compare our independent variables with dependent variables and draw conclusions and findings based on the results. To answer our research question "How does gender in firms' top management affect firm profitability?", we compute our regression models the following ways:

Hypothesis 1

$$Dependent\ variables_{i,t} = \beta_0 + \beta_1\ Female\ CEO_{i,t} + \beta_2 X_{i,t} + \beta_3 Year_t + u_i + \epsilon_{i,t}$$

$Where$:

$Dependent\ variables_{i,t}$	$Adjusted\ ROA, ROA, and\ ROE\ of\ firm\ i, in\ year\ t.$
$Female\ CEO_i$	$Dummy\ variable\ taking\ the\ value\ of\ 1\ if\ the\ CEO\ is\ female.$
$X_{i,t}$	$Vector\ of\ CEO\ spesific\ control\ variables\ (CEO\ tenure, CEO\ duality, CEO\ age, CEO\ salary\ (log), CEO\ share)\ and\ firm\ spesific\ control\ variables\ (Employees, Leverage, Firm\ size\ ln(assets), Firm\ risk, Family\ firm, Board\ size, Independent\ board\ members\ \%\ and\ Owners).$
$Year_t$	$Vector\ of\ year\ dummies.$
u_i	$Unobserved\ random\ effects.$
$\epsilon_{i,t}$	$Error\ term.$

Hypothesis 2

$$Dependent\ variables_{i,t} = \beta_0 + \beta_1\ Female\ directors\ \%_{i,t} + \beta_2 X_{i,t} + \beta_3 Year_t + u_i + \epsilon_{i,t}$$

$Where$:

$Dependent\ variables_{i,t}$	$Adjusted\ ROA, ROA, and\ ROE\ of\ firm\ i, in\ year\ t.$
$Female\ directors\ \%_i$	$The\ percentage\ of\ female\ directors\ relative\ to\ board\ size.$
$X_{i,t}$	$Vector\ of\ CEO\ and\ director\ spesific\ control\ variables\ (CEO\ tenure, CEO\ duality, Director\ mean\ age, CEO\ salary\ (log)\ and\ CEO\ share)\ and\ firm\ spesific\ control\ variables\ (Employees, Leverage, Firm\ size\ ln(assets), Firm\ risk, Family\ firm, Board\ size, Independent\ board\ members\ \%\ and\ Owners).$
$Year_t$	$Vector\ of\ year\ dummies.$
u_i	$Unobserved\ random\ effects.$
$\epsilon_{i,t}$	$Error\ term.$

Hypothesis 3

$$Dependent\ variables_{i,t} = \beta_0 + \beta_1\ Female\ directors\ \%_{i,t} + \beta_2 X_{i,t} + \beta_3 Year_t + u_i + \epsilon_{i,t}$$

$Where$:

$Dependent\ variables_{i,t}$	$Adjusted\ ROA, ROA, and\ ROE\ of\ firm\ i, in\ year\ t.$
$Female\ directors\ \%_i$	$The\ percentage\ of\ female\ directors\ relative\ to\ board\ size.$
$X_{i,t}$	$Vector\ of\ CEO\ and\ director\ spesific\ control\ variables\ (Quota, Quota(female\ directors\ \%), CEO\ tenure, CEO\ duality, Directors'\ mean\ age, CEO\ salary\ (log)\ and\ CEO\ share)\ and\ firm\ spesific\ control\ variables\ (Employees, Leverage, Firm\ size\ ln(assets), Firm\ risk, Family\ firm, Board\ size, Independent\ board\ members\ \%\ and\ Owners).$
u_i	$Unobserved\ random\ effects.$
$\epsilon_{i,t}$	$Error\ term.$

Hypothesis 4

$$Dependent\ variables_{i,t} = \beta_0 + \beta_1\ Female\ CEO_{i,t} + \beta_2 X_{i,t} + \beta_3 Year_t + u_i + \epsilon_{i,t}$$

$Where$:

$Dependent\ variables_{i,t}$	$Adjusted\ ROA, ROA, and\ ROE\ of\ firm\ i, in\ year\ t.$
$Female\ CEO_i$	$Dummy\ variable\ taking\ the\ value\ of\ 1\ if\ the\ CEO\ is\ female.$
$X_{i,t}$	$Vector\ of\ CEO\ spesific\ control\ variables\ (CEO\ tenure, CEO\ duality, CEO\ age, CEO\ salary\ (log), CEO\ share)\ and\ firm\ spesific\ control\ variables\ (Employees, Leverage, Firm\ size\ ln(assets), Firm\ risk, Board\ size, Independent\ board\ members\ \%\ and\ Owners).$
$Year_t$	$Vector\ of\ year\ dummies.$
u_i	$Unobserved\ random\ effects.$
$\epsilon_{i,t}$	$Error\ term.$

Hypothesis 5

$$Dependent\ variables_{i,t} = \beta_0 + \beta_1\ Female\ directors\ \%_{i,t} + \beta_2 X_{i,t} + \beta_3 Year_t + u_i + \epsilon_{i,t}$$

$Where$:

$Dependent\ variables_{i,t}$	$Adjusted\ ROA, ROA, and\ ROE\ of\ firm\ i, in\ year\ t.$
$Female\ directors\ \%_i$	$The\ percentage\ of\ female\ directors\ relative\ to\ board\ size.$
$X_{i,t}$	$Vector\ of\ CEO\ and\ director\ spesific\ control\ variables\ (CEO\ tenure, CEO\ duality, Director\ mean\ age, CEO\ salary\ (log)\ and\ CEO\ share)\ and\ firm\ spesific\ control\ variables\ (Employees, Leverage, Firm\ size\ ln(assets),\ Firm\ risk,\ Board\ size, Independent\ board\ members\ \%\ and\ Owners).$
$Year_t$	$Vector\ of\ year\ dummies.$
u_i	$Unobserved\ random\ effects.$
$\epsilon_{i,t}$	$Error\ term.$

The five models are developed for answering our five hypotheses, which each have three different dependent variables for measuring profitability. The regressions conducted in hypotheses 4 and 5 are carried out for both family firms and non-family firms, to allow comparison between these firms. The dependent and independent variables in our models are elaborated in the previous sections 3.2 and 3.3.

According to Parsons and Titman (2008, p. 207) the biggest concern in empirical corporate finance is probably the issue of endogeneity. Thus, endogeneity is an important matter to consider when choosing a regression model. Endogeneity is a term used to describe the presence of an endogenous explanatory variable (Wooldridge, 2015). The endogeneity issue arises when at least one of the independent variables is correlated with the error term, which may lead to biased coefficient estimates Parsons and Titman (2008, p. 207). If biased coefficient estimates occur several issues may distort the results on our dependent profitability measures. Parsons and Titman (2008, p. 216) state that reverse causality, self-selection or omitted variables can be challenges that need to be tackled if the coefficient estimates are biased. According to Đặng et al. (2020), estimating a causal relationship between gender diversity and firm performance might be challenging as board characteristics are endogenously chosen by firms.

Pooled OLS is often used as an effort to mitigate the issue of endogeneity. However, pooled OLS is suffering from unobserved heterogeneity making our study possibly lead to omitted variable bias (Hill et al., 2018, p. 661). If omitted variables are correlated with any explanatory variables in the regression model, then the OLS estimator suffers from omitted variable bias. This is likely to be the case in our data, as several factors can affect our independent variables. When correlation between the regression model's residuals exists, Generalized Least Squares (GLS) are seen to be a useful regression model (Hansen, 2007). According to Menke (2015), GLS has proven to be an extremely powerful tool for solving inverse problems, meaning, gaining knowledge about the world. Thus, the empirical models applied in our thesis are unbalanced linear panel data regressions performed with the GLS estimation model.

The GLS estimator can be done either by using fixed effects or random effects. The preference of choosing fixed effects over random effects lies in the unobservable heterogeneity term ui. The fixed effects model is useful when the unobserved heterogeneity term ui is correlated with one or more of the independent variables. The random effects estimator takes into account the assumption that the errors are uncorrelated and this assumption does not hold. In other words, it considers the error covariance within the observations for each individual that arises from the unobserved heterogeneity (Hill et al., 2018, p. 651). The fixed effects model is constant across units, which will help address endogeneity problems as we have longitudinal data across 18 years.

To make additional inferences on which effects are best suitable, we conduct Hausman tests for each hypothesis (Hill et al., 2018, p. 655). The null hypotheses say that the random effects are independent. We reject the null hypotheses in all of the tests as the p-value is statistically significant at the 5% level, indicating that the Hausman tests tell us to use the fixed effect estimator. However, fixed effects cannot estimate coefficients for variables that are either time-invariant or quasi-time invariant. The random effects model has a key feature that time-invariant variables are not eliminated (Hill et al., 2018, p. 652). Therefore, we choose to use GLS with random effects, as many of our explanatory variables are time-invariant. To tackle the issues related to heterogeneity, we perform the regressions with robust errors clustered at firm level. The usage of robust standard errors is justified when the sample size is large (Wooldridge, 2015). In an effort to tackle the issue of potential omitted variables, we include several CEO, BoD and firm-specific variables, as explained in section 3.3.

We also perform Pooled OLS regression for all our hypotheses, where the unbalanced panel data are pooled across time as well as across cross-sectional units. The desired outcome is that both Pooled OLS and GLS with random effects show that the same variables are significant in both models. The results of the OLS regressions can be seen in appendix 8-12.

4.2 Robustness checks

We perform a number of robustness tests for each of our hypotheses with the GLS model with random effects. The robustness tests revolve around testing whether or

not a change may alter the outcome of our regressions. As differences in firm size can have a great difference on profitability, we divide our sample into small firms with 1 owner, small firms with multiple owners and medium-to-large firms in each of our hypotheses. However, in hypotheses 4 and 5, we do not include non-family firms with 1 owner, as these firms would technically be seen as family firms according to our definition, as the owners will own 100% of the shares and be in family with themselves.

In addition to dividing our samples into firm sizes, we perform additional robustness tests for hypotheses 1, 2, 4 and 5. In hypotheses 1 and 4, we check how the effect of *Female CEO* on profitability changes from firms with board gender diversity to firms without, as the link between the leader's gender and gender in the BoD are suggested to have an impact on performance (Nielsen & Huse, 2010). In the robustness test for hypotheses 2 and 5, we use the variable *BGD* instead of *Female directors %*, to account for diversity on behalf of both genders. In hypothesis 4, we also examine the effect of *Female CEO* on our profitability measures when the CEO is part of the family and not part of the family, as Miller et al. (2014) suggest that independent CEOs might perform better than family CEOs. The results for our main regressions and robustness tests related to our five hypotheses are presented and discussed in section 5.

5.0 RESULTS AND DISCUSSION

The results from our regressions are presented in the four following sections, divided by our five hypotheses. To check whether our main results are robust, we perform several robustness checks. Additionally, we conduct Pooled OLS regressions, as elaborated in section 4. The results from the Pooled OLS regressions are shown in appendix 8-12 and show mostly similar results as the GLS model with random effects.

5.1 Hypothesis 1: CEO gender effects on profitability

Table 3 presents the main results from using the GLS model with random effects to examine hypothesis 1: "The gender of the CEO has an effect on profitability".

TABLE 3: The table shows the results of regressing *Female CEO* and a set of control variables on *Adjusted ROA* (column 1), *ROA* (column 2) and *ROE* (column 3), using the GLS model with random effects. The sample consists of 112734 AS firms in the period 2000-2018. *Female CEO* takes the value 1 if the CEO is female and 0 otherwise. *CEO tenure* is the number of years the CEO has been in the position. *CEO age* is the age of the CEO in the current year. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the percentage of shares owned directly by the CEO. *Employees* is the total number of employees. *Leverage* is the total debt relative to total assets. *Firm size ln(assets)* is measured as the natural logarithm of total assets. *Firm risk* is the standard deviation of growth in operating revenue. *Family firm* is a dummy variable that takes the value 1 if at least 50% of the firm is ultimately owned by families. *Board size* is the number of directors on board. *Independent board members %* is the percentage of board members not employee elected and not in relation to owners or the CEO. *Owners* is the total number of owners. Year dummies controlling general effects in the period 2000-2018 are included, as well as industry dummies for each industry as shown in appendix 1. The standard errors are clustered at firm level. Significant levels are shown in stars.

GLS with random effects

	(1) Adjusted ROA	(2) ROA	(3) ROE
Female CEO	-0.005***	-0.004**	-0.005
	(0.002)	(0.002)	(0.008)
CEO duality	0.015***	0.017***	0.075***
	(0.003)	(0.003)	(0.016)
CEO tenure	-0.002***	-0.002***	-0.007***
	(0.000)	(0.000)	(0.001)
CEO age	-0.000***	-0.000***	-0.002***
	(0.000)	(0.000)	(0.000)
CEO salary log	0.003***	0.002***	0.035***
	(0.001)	(0.001)	(0.003)
CEO share	-0.000	-0.000	-0.001***
	(0.000)	(0.000)	(0.000)
Employees	-0.001***	-0.001***	-0.003***
	(0.000)	(0.000)	(0.000)
Leverage	-0.014***	-0.045***	-0.248***
	(0.003)	(0.003)	(0.011)
Firm size ln(assets)	0.018***	0.021***	0.121***
	(0.001)	(0.001)	(0.003)
Firm risk	0.058***	0.061***	0.202***
	(0.001)	(0.001)	(0.005)
Family firm	0.004	0.005	0.060***
	(0.003)	(0.003)	(0.015)
Board size	-0.007***	-0.009***	-0.029***
	(0.001)	(0.001)	(0.003)
Independent board members %	-0.002	-0.003*	-0.028***
	(0.002)	(0.002)	(0.008)
Owners	-0.001***	-0.001***	-0.013***
	(0.000)	(0.000)	(0.002)
Constant	-0.072***	-0.110***	-1.287***
	(0.026)	(0.028)	(0.157)
Observations	112734	112734	112734
Overall R^2	0.1076	0.1017	0.0990
Year dummies	yes	yes	yes
Industry dummies	yes	yes	yes

Robust standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

In support of hypothesis 1, our results show that female CEOs have a negative impact on *Adjusted ROA* and *ROA*. These findings may indicate that female CEOs are more risk averse than male CEOs, as suggested by Faccio et al. (2016), leading to lower operating revenues. The negative effect is weaker for *ROA* than *Adjusted ROA*, as our data sample shows that female CEOs on average have lower net financial expenses than male CEOs3. This is despite female CEOs showing to have

3 Net financial expenses are shown in appendix 7

higher levels of leverage than male CEOs, according to our descriptive data, indicating that female CEOs may be better at managing debt and debt related expenses. *ROE* shows no significant effect from *Female CEO*, perhaps due to female CEOs having relatively lower levels of equity than male CEOs, which increase *ROE* and outweigh the negative effect female CEOs have on the risk-and-return relationship.

5.1.1 Robustness check: board gender diversity or not

Table 4 shows how the main results related to hypothesis 1 vary between firms without board gender diversity and firms with board gender diversity. We define firms with board gender diversity to have at least 40% of both genders on their BoD.

TABLE 4: The table shows the results of regressing *Female CEO* and a set of control variables on *Adjusted ROA* (column 1 and 2), *ROA* (column 3 and 4) and *ROE* (column 5 and 6), using the GLS model with random effects. The sample consists of 112734 AS firms in the period 2000-2018, divided by firms with no board gender diversity (column 1, 3 and 5) and firms with board gender diversity (column 2, 4 and 6). Board gender diversity is defined as when the firm has at least 40% of both genders on their BoD. *Female CEO* takes the value 1 if the CEO is female and 0 otherwise. *CEO tenure* is the number of years the CEO has been in the position. *CEO age* is the age of the CEO in the current year. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the percentage of shares owned directly by the CEO. *Employees* is the total number of employees. *Leverage* is the total debt relative to total assets. *Firm size ln(assets)* is measured as the natural logarithm of total assets. *Firm risk* is the standard deviation of growth in operating revenue. *Family firm* is a dummy variable that takes the value 1 if at least 50% of the firm is ultimately owned by families. *Board size* is the number of directors on board. *Independent board members %* is the percentage of board members not employee elected and not in relation to owners or the CEO. *Owners* is the total number of owners. Year dummies controlling general effects in the period 2000-2018 are included, as well as industry dummies for each industry as shown in appendix 1. The standard errors are clustered at firm level. Significant levels are shown in stars.

	GLS with Random Effects					
	(1) Adjusted ROA	(2) Adjusted ROA	(3) ROA	(4) ROA	(5) ROE	(6) ROE
Sample	*Firms with no board gender diversity*	*Firms with board gender diversity*	*Firms with no board gender diversity*	*Firms with board gender diversity*	*Firms with no board gender diversity*	*Firms with board gender diversity*
Female CEO	-0.005***	-0.005	-0.004*	-0.003	-0.003	-0.004
	(0.002)	(0.004)	(0.002)	(0.004)	(0.009)	(0.021)
CEO duality	0.016***	0.012	0.018***	0.013	0.079***	0.050
	(0.003)	(0.011)	(0.003)	(0.012)	(0.016)	(0.061)
CEO tenure	-0.002***	-0.001**	-0.002***	-0.001**	-0.008***	-0.002
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)
CEO age	-0.000***	-0.000**	-0.000***	-0.000**	-0.002***	-0.002*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
CEO salary log	0.003***	0.003	0.002***	0.001	0.035***	0.032***
	(0.001)	(0.002)	(0.001)	(0.002)	(0.003)	(0.011)
CEO share	-0.000	0.000**	-0.000*	0.000*	-0.001***	0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Employees	-0.001***	-0.001***	-0.001***	-0.001***	-0.003***	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Leverage	-0.015***	-0.015*	-0.046***	-0.044***	-0.246***	-0.282***
	(0.003)	(0.009)	(0.003)	(0.010)	(0.011)	(0.035)
Firm size ln(assets)	0.018***	0.017***	0.021***	0.021***	0.122***	0.109***
	(0.001)	(0.002)	(0.001)	(0.002)	(0.003)	(0.010)
Firm risk	0.057***	0.065***	0.060***	0.068***	0.200***	0.237***
	(0.001)	(0.006)	(0.001)	(0.006)	(0.006)	(0.023)
Family firm	0.004	0.009	0.004	0.011	0.059***	0.071
	(0.003)	(0.008)	(0.003)	(0.010)	(0.016)	(0.048)
Board size	-0.008***	-0.005***	-0.009***	-0.007***	-0.032***	-0.006
	(0.001)	(0.002)	(0.001)	(0.002)	(0.003)	(0.012)
Independent board members %	-0.002	-0.005	-0.003*	-0.003	-0.027***	-0.044
	(0.002)	(0.006)	(0.002)	(0.007)	(0.008)	(0.034)
Owners	-0.002***	0.000	-0.002***	0.000	-0.014***	-0.004
	(0.000)	(0.002)	(0.000)	(0.002)	(0.002)	(0.008)
Constant	-0.073***	-0.099**	-0.111***	-0.124***	-1.272***	-1.370***
	(0.028)	(0.041)	(0.030)	(0.046)	(0.164)	(0.206)
Observations	102947	9787	102947	9787	102947	9787
Overall R^2	0.1080	0.1056	0.1019	0.1019	0.0993	0.1010
Year dummies	yes	yes	yes	yes	yes	yes
Industry dummies	yes	yes	yes	yes	yes	yes

Robust standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

Table 4 shows that female CEOs only have a negative impact on *Adjusted ROA* and *ROA* in firms where gender diversity is not present on the firms' BoD. In firm with board gender diversity, female CEOs have no impact. The negative results in firms without board gender diversity may indicate that female CEOs have difficulties in performing in environments that are male dominated. This is consistent with Nielsen and Huse (2010), who found that board decisions may be influenced by the relationship between a leader's gender and the gender of the BoD.

5.1.2 Robustness check: Different firm sizes

The tables below show how the results differ between firms with different sizes. Table 5 shows results for small firms with 1 owner and small firms with multiple owners, while table 6 shows results for larger firms.

TABLE 5: The table shows the results of regressing *Female CEO* and a set of control variables on *Adjusted ROA* (column 1 and 2), *ROA* (column 3 and 4) and *ROE* (column 5 and 6), using the GLS model with random effects. The sample consists of 81809 small AS firms in the period 2000-2018, divided by firms with 1 owner (column 1, 3 and 5) and firms with multiple owners (column 2, 4 and 6). Firm size small is defined as when operating revenues are lower than 10 000 000 NOK (in 2015 kroners, price Adjusted per year). *Female CEO* takes the value 1 if the CEO is female and 0 otherwise. *CEO tenure* is the number of years the CEO has been in the position. *CEO age* is the age of the CEO in the current year. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the percentage of shares owned directly by the CEO. *Employees* indicate the total number of employees. *Leverage* is the total debt relative to total assets. *Firm size ln(assets)* is measured as the natural logarithm of total assets. *Firm risk* is the standard deviation of growth in operating revenue. *Family firm* is a dummy variable that takes the value 1 if at least 50% of the firm is ultimately owned by families. *Board size* is the number of directors on board. *Independent board members %* is the percentage of board members not employee elected and not in relation to owners or the CEO. *Owners* is the total number of owners. Year dummies controlling general effects in the period 2000-2018 are included, as well as industry dummies for each industry as shown in appendix 1. The standard errors are clustered at firm level. Significant levels are shown in stars.

	GLS with Random Effects					
	(1) Adjusted ROA	(2) Adjusted ROA	(3) ROA	(4) ROA	(5) ROE	(6) ROE
Sample	*Small firms with 1 owner*	*Small firms with multiple owners*	*Small firms with 1 owner*	*Small firms with multiple owners*	*Small firms with 1 owner*	*Small firms with multiple owners*
Female CEO	-0.009***	-0.003	-0.008***	-0.002	-0.016	0.007
	(0.003)	(0.002)	(0.003)	(0.003)	(0.013)	(0.012)
CEO duality	0.011	0.015***	0.014	0.018***	0.072	0.082***
	(0.012)	(0.005)	(0.013)	(0.005)	(0.057)	(0.024)
CEO tenure	-0.003***	-0.001***	-0.002***	-0.001***	-0.009***	-0.005***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
CEO age	-0.000	-0.000*	-0.000	-0.000	-0.001**	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CEO salary log	0.003***	0.002*	0.002	0.002	0.036***	0.034***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.005)	(0.005)
CEO share	0.001*	0.000	0.001**	0.000	0.004***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)
Employees	-0.003***	-0.003***	-0.003***	-0.003***	-0.003*	-0.011***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)
Leverage	-0.003	0.000	-0.032***	-0.026***	-0.320***	-0.294***
	(0.004)	(0.004)	(0.005)	(0.005)	(0.016)	(0.016)
Firm size ln(assets)	0.021***	0.019***	0.025***	0.023***	0.116***	0.138***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.005)	(0.006)
Firm risk	0.059***	0.063***	0.063***	0.066***	0.183***	0.217***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.008)	(0.010)
Family firm	-0.029	0.005	-0.042	0.004	-0.257**	0.050**
	(0.025)	(0.004)	(0.029)	(0.005)	(0.122)	(0.021)
Board size	-0.010***	-0.007***	-0.011***	-0.008***	-0.023**	-0.021***
	(0.002)	(0.001)	(0.002)	(0.001)	(0.009)	(0.005)
Independent board members %	-0.002	-0.003	-0.003	-0.003	-0.021**	-0.014
	(0.002)	(0.003)	(0.002)	(0.004)	(0.010)	(0.018)
Owners		-0.004***		-0.004***		-0.029***
		(0.001)		(0.001)		(0.004)
Constant	-0.116**	-0.086**	-0.180***	-0.143***	-1.570***	-1.523***
	(0.048)	(0.041)	(0.056)	(0.044)	(0.220)	(0.241)
Observations	40465	41344	40465	41344	40465	41344
Overall R^2	0.1191	0.1115	0.1111	0.1004	0.1057	0.1013
Year dummies	yes	yes	yes	yes	yes	yes
Industry dummies	yes	yes	yes	yes	yes	yes

Robust standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

We see from table 5 that the impact *Female CEO* has on *Adjusted ROA* and *ROA* are only significant in the cases where the small firms have 1 owner. The negative results may imply that male CEOs are better entrepreneurs than female CEOs regarding profitability, as small firms with 1 owner are more likely to be entrepreneurial firms than established firms. Being an entrepreneur involves high risk taking, as numbers from Statistics Norway (2020) show that most newly established firms in Norway go bankrupt. As female CEOs are associated with higher risk aversion than men (Faccio et al., 2016), this might explain our negative results.

TABLE 6: The table shows the results of regressing *Female CEO* and a set of control variables on *Adjusted ROA* (column 1), *ROA* (column 2) and *ROE* (column 3), using the GLS model with random effects. The sample consists of 30925 medium-to-large AS firms in the period 2000-2018. Medium-to-large firms are defined as when operating revenues are equal or above 10 000 000 NOK (in 2015 kroners, price Adjusted per year). *Female CEO* takes the value 1 if the CEO is female and 0 otherwise. *CEO tenure* is the number of years the CEO has been in the position. *CEO age* is the age of the CEO in the current year. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the percentage of shares owned directly by the CEO. *Employees* is the total number of employees. *Leverage* is the total debt relative to total assets. *Firm size ln(assets)* is measured as the natural logarithm of total assets. *Firm risk* is the standard deviation of growth in operating revenue. *Family firm* is a dummy variable that takes the value 1 if at least 50% of the firm is ultimately owned by families. *Board size* is the number of directors on board. *Independent board members %* is the percentage of board members not employee elected and not in relation to owners or the CEO. *Owners* is the total number of owners. Year dummies controlling general effects in the period 2000-2018 are included, as well as industry dummies for each industry as shown in appendix 1. The standard errors are clustered at firm level. Significant levels are shown in stars.

GLS with Random Effects

	(1) Adjusted ROA	(2) ROA	(3) ROE
Sample	*Medium-to-large firms*	*Medium-to-large firms*	*Medium-to-large firms*
Female CEO	0.006*	0.009***	0.047**
	(0.003)	(0.003)	(0.018)
CEO duality	0.015***	0.015***	0.050**
	(0.004)	(0.004)	(0.023)
CEO tenure	-0.001***	-0.001***	-0.005***
	(0.000)	(0.000)	(0.001)
CEO age	-0.001***	-0.000***	-0.003***
	(0.000)	(0.000)	(0.001)
CEO salary log	0.005***	0.005***	0.034***
	(0.001)	(0.001)	(0.006)
CEO share	-0.000***	-0.000***	-0.001***
	(0.000)	(0.000)	(0.000)
Employees	-0.001***	-0.001***	-0.003***
	(0.000)	(0.000)	(0.001)
Leverage	-0.095***	-0.137***	0.003
	(0.005)	(0.005)	(0.029)
Firm size ln(assets)	0.005***	0.006***	0.044***
	(0.001)	(0.001)	(0.007)
Firm risk	0.046***	0.047***	0.210***
	(0.003)	(0.003)	(0.012)
Family firm	0.009**	0.011***	0.088***
	(0.004)	(0.004)	(0.023)
Board size	-0.005***	-0.006***	-0.030***
	(0.001)	(0.001)	(0.005)
Independent board members %	-0.002	-0.003	-0.041**
	(0.002)	(0.003)	(0.016)
Owners	-0.002***	-0.002***	-0.010***
	(0.000)	(0.000)	(0.002)
Constant	0.174***	0.172***	0.153
	(0.027)	(0.031)	(0.185)
Observations	30925	30925	30925
Overall R^2	0.1223	0.1332	0.0910
Year dummies	yes	yes	yes
Industry dummies	yes	yes	yes

Robust standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

For medium-to-large firms, the results change drastically from our previous results. Table 6 shows that female CEOs have a significant and positive impact on all our profitability measures. A potential explanation for this change can be that female CEOs might be less reluctant to take risks in bigger firms, as these firms may be more financially stable. In addition, the CEO has more directors to lean on and involve in decision making, perhaps improving the quality of decision making.

5.2 Hypothesis 2: Board gender diversity effects on profitability

Table 7 presents the main results from the GLS with random effects model for our hypothesis 2: "Gender diversity in the BoD has an effect on profitability".

TABLE 7: The table shows the results of regressing *Female directors %* and a set of control variables on *Adjusted ROA* (column 1), *ROA* (column 2) and *ROE* (column 3), using the GLS model with random effects. The sample consists of 113350 AS firms in the period 2000-2018. *Female directors %* is the percentage of female directors, relative to the total number of directors. *CEO tenure* is the number of years the CEO has been in the position. *Directors' mean age* is the mean age of the board of directors in the current year. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the percentage of shares owned directly by the CEO. *Employees* is the total number of employees. *Leverage* is the total debt relative to total assets. *Firm size ln(assets)* is measured as the natural logarithm of total assets. *Firm risk* is the standard deviation of growth in operating revenue. *Family firm* is a dummy variable that takes the value 1 if at least 50% of the firm is ultimately owned by families. *Board size* is the number of directors on board. *Independent board members %* is the percentage of board members not employee elected and not in relation to owners or the CEO. *Owners* is the total number of owners. Year dummies controlling general effects in the period 2000-2018 are included, as well as industry dummies for each industry as shown in appendix 1. The standard errors are clustered at firm level. Significant levels are shown in stars.

GLS with Random Effects

	(1) Adjusted ROA	(2) ROA	(3) ROE
Female directors %	-0.006***	-0.006***	-0.025***
	(0.002)	(0.002)	(0.009)
CEO duality	0.014***	0.016***	0.069***
	(0.003)	(0.003)	(0.016)
CEO tenure	-0.002***	-0.002***	-0.007***
	(0.000)	(0.000)	(0.001)
Directors' mean age	-0.000***	-0.000***	-0.002***
	(0.000)	(0.000)	(0.000)
CEO salary log	0.003***	0.002***	0.035***
	(0.001)	(0.001)	(0.003)
CEO share	-0.000	-0.000	-0.001***
	(0.000)	(0.000)	(0.000)
Employees	-0.001***	-0.001***	-0.003***
	(0.000)	(0.000)	(0.000)
Leverage	-0.015***	-0.045***	-0.250***
	(0.003)	(0.003)	(0.010)
Firm size ln(assets)	0.018***	0.021***	0.120***
	(0.001)	(0.001)	(0.003)
Firm risk	0.057***	0.061***	0.201***
	(0.001)	(0.001)	(0.005)
Family firm	0.004	0.004	0.062***
	(0.003)	(0.003)	(0.015)
Board size	-0.007***	-0.008***	-0.029***
	(0.001)	(0.001)	(0.003)
Independent board members %	-0.003*	-0.004**	-0.030***
	(0.002)	(0.002)	(0.008)
Owners	-0.002***	-0.001***	-0.014***
	(0.000)	(0.000)	(0.002)
Constant	-0.065**	-0.103***	-1.225***
	(0.026)	(0.028)	(0.157)
Observations	113350	113350	113350
Overall R^2	0.1071	0.1012	0.0991
Year dummies	yes	yes	yes
Industry dummies	yes	yes	yes

Robust standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

Table 7 shows that *Female directors %* is negatively correlated to all our profitability measures. The negative impact is similar for *Adjusted ROA* and *ROA*, while being stronger for *ROE*. According to our formulas for *ROA* and *ROE*, the only difference is in the denominator, which suggests that a higher percentage of female directors increases total equity. However, our descriptive data shows that firms with more than 40% female directors have higher levels of leverage than firms with less than 40% female directors. Thus, our findings for *ROE* are mixed and suggest that there are other factors than leverage that affects *ROE*.

5.2.1 Robustness check: Alternative measure for diversity

We check if our results stay the same if we apply an alternative measure for diversity; *BGD*. *BGD* takes the value 1 if there are at least 40% of both genders in the BoD. The results are presented in table 8 below.

TABLE 8: The table shows the results of regressing *BGD* and a set of control variables on *Adjusted ROA* (column 1), *ROA* (column 2) and *ROE* (column 3), using the GLS model with random effects. The sample consists of 113350 AS firms in the period 2000-2018. *BGD* is a dummy variable that takes the value 1 if there are at least 40% of both genders in the BoD. *CEO tenure* is the number of years the CEO has been in the position. *Directors' mean age* indicates the mean age of the board of directors in the current year. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the percentage of shares owned directly by the CEO. *Employees* is the total number of employees. *Leverage* is the total debt relative to total assets. *Firm size ln(assets)* is measured as the natural logarithm of total assets. *Firm risk* is the standard deviation of growth in operating revenue. *Family firm* is a dummy variable that takes the value 1 if at least 50% of the firm is ultimately owned by families. *Board size* is the number of directors on board. *Independent board members %* is the percentage of board members not employee elected and not in relation to owners or the CEO. *Owners* is the total number of owners. Year dummies controlling general effects in the period 2000-2018 are included, as well as industry dummies for each industry as shown in appendix 1. The standard errors are clustered at firm level. Significant levels are shown in stars.

GLS with Random Effects

	(1) Adjusted ROA	(2) ROA	(3) ROE
BGD	-0.002	-0.002	-0.007
	(0.002)	(0.002)	(0.009)
CEO duality	0.014***	0.016***	0.069***
	(0.003)	(0.003)	(0.016)
CEO tenure	-0.002***	-0.002***	-0.007***
	(0.000)	(0.000)	(0.001)
Directors' mean age	-0.000***	-0.000***	-0.002***
	(0.000)	(0.000)	(0.000)
CEO salary log	0.003***	0.002***	0.035***
	(0.001)	(0.001)	(0.003)
CEO share	-0.000	-0.000	-0.001***
	(0.000)	(0.000)	(0.000)
Employees	-0.001***	-0.001***	-0.003***
	(0.000)	(0.000)	(0.000)
Leverage	-0.015***	-0.045***	-0.250***
	(0.003)	(0.003)	(0.010)
Firm size ln(assets)	0.018***	0.021***	0.121***
	(0.001)	(0.001)	(0.003)
Firm risk	0.057***	0.061***	0.201***
	(0.001)	(0.001)	(0.005)
Family firm	0.004	0.004	0.063***
	(0.003)	(0.003)	(0.015)
Board size	-0.007***	-0.008***	-0.030***
	(0.001)	(0.001)	(0.003)
Independent board members %	-0.003*	-0.003**	-0.029***
	(0.002)	(0.002)	(0.008)
Owners	-0.001***	-0.001***	-0.014***
	(0.000)	(0.000)	(0.002)
Constant	-0.073***	-0.110***	-1.255***
	(0.025)	(0.028)	(0.156)
Observations	113350	113350	113350
Overall R^2	0.1069	0.1011	0.0990
Year dummies	yes	yes	yes
Industry dummies	yes	yes	yes

Robust standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

The results in table 8 show that none of the coefficients related to *BGD* are significant. Thus, for firms with a gender balanced board, we cannot make an inference on whether gender has an impact on profits.

5.2.2 Robustness check: Different firm sizes

Tables 9 and 10 show the results related to hypothesis 2 for small firms, with 1 owner or multiple owners and for medium-to-large firms, respectively.

TABLE 9: The table shows the results of regressing *Female directors %* and a set of control variables on *Adjusted ROA* (column 1 and 2), *ROA* (column 3 and 4) and *ROE* (column 5 and 6), using the GLS model with random effects. The sample consists of 82239 small AS firms in the period 2000-2018, divided by firms with 1 owner (column 1, 3 and 5) and firms with multiple owners (column 2, 4 and 6). Firm size small is defined as when operating revenues are lower than 10 000 000 NOK (in 2015 kroners, price Adjusted per year). *Female directors %* is the percentage of female directors, relative to the total number of directors. *CEO tenure* is the number of years the CEO has been in the position. *CEO age* is the age of the CEO in the current year. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the percentage of shares owned directly by the CEO. *Employees* is the total number of employees. *Leverage* is the total debt relative to total assets. *Firm size ln(assets)* is measured as the natural logarithm of total assets. *Firm risk* is the standard deviation of growth in operating revenue. *Family firm* is a dummy variable that takes the value 1 if at least 50% of the firm is ultimately owned by families. *Board size* is the number of directors on board. *Independent board members %* is the percentage of board members not employee elected and not in relation to owners or the CEO. *Owners* is the total number of owners. Year dummies controlling general effects in the period 2000-2018 are included, as well as industry dummies for each industry as shown in appendix 1. The standard errors are clustered at firm level. Significant levels are shown in stars.

	GLS with Random Effects					
	(1) Adjusted ROA	(2) Adjusted ROA	(3) ROA	(4) ROA	(5) ROE	(6) ROE
Sample	*Small firms with 1 owner*	*Small firms with multiple owners*	*Small firms with 1 owner*	*Small firms with multiple owners*	*Small firms with 1 owner*	*Small firms with multiple owners*
Female directors %	-0.008***	-0.005**	-0.007**	-0.004	-0.016	-0.018
	(0.003)	(0.003)	(0.003)	(0.003)	(0.013)	(0.014)
CEO tenure	-0.003***	-0.001***	-0.003***	-0.001***	-0.009***	-0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Directors' mean age	-0.000	-0.000***	-0.000	-0.000***	-0.001**	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
CEO salary log	0.003***	0.002*	0.002	0.001	0.037***	0.034***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.005)	(0.005)
Employees	-0.003***	-0.003***	-0.003***	-0.003***	-0.003	-0.011***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)
Leverage	-0.003	0.000	-0.032***	-0.026***	-0.319***	-0.295***
	(0.004)	(0.004)	(0.005)	(0.005)	(0.016)	(0.016)
Firm size ln(assets)	0.021***	0.019***	0.025***	0.023***	0.115***	0.137***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.005)	(0.006)
Firm risk	0.058***	0.063***	0.063***	0.066***	0.182***	0.216***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.008)	(0.010)
Family firm	-0.028	0.004	-0.040	0.004	-0.253**	0.050**
	(0.025)	(0.004)	(0.029)	(0.005)	(0.121)	(0.021)
CEO duality	0.016	0.015***	0.018	0.018***	0.072	0.080***
	(0.012)	(0.005)	(0.013)	(0.005)	(0.055)	(0.024)
CEO share	0.001*	0.000	0.001**	0.000	0.004***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)
Board size	-0.009***	-0.007***	-0.011***	-0.008***	-0.023**	-0.020***
	(0.002)	(0.001)	(0.002)	(0.001)	(0.009)	(0.005)
Independent board members %	-0.002	-0.004	-0.003	-0.004	-0.020**	-0.017
	(0.002)	(0.003)	(0.002)	(0.004)	(0.010)	(0.018)
Owners		-0.004***		-0.004***		-0.029***
		(0.001)		(0.001)		(0.004)
Constant	-0.124***	-0.076*	-0.188***	-0.134***	-1.577***	-1.472***
	(0.048)	(0.041)	(0.055)	(0.044)	(0.219)	(0.241)
Observations	40682	41557	40682	41557	40682	41557
Overall R^2	0.1177	0.1116	0.1099	0.1003	0.1049	0.1016
Year dummies	yes	yes	yes	yes	yes	yes
Industry dummies	yes	yes	yes	yes	yes	yes

Robust standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

Looking at small firms in table 9, we see that female directors have a significant and negative result on *Adjusted ROA* for both firms with 1 owner and multiple owners and on *ROA* for firms with 1 owner. The negative impact on *Adjusted ROA* is stronger for firms with 1 owner than multiple owners, potentially because more actors involved may improve quality in decision making and thus profitability. Comparing *Adjusted ROA* and *ROA* for small firms with 1 owner, we see again that the negative effects from *Female directors %* are weaker on *ROA* than *Adjusted ROA*, potentially because of females having lower financial expenses than their male counterparts.

TABLE 10: The table shows the results of regressing *Female directors %* and a set of control variables on *Adjusted ROA* (column 1), *ROA* (column 2) and *ROE* (column 3), using the GLS model with random effects. The sample consists of 31111 medium-to-large AS firms in the period 2000-2018. Medium-to-large firms are defined as when operating revenues are equal or above 10 000 000 NOK (in 2015 kroners, price Adjusted per year). *Female directors %* indicates the percentage of female directors, relative to the total number of directors. *CEO tenure* is the number of years the CEO has been in the position. *CEO age* is the age of the CEO in the current year. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the percentage of shares owned directly by the CEO. *Employees* is the total number of employees. *Leverage* is the total debt relative to total assets. *Firm size ln(assets)* is measured as the natural logarithm of total assets. *Firm risk* is the standard deviation of growth in operating revenue. *Family firm* is a dummy variable that takes the value 1 if at least 50% of the firm is ultimately owned by families. *Board size* is the number of directors on board. *Independent board members %* is the percentage of board members not employee elected and not in relation to owners or the CEO. *Owners* is the total number of owners. Year dummies controlling general effects in the period 2000-2018 are included, as well as industry dummies for each industry as shown in appendix 1. The standard errors are clustered at firm level. Significant levels are shown in stars.

GLS with Random Effects

	(1) Adjusted ROA	(2) ROA	(3) ROE
Sample	*Medium-to-large firms*	*Medium-to-large firms*	*Medium-to-large firms*
Female directors %	0.001	0.002	-0.005
	(0.003)	(0.004)	(0.021)
CEO tenure	-0.001***	-0.001***	-0.005***
	(0.000)	(0.000)	(0.001)
Directors' mean age	-0.001***	-0.001***	-0.005***
	(0.000)	(0.000)	(0.001)
CEO salary log	0.005***	0.006***	0.035***
	(0.001)	(0.001)	(0.006)
Employees	-0.001***	-0.001***	-0.003***
	(0.000)	(0.000)	(0.001)
Leverage	-0.096***	-0.139***	-0.010
	(0.005)	(0.005)	(0.029)
Firm size ln(assets)	0.005***	0.006***	0.045***
	(0.001)	(0.001)	(0.007)
Firm risk	0.045***	0.047***	0.208***
	(0.002)	(0.003)	(0.012)
Family firm	0.009**	0.011***	0.090***
	(0.004)	(0.004)	(0.023)
CEO duality	0.012***	0.013***	0.038*
	(0.004)	(0.004)	(0.023)
CEO share	-0.000***	-0.000***	-0.001***
	(0.000)	(0.000)	(0.000)
Board size	-0.006***	-0.006***	-0.033***
	(0.001)	(0.001)	(0.005)
Independent board members %	-0.003	-0.003	-0.043***
	(0.002)	(0.003)	(0.016)
Owners	-0.002***	-0.002***	-0.010***
	(0.000)	(0.000)	(0.002)
Constant	0.197***	0.198***	0.318*
	(0.028)	(0.031)	(0.187)
Observations	31111	31111	31111
Overall R^2	0.1237	0.1342	0.0917
Year dummies	yes	yes	yes
Industry dummies	yes	yes	yes

Robust standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

Table 10 shows that the results from *Female directors %* are not significant for any of the profitability measures. Thus, for medium-to-large firms, gender in the BoD have no impact on profitability. A potential explanation might be that larger firms have more people involved, potentially improving decision-making and nullifying the impact of female directors.

5.3 Hypothesis 3: The gender quota's influence on gender effects in AS firms

Table 11 shows the main results related to our third hypothesis: "The Gender Balance Law has changed how female directors impact profitability in AS firms". Though AS firms were not required to follow the Gender Balance Law, we examine whether the quota has had an indirect effect on our dependent variables. We include the dummy variable *Quota* that takes the value 1 if the gender balance law has been implemented, meaning if the year is 2008 or after. We also include an interaction term between *Quota* and *Female directors %* to see how the quota has affected how female directors affect firm performance.

TABLE 11: The table shows the results of regressing *Female directors %*, *Quota* and an interaction term between those two variables, as well as a set of control variables on *Adjusted ROA* (column 1), *ROA* (column 2) and *ROE* (column 3), using the GLS model with random effects. The sample consists of 113350 AS firms in the period 2000-2018. *Female directors %* is the percentage of female directors, relative to the total number of directors. *Quota* is a dummy variable that takes the value 1 for years from and including 2008 and the value 0 otherwise. *CEO tenure* is the number of years the CEO has been in the position. *Directors' mean age* indicates the mean age of the board of directors in the current year. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the percentage of shares owned directly by the CEO. *Employees* is the total number of employees. *Leverage* is the total debt relative to total assets. *Firm size ln(assets)* is measured as the natural logarithm of total assets. *Firm risk* is the standard deviation of growth in operating revenue. *Family firm* is a dummy variable that takes the value 1 if at least 50% of the firm is ultimately owned by families. *Board size* is the number of directors on board. *Independent board members %* is the percentage of board members not employee elected and not in relation to owners or the CEO. *Owners* is the total number of owners. Industry dummies controlling for differences between the industries shown in appendix 1 are included. The standard errors are clustered at firm level. Significant levels are shown in stars.

GLS with random effects

	(1) Adjusted ROA	(2) ROA	(3) ROE
Female directors %	-0.010***	-0.009***	-0.082***
	(0.002)	(0.003)	(0.013)
Quota	-0.033***	-0.034***	-0.280***
	(0.001)	(0.001)	(0.006)
Quota*Female directors %	0.008***	0.007**	0.089***
	(0.003)	(0.003)	(0.015)
CEO duality	0.014***	0.016***	0.069***
	(0.003)	(0.003)	(0.016)
CEO tenure	-0.002***	-0.001***	-0.007***
	(0.000)	(0.000)	(0.001)
Directors' mean age	-0.000***	-0.000***	-0.002***
	(0.000)	(0.000)	(0.000)
CEO salary log	0.003***	0.003***	0.030***
	(0.001)	(0.001)	(0.003)
CEO share	-0.000	-0.000	-0.001***
	(0.000)	(0.000)	(0.000)
Employees	-0.001***	-0.001***	-0.003***
	(0.000)	(0.000)	(0.000)
Leverage	-0.014***	-0.046***	-0.197***
	(0.003)	(0.003)	(0.011)
Firm size ln(assets)	0.018***	0.021***	0.121***
	(0.001)	(0.001)	(0.003)
Firm risk	0.058***	0.061***	0.195***
	(0.001)	(0.001)	(0.005)
Family firm	0.004	0.003	0.093***
	(0.003)	(0.003)	(0.015)
Board size	-0.007***	-0.008***	-0.029***
	(0.001)	(0.001)	(0.003)
Independent board members %	-0.003*	-0.003*	-0.032***
	(0.002)	(0.002)	(0.008)
Owners	-0.002***	-0.002***	-0.012***
	(0.000)	(0.000)	(0.002)
Constant	-0.058**	-0.090***	-1.190***
	(0.025)	(0.027)	(0.150)
Observations	113350	113350	113350
Overall R^2	0.1059	0.0990	0.0875
Year dummies	no	no	no
Industry dummies	yes	yes	yes

Robust standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

From table 11 we see that *Female directors %* and *Quota* have significant and negative effects on *Adjusted ROA*, *ROA* and *ROE*. However, the interaction term between *Quota* and *Female directors %* are positive and significant for all profitability measures, indicating that the negative effect female directors have on profitability is reduced after the quota than before the quota. Green and Homroy (2018) state that female directors perform better when being actively involved in

firm governance. Thus, we suggest that increased voluntary inclusion of women affect how women are integrated in firm decisions and how they affect firm performance.

5.3.1 Robustness check: Different firm sizes

The tables below show the results for hypothesis 3 for our two firm sizes. Table 12 shows the results for small firms with 1 owner and small firms with multiple owners, while table 13 shows the results for medium-to-large firms.

TABLE 12: The table shows the results of regressing *Female directors %*, *Quota* and an interaction term between those two variables, as well as a set of control variables on *Adjusted ROA* (column 1 and 2), *ROA* (column 3 and 4) and *ROE* (column 5 and 6), using the GLS model with random effects. The sample consists of 82239 small AS firms in the period 2000-2018, divided by firms with 1 owner (column 1, 3 and 5) and firms with multiple owners (column 2, 4 and 6). Firm size small is defined as when operating revenues are lower than 10 000 000 NOK (in 2015 kroners, price Adjusted per year). *Female directors %* is the percentage of female directors, relative to the total number of directors. *Quota* is a dummy variable that takes the value 1 for years from and including 2008 and the value 0 otherwise. *CEO tenure* is the number of years the CEO has been in the position. *CEO age* is the age of the CEO in the current year. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the percentage of shares owned directly by the CEO. *Employees* is the total number of employees. *Leverage* is the total debt relative to total assets. *Firm size ln(assets)* is measured as the natural logarithm of total assets. *Firm risk* is the standard deviation of growth in operating revenue. *Family firm* is a dummy variable that takes the value 1 if at least 50% of the firm is ultimately owned by families. *Board size* is the number of directors on board. *Independent board members %* is the percentage of board members not employee elected and not in relation to owners or the CEO. *Owners* is the total number of owners. Industry dummies controlling for differences between the industries shown in appendix 1 are included. The standard errors are clustered at firm level. Significant levels are shown in stars.

				GLS with random effects		
	(1) Adjusted ROA	(2) Adjusted ROA	(3) ROA	(4) ROA	(5) ROE	(6) ROE
Sample	*Small firms with 1 owner*	*Small firms with multiple owners*	*Small firms with 1 owner*	*Small firms with multiple owners*	*Small firms with 1 owner*	*Small firms with multiple owners*
Female directors %	-0.016***	-0.011***	-0.015***	-0.009**	-0.084***	-0.080***
	(0.004)	(0.004)	(0.005)	(0.004)	(0.022)	(0.020)
Quota	-0.034***	-0.038***	-0.034***	-0.039***	-0.272***	-0.297***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.010)	(0.011)
Quota*Female directors %	0.013***	0.011***	0.014**	0.012**	0.092***	0.109***
	(0.005)	(0.004)	(0.005)	(0.005)	(0.024)	(0.024)
CEO tenure	-0.003***	-0.001***	-0.002***	-0.001***	-0.009***	-0.005***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Directors' mean age	-0.000	-0.000***	-0.000	-0.000**	-0.001**	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
CEO salary log	0.003***	0.002*	0.002*	0.002	0.032***	0.028***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.005)	(0.005)
Employees	-0.003***	-0.003***	-0.003***	-0.003***	-0.003	-0.011***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)
Leverage	-0.003	0.001	-0.035***	-0.026***	-0.276***	-0.244***
	(0.004)	(0.004)	(0.005)	(0.005)	(0.016)	(0.016)
Firm size ln(assets)	0.020***	0.019***	0.025***	0.023***	0.115***	0.138***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.005)	(0.006)
Firm risk	0.059***	0.063***	0.063***	0.066***	0.177***	0.209***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.008)	(0.010)
Family firm	-0.031	0.005	-0.048	0.004	-0.205*	0.088***
	(0.025)	(0.004)	(0.029)	(0.005)	(0.121)	(0.021)
CEO duality	0.016	0.014***	0.018	0.017***	0.061	0.079***
	(0.012)	(0.005)	(0.013)	(0.005)	(0.056)	(0.023)
CEO share	0.001**	0.000	0.001**	0.000	0.004***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)
Board size	-0.009***	-0.007***	-0.011***	-0.008***	-0.021**	-0.022***
	(0.002)	(0.001)	(0.002)	(0.001)	(0.009)	(0.005)
Independent board members %	-0.002	-0.004	-0.003	-0.004	-0.022**	-0.024
	(0.002)	(0.003)	(0.002)	(0.004)	(0.010)	(0.018)
Owners		-0.004***		-0.004***		-0.026***
		(0.001)		(0.001)		(0.004)
Constant	-0.117**	-0.069*	-0.172***	-0.123***	-1.571***	-1.422***
	(0.048)	(0.040)	(0.053)	(0.043)	(0.237)	(0.233)
Observations	40682	41557	40682	41557	40682	41557
Overall R^2	0.1165	0.1104	0.1072	0.0987	0.0943	0.0893
Year dummies	no	no	no	no	no	no
Industry dummies	yes	yes	yes	yes	yes	yes

Robust standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

Consistent with our main results for hypothesis 3, as shown in table 12, all profitability measures are negatively affected by *Female directors %* and *Quota*, when looking at small firms. However, the interaction term between the *Female directors %* and *Quota* is positive and significant for all profitability measures, indicating that the effect female directors have on profitability in small firms is improved after the quota is implemented. When comparing these results with hypothesis 2 for small firms, we see that when including *Quota* and its interaction term with *Female directors %*, the effect *Female directors %* have on *ROA* for small firms with multiple owners and on *ROE* for all small firms becomes significant.

TABLE 13: The table shows the results of regressing *Female directors %*, *Quota* and an interaction term between those two variables, as well as a set of control variables on *Adjusted ROA* (column 1), *ROA* (column 2) and *ROE* (column 3), using the GLS model with random effects. The sample consists of 31111 medium-to-large AS firms in the period 2000-2018. Medium-to-large firms are defined as when operating revenues are equal or above 10 000 000 NOK (in 2015 kroners, price Adjusted per year). *Female directors %* is the percentage of female directors, relative to the total number of directors. *Quota* is a dummy variable that takes the value 1 for years from and including 2008 and the value 0 otherwise. *CEO tenure* is the number of years the CEO has been in the position. *CEO age* is the age of the CEO in the current year. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the percentage of shares owned directly by the CEO. *Employees* is the total number of employees. *Leverage* is the total debt relative to total assets. *Firm size ln(assets)* is measured as the natural logarithm of total assets. *Firm risk* is the standard deviation of growth in operating revenue. *Family firm* is a dummy variable that takes the value 1 if at least 50% of the firm is ultimately owned by families. *Board size* is the number of directors on board. *Independent board members %* is the percentage of board members not employee elected and not in relation to owners or the CEO. *Owners* is the total number of owners. Industry dummies controlling for differences between the industries shown in appendix 1 are included. The standard errors are clustered at firm level. Significant levels are shown in stars.

GLS with random effects

	(1) Adjusted ROA	(2) ROA	(3) ROE
Female directors %	0.003	0.007	0.004
	(0.004)	(0.005)	(0.029)
Quota	-0.032***	-0.035***	-0.231***
	(0.002)	(0.002)	(0.011)
Quota*Female directors	-0.002	-0.006	-0.011
	(0.006)	(0.006)	(0.036)
CEO tenure	-0.001***	-0.001***	-0.003***
	(0.000)	(0.000)	(0.001)
Directors' mean age	-0.001***	-0.001***	-0.005***
	(0.000)	(0.000)	(0.001)
CEO salary log	0.006***	0.006***	0.033***
	(0.001)	(0.001)	(0.006)
Employees	-0.001***	-0.001***	-0.003***
	(0.000)	(0.000)	(0.001)
Leverage	-0.093***	-0.136***	0.087***
	(0.005)	(0.005)	(0.029)
Firm size ln(assets)	0.006***	0.007***	0.050***
	(0.001)	(0.001)	(0.007)
Firm risk	0.046***	0.047***	0.205***
	(0.003)	(0.003)	(0.012)
Family firm	0.009**	0.010**	0.107***
	(0.004)	(0.004)	(0.022)
CEO duality	0.012***	0.012***	0.037
	(0.004)	(0.004)	(0.023)
CEO share	-0.000***	-0.000***	-0.001***
	(0.000)	(0.000)	(0.000)
Board size	-0.006***	-0.006***	-0.031***
	(0.001)	(0.001)	(0.005)
Independent board members %	-0.003	-0.003	-0.043***
	(0.002)	(0.003)	(0.016)
Owners	-0.002***	-0.002***	-0.010***
	(0.000)	(0.000)	(0.002)
Constant	0.192***	0.193***	0.263
	(0.026)	(0.029)	(0.165)
Observations	31111	31111	31111
Overall R^2	0.1204	0.1297	0.0783
Year dummies	no	no	no
Industry dummies	yes	yes	yes

Robust standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

Table 13 shows that *Female directors %* have no significant impact on any profitability measures. The coefficients of *Quota* show that the years following 2008 had a significant and negative impact on the profitability measures. However, as the interaction term between *Female directors %* and *Quota* shows no significant results, we cannot state that the quota has had an impact on the effect of diversity on profitability in medium-to-large firms.

5.4 Hypothesis 4: CEO gender effects on profitability, comparing non-family and family firms

Table 14 below shows the main results from using the GLS model with random effects for our hypothesis 4: "The effect of the CEO's gender on profitability is not equal for family firms and non-family firms". The regression is the same as for hypothesis 1, except that we compare the results for non-family firms to the results for family firms.

TABLE 14: The table shows the results of regressing *Female CEO* and a set of control variables on *Adjusted ROA* (column 1 and 2), *ROA* (column 3 and 4) and *ROE* (column 5 and 6), using the GLS model with random effects. The sample consists of 112734 AS firms in the period 2000-2018, divided by non-family firms (column 1, 3 and 5) and family firms (column 2, 4 and 6). The firm is a family firm if at least 50% of the firm is ultimately owned by families. *Female CEO* takes the value 1 if the CEO is female and 0 otherwise. *CEO tenure* is the number of years the CEO has been in the position. *CEO age* is the age of the CEO in the current year. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the percentage of shares owned directly by the CEO. *Employees* is the total number of employees. *Leverage* is the total debt relative to total assets. *Firm size ln(assets)* is measured as the natural logarithm of total assets. *Firm risk* is the standard deviation of growth in operating revenue. *Family firm* is a dummy variable that takes the value 1 if at least 50% of the firm is ultimately owned by families. *Board size* is the number of directors on board. *Independent board members %* is the percentage of board members not employee elected and not in relation to owners or the CEO. *Owners* is the total number of owners. Year dummies controlling general effects in the period 2000-2018 are included, as well as industry dummies for each industry as shown in appendix 1. The standard errors are clustered at firm level. Significant levels are shown in stars.

GLS with Random Effects

	(1)	(2)	(3)	(4)	(5)	(6)
	Adjusted ROA	Adjusted ROA	ROA	ROA	ROE	ROE
Sample	*Non-family firms*	*Family firms*	*Non-family firms*	*Family firms*	*Non-family firms*	*Family firms*
Female CEO	-0.010	-0.005***	-0.010	-0.004**	-0.065*	-0.005
	(0.008)	(0.002)	(0.009)	(0.002)	(0.038)	(0.008)
CEO duality	0.020**	0.013***	0.019*	0.015***	0.096*	0.064***
	(0.009)	(0.003)	(0.010)	(0.003)	(0.054)	(0.016)
CEO tenure	-0.002***	-0.002***	-0.002***	-0.002***	-0.010***	-0.007***
	(0.001)	(0.000)	(0.001)	(0.000)	(0.003)	(0.001)
CEO age	-0.000	-0.000***	-0.000	-0.000***	-0.002	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)
CEO salary log	0.011***	0.003***	0.014***	0.002***	0.053***	0.035***
	(0.004)	(0.001)	(0.004)	(0.001)	(0.020)	(0.003)
CEO share	0.000	-0.000	0.000	-0.000	0.002**	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
Employees	-0.001**	-0.001***	-0.001**	-0.001***	-0.004**	-0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)
Leverage	-0.020	-0.015***	-0.041**	-0.046***	-0.298***	-0.248***
	(0.017)	(0.003)	(0.020)	(0.003)	(0.060)	(0.011)
Firm size ln(assets)	0.013***	0.018***	0.014***	0.021***	0.102***	0.121***
	(0.003)	(0.001)	(0.004)	(0.001)	(0.016)	(0.003)
Firm risk	0.040***	0.058***	0.043***	0.061***	0.114***	0.204***
	(0.007)	(0.001)	(0.008)	(0.001)	(0.032)	(0.006)
Board size	-0.010***	-0.007***	-0.012***	-0.008***	-0.032**	-0.028***
	(0.003)	(0.001)	(0.003)	(0.001)	(0.014)	(0.003)
Independent board members %	-0.006	-0.002	-0.003	-0.003*	0.025	-0.029***
	(0.008)	(0.002)	(0.009)	(0.002)	(0.039)	(0.008)
Owners	-0.002*	-0.001***	-0.002	-0.001**	-0.005	-0.014***
	(0.001)	(0.000)	(0.001)	(0.001)	(0.005)	(0.002)
Constant	-0.104*	-0.062**	-0.138*	-0.097***	-1.330***	-1.192***
	(0.063)	(0.028)	(0.073)	(0.028)	(0.318)	(0.168)
Observations	2718	110016	2718	110016	2718	110016
Overall R^2	0.1031	0.1081	0.0977	0.1022	0.0888	0.1000
Year dummies	yes	yes	yes	yes	yes	yes
Industry dummies	yes	yes	yes	yes	yes	yes

Robust standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

The table above shows that the coefficients for *Female CEO* are only significant for *Adjusted ROA* and *ROA* in family firms and *ROE* in non-family firms. Thus, according to *Adjusted ROA* and *ROA*, female CEOs have a negative impact on profitability in family firms, while gender has no impact in non-family firms. This is perhaps due to the unique governance and agency mechanisms in family firms. However, *ROE* shows a negative and significant result in non-family firms but no effect in family firms. The insignificant result on *ROE* for family firms may be due to family firms having more leverage, on average, than non-family firms, increasing *ROE* and outweighing the negative effects of female CEOs.

5.4.1 Robustness check: Family CEO

The table below shows how the results for family firms differ between those who have appointed the CEO from the family and those who have appointed the CEO externally.

TABLE 15: The table shows the results of regressing *Female CEO* and a set of control variables on *Adjusted ROA* (column 1 and 2), *ROA* (column 3 and 4) and *ROE* (column 5 and 6), using the GLS model with random effects. The sample consists of 110016 AS family firms in the period 2000-2018, divided by firms with a family CEO (column 2, 4 and 6) and firms with a family CEO (column 1, 3 and 5). The firm is a family firm if at least 50% of the firm is ultimately owned by families. Family CEO is defined as if the CEO is in the family with the largest ultimate ownership. *Female CEO* takes the value 1 if the CEO is female and 0 otherwise. *CEO tenure* is the number of years the CEO has been in the position. *CEO age* is the age of the CEO in the current year. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the percentage of shares owned directly by the CEO. *Employees* is the total number of employees. *Leverage* is the total debt relative to total assets. *Firm size ln(assets)* is measured as the natural logarithm of total assets. *Firm risk* is the standard deviation of growth in operating revenue. *Family firm* is a dummy variable that takes the value 1 if at least 50% of the firm is ultimately owned by families. *Board size* is the number of directors on board. *Independent board members %* is the percentage of board members not employee elected and not in relation to owners or the CEO. *Owners* is the total number of owners. Year dummies controlling general effects in the period 2000-2018 are included, as well as industry dummies for each industry as shown in appendix 1. The standard errors are clustered at firm level. Significant levels are shown in stars.

			GLS with Random Effects			
	(1)	(2)	(3)	(4)	(5)	(6)
	Adjusted ROA	Adjusted ROA	ROA	ROA	ROE	ROE
Sample	*Family firms without family CEO*	*Family firms with family CEO*	*Family firms without family CEO*	*Family firms with family CEO*	*Family firms without family CEO*	*Family firms with family CEO*
Female CEO	0.003	-0.006***	0.004	-0.005**	0.049**	-0.011
	(0.004)	(0.002)	(0.005)	(0.002)	(0.024)	(0.009)
CEO duality	0.009*	0.014***	0.011*	0.017***	0.032	0.075***
	(0.005)	(0.004)	(0.006)	(0.004)	(0.031)	(0.020)
CEO tenure	-0.000	-0.002***	-0.000	-0.002***	-0.002	-0.007***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.001)
CEO age	-0.001***	-0.000***	-0.001***	-0.000*	-0.002**	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
CEO salary log	0.004*	0.004***	0.005**	0.002***	0.052***	0.035***
	(0.002)	(0.001)	(0.003)	(0.001)	(0.012)	(0.003)
CEO share	0.000***	-0.000	0.000***	-0.000	0.003***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
Employees	-0.001***	-0.001***	-0.001***	-0.001***	-0.004***	-0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
Leverage	-0.022***	-0.014***	-0.049***	-0.045***	-0.212***	-0.253***
	(0.008)	(0.003)	(0.010)	(0.003)	(0.034)	(0.011)
Firm size ln(assets)	0.024***	0.017***	0.025***	0.021***	0.163***	0.117***
	(0.002)	(0.001)	(0.002)	(0.001)	(0.010)	(0.003)
Firm risk	0.057***	0.058***	0.058***	0.061***	0.226***	0.200***
	(0.004)	(0.001)	(0.004)	(0.002)	(0.019)	(0.006)
Board size	-0.001	-0.008***	-0.001	-0.009***	-0.002	-0.033***
	(0.001)	(0.001)	(0.002)	(0.001)	(0.008)	(0.004)
Independent board members %	-0.013**	-0.002	-0.014*	-0.003	-0.130***	-0.024***
	(0.006)	(0.002)	(0.007)	(0.002)	(0.035)	(0.008)
Owners	-0.001	-0.001***	-0.001	-0.002***	-0.015***	-0.014***
	(0.001)	(0.000)	(0.001)	(0.001)	(0.004)	(0.003)
Constant	-0.141***	-0.065**	-0.165***	-0.101***	-1.706***	-1.227***
	(0.045)	(0.031)	(0.046)	(0.032)	(0.198)	(0.187)
Observations	12017	97999	12017	97999	12017	97999
Overall R^2	0.1062	0.1106	0.1001	0.1045	0.1109	0.1000
Year dummies	yes	yes	yes	yes	yes	yes
Industry dummies	yes	yes	yes	yes	yes	yes

Robust standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

The table above shows that the negative results on *Adjusted ROA* and *ROA* for *Female CEO* are significant in the cases where the family firms have appointed a family CEO and insignificant where they have external CEOs. These results may indicate that the negative impact female CEOs have on *Adjusted ROA* and *ROA* may be affected by nepotism. This is consistent with Pérez-González (2006) and Bennedsen et al. (2007) that found CEOs with family ties to decrease performance. Nepotism could negatively affect the impact male CEOs have on profitability, as well. However, the overall effect male CEOs have on profitability might be better than the effect female CEOs have, due to differences in risk taking and operational profitability.

We see a significant and positive relationship between female CEOs and *ROE* in family firms without family CEO, which might be due to female CEOs having higher leverage ratios than male CEOs and thus relatively lower equity, resulting in a higher *ROE.* However, this result is not seen in *ROE* for family firms with family CEOs, perhaps because a negative effect of female family CEOs outweighs the positive effects on *ROE* of higher leverage. The fact that *ROE* has significant results for *Female CEO* when the family firm has an external CEO and insignificant result when the CEO is in the family, may explain why our main regressions for hypothesis 4, shown in table 14, showed an insignificant effect of *Female CEO* on *ROE*.

5.4.2 Robustness check: Different firm sizes

Tables 16 and 17 show the results for family and non-family firms for our two different firm sizes. Table 16 shows the results related to hypothesis 4 for non-family firms with multiple owners, family firms with 1 owner and family firms with multiple owners. Firms with only 1 owner will have owners that own 100% of the firm. Firms with 1 owner will therefore be considered as a family firm, according to our definition. Thus, we believe it is important to distinguish family firms with one owner from family firms consisting of multiple family owners, as their governance structures may impact the results differently. Table 17 shows the results for medium-to-large family and non-family firms.

TABLE 16: The table shows the results of regressing *Female CEO* and a set of control variables on *Adjusted ROA* (column 1, 2 and 3), *ROA* (column 4, 5 and 6) and *ROE* (column 7, 8 and 9), using the GLS model with random effects. The sample consists of 81716 small AS firms in the period 2000-2018, divided by non-family firms with multiple owners (column 1, 4 and 7), family firms with 1 owner (column 2, 5 and 8) and family firms with multiple owners (column 3, 6 and 9). Firm size small is defined as when operating revenues are lower than 10 000 000 NOK (in 2015 kroners, price Adjusted per year). The firm is a family firm if at least 50% of the firm is ultimately owned by families. *Female CEO* takes the value 1 if the CEO is female and 0 otherwise. *CEO tenure* is the number of years the CEO has been in the position. *CEO age* is the age of the CEO in the current year. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the percentage of shares owned directly by the CEO. *Employees* is the total number of employees. *Leverage* is the total debt relative to total assets. *Firm size ln(assets)* is measured as the natural logarithm of total assets. *Firm risk* is the standard deviation of growth in operating revenue. *Family firm* is a dummy variable that takes the value 1 if at least 50% of the firm is ultimately owned by families. *Board size* is the number of directors on board. *Independent board members %* is the percentage of board members not employee elected and not in relation to owners or the CEO. *Owners* is the total number of owners. Year dummies controlling general effects in the period 2000-2018 are included, as well as industry dummies for each industry as shown in appendix 1. The standard errors are clustered at firm level. Significant levels are shown in stars.

GLS with random effects

	(1) Adjusted ROA	(2) Adjusted ROA	(3) Adjusted ROA	(4) ROA	(5) ROA	(6) ROA	(7) ROE	(8) ROE	(9) ROE
Sample	*Non-family firms with multiple owners*	*Family firms with 1 owner*	*Family firms with multiple owners*	*Non-family firms with multiple owners*	*Family firms with 1 owner*	*Family firms with multiple owners*	*Non-family firms with multiple owners*	*Family firms with 1 owner*	*Family firms with multiple owners*
Female CEO	-0.003	-0.009***	-0.003	-0.001	-0.008**	-0.002	-0.024	-0.016	0.008
	(0.011)	(0.003)	(0.002)	(0.012)	(0.003)	(0.003)	(0.051)	(0.013)	(0.012)
CEO duality	0.013	0.010	0.013***	0.017	0.014	0.016***	0.127	0.073	0.070***
	(0.015)	(0.012)	(0.005)	(0.017)	(0.013)	(0.006)	(0.078)	(0.059)	(0.025)
CEO tenure	-0.002***	-0.003***	-0.001***	-0.002**	-0.002***	-0.001***	-0.006	-0.009***	-0.005***
	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.004)	(0.001)	(0.001)
CEO age	-0.000	-0.000	-0.000*	0.000	-0.000	-0.000	-0.001	-0.001**	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)
CEO salary log	0.008	0.003***	0.002*	0.011*	0.002	0.001	0.029	0.036***	0.035***
	(0.005)	(0.001)	(0.001)	(0.006)	(0.001)	(0.001)	(0.025)	(0.005)	(0.005)
CEO share	-0.000	0.001***	0.000	-0.000	0.001***	0.000	0.001	0.004**	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)	(0.000)
Employees	-0.003**	-0.003***	-0.003***	-0.003**	-0.003***	-0.003***	-0.004	-0.003*	-0.011***
	(0.001)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.008)	(0.002)	(0.002)
Leverage	0.006	-0.003	-0.000	-0.008	-0.032***	-0.027***	-0.391***	-0.320***	-0.290***
	(0.020)	(0.004)	(0.004)	(0.024)	(0.005)	(0.005)	(0.076)	(0.016)	(0.016)
Firm size ln(assets)	0.011**	0.021***	0.020***	0.015***	0.025***	0.024***	0.075***	0.116***	0.140***
	(0.005)	(0.001)	(0.001)	(0.006)	(0.001)	(0.001)	(0.024)	(0.005)	(0.006)
Firm risk	0.049***	0.059***	0.063***	0.055***	0.063***	0.066***	0.147***	0.184***	0.219***
	(0.008)	(0.002)	(0.002)	(0.009)	(0.002)	(0.002)	(0.041)	(0.008)	(0.010)
Board size	-0.016***	-0.010***	-0.006***	-0.018***	-0.011***	-0.008***	-0.055**	-0.024***	-0.019***
	(0.005)	(0.002)	(0.001)	(0.005)	(0.002)	(0.001)	(0.023)	(0.009)	(0.005)
Independent board members %	-0.006	-0.002	-0.003	-0.005	-0.003	-0.003	0.034	-0.021**	-0.014
	(0.010)	(0.002)	(0.003)	(0.012)	(0.002)	(0.004)	(0.053)	(0.010)	(0.019)
Owners	-0.009***		-0.004***	-0.009***		-0.003***	-0.019*		-0.029***
	(0.003)		(0.001)	(0.003)		(0.001)	(0.011)		(0.004)
Constant	-0.026	-0.178***	-0.065	-0.136	-0.259***	-0.113**	-0.980**	-1.803***	-1.415***
	(0.094)	(0.057)	(0.044)	(0.105)	(0.066)	(0.044)	(0.419)	(0.266)	(0.260)
Observations	1442	40372	39902	1442	40372	39902	1442	40372	39902
Overall R^2	0.1268	0.1191	0.1120	0.1207	0.1112	0.1008	0.0906	0.1055	0.1027
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes
Industry dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes

Robust standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

Table 16 shows that the results from *Female CEO* on *Adjusted ROA* and *ROA* are only significant for small family firms in the cases where the firms have 1 owner. This might be because the CEO gains relatively less influence on firm decisions affecting profitability when there are multiple owners involved. Consistent with previous results, the effect of *Female CEO* on *Adjusted ROA* and *ROA* are insignificant for non-family firms. Consistent with our main regression for hypothesis 4, the effects female CEOs have on *ROE* are insignificant.

TABLE 17: The table shows the results of regressing *Female CEO* and a set of control variables on *Adjusted ROA* (column 1 and 2), *ROA* (column 3 and 4) and *ROE* (column 5 and 6), using the GLS model with random effects. The sample consists of 30925 AS firms in the period 2000-2018, divided by medium-to-large non-family firms (column 1, 3 and 5) and medium-to-large family firms (column 2, 4 and 6). Medium-to-large firms are defined as when operating revenues are equal or above 10 000 000 NOK (in 2015 kroners, price Adjusted per year). The firm is a family firm if at least 50% of the firm is ultimately owned by families. *Female CEO* takes the value 1 if the CEO is female and 0 otherwise. *CEO tenure* is the number of years the CEO has been in the position. *CEO age* is the age of the CEO in the current year. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the percentage of shares owned directly by the CEO. *Employees* is the total number of employees. *Leverage* is the total debt relative to total assets. *Firm size ln(assets)* is measured as the natural logarithm of total assets. *Firm risk* is the standard deviation of growth in operating revenue. *Family firm* is a dummy variable that takes the value 1 if at least 50% of the firm is ultimately owned by families. *Board size* is the number of directors on board. *Independent board members %* is the percentage of board members not employee elected and not in relation to owners or the CEO. *Owners* is the total number of owners. Year dummies controlling general effects in the period 2000-2018 are included, as well as industry dummies for each industry as shown in appendix 1. The standard errors are clustered at firm level. Significant levels are shown in stars.

GLS with Random Effects

	(1) Adjusted ROA	(2) Adjusted ROA	(3) ROA	(4) ROA	(5) ROE	(6) ROE
Sample	*Medium-to-large non-family firms*	*Medium-to-large family firms*	*Medium-to-large non-family firms*	*Medium-to-large family firms*	*Medium-to-large non-family firms*	*Medium-to-large family firms*
Female CEO	-0.011	0.006*	-0.009	0.009***	-0.130*	0.054***
	(0.013)	(0.003)	(0.014)	(0.003)	(0.067)	(0.019)
CEO duality	0.017	0.012***	0.013	0.013***	0.085	0.041*
	(0.011)	(0.004)	(0.013)	(0.004)	(0.074)	(0.024)
CEO tenure	-0.002**	-0.001***	-0.002*	-0.001***	-0.016***	-0.005***
	(0.001)	(0.000)	(0.001)	(0.000)	(0.005)	(0.001)
CEO age	-0.001	-0.001***	-0.001	-0.000***	-0.004*	-0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.001)
CEO salary log	0.014***	0.005***	0.016***	0.005***	0.087**	0.033***
	(0.005)	(0.001)	(0.005)	(0.001)	(0.037)	(0.007)
CEO share	0.001**	-0.000***	0.001*	-0.000***	0.003*	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)
Employees	-0.001***	-0.001***	-0.001***	-0.001***	-0.006***	-0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.001)
Leverage	-0.115***	-0.094***	-0.164***	-0.137***	-0.086	0.002
	(0.021)	(0.005)	(0.024)	(0.005)	(0.114)	(0.030)
Firm size ln(assets)	0.006	0.005***	0.007	0.006***	0.069**	0.043***
	(0.006)	(0.001)	(0.006)	(0.001)	(0.031)	(0.008)
Firm risk	0.029***	0.046***	0.030**	0.048***	0.082*	0.216***
	(0.011)	(0.003)	(0.012)	(0.003)	(0.048)	(0.012)
Board size	-0.006*	-0.005***	-0.007*	-0.006***	-0.019	-0.031***
	(0.003)	(0.001)	(0.004)	(0.001)	(0.020)	(0.005)
Independent board members %	0.003	-0.002	0.004	-0.003	0.016	-0.042**
	(0.011)	(0.003)	(0.012)	(0.003)	(0.061)	(0.017)
Owners	-0.002	-0.002***	-0.002	-0.002***	-0.005	-0.010***
	(0.001)	(0.000)	(0.002)	(0.001)	(0.006)	(0.002)
Constant	0.006	0.174***	0.013	0.173***	-1.034	0.295
	(0.106)	(0.028)	(0.117)	(0.030)	(0.676)	(0.217)
Observations	1183	29742	1183	29742	1183	29742
Overall R^2	0.1463	0.1233	0.1501	0.1343	0.1098	0.0921
Year dummies	yes	yes	yes	yes	yes	yes
Industry dummies	yes	yes	yes	yes	yes	yes

Robust standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

Table 17 shows that female CEOs have a significant and positive impact on *Adjusted ROA*, *ROA* and *ROE* in medium-to-large family firms. The results for family firms are in accordance with our findings in hypothesis 1. In medium-to-large non-family firms, the effect on *ROE* is negative, however only at 10% level.

5.5 Hypothesis 5: Board gender diversity effects on profitability, comparing non-family and family firms

In this section, we present our results related to hypothesis 5: "The effect of gender diversity in the BoD on profitability is not equal for family firms and non-family firms". We perform the same regressions as in hypothesis 2 but compare the results between non-family and family firms. Table 18 shows the main results of the GLS with random effects model used to answer our hypothesis.

TABLE 18: The table shows the results of regressing *Female directors %* and a set of control variables on *Adjusted ROA* (column 1 and 2), *ROA* (column 3 and 4) and *ROE* (column 5 and 6), using the GLS model with random effects. The sample consists of 113350 AS firms in the period 2000-2018, divided by non-family firms (column 1, 3 and 5) and family firms (column 2, 4 and 6). The firm is a family firm if at least 50% of the firm is ultimately owned by families. *Female directors %* is the percentage of female directors, relative to the total number of directors. *CEO tenure* is the number of years the CEO has been in the position. *Directors' mean age* indicates the mean age of the board of directors in the current year. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the percentage of shares owned directly by the CEO. *Employees* is the total number of employees. *Leverage* is the total debt relative to total assets. *Firm size ln(assets)* is measured as the natural logarithm of total assets. *Firm risk* is the standard deviation of growth in operating revenue. *Board size* is the number of directors on board. *Independent board members %* is the percentage of board members not employee elected and not in relation to owners or the CEO. *Owners* is the total number of owners. Year dummies controlling general effects in the period 2000-2018 are included, as well as industry dummies for each industry as shown in appendix 1. The standard errors are clustered at firm level. Significant levels are shown in stars.

GLS with random effects

	(1) Adjusted ROA	(2) Adjusted ROA	(3) ROA	(4) ROA	(5) ROE	(6) ROE
Sample	*Non-family firms*	*Family firms*	*Non-family firms*	*Family firms*	*Non-family firms*	*Family firms*
Female directors %	-0.021**	-0.006***	-0.020*	-0.005***	-0.092*	-0.025***
	(0.010)	(0.002)	(0.011)	(0.002)	(0.049)	(0.009)
CEO duality	0.019**	0.012***	0.019*	0.015***	0.098*	0.057***
	(0.009)	(0.003)	(0.010)	(0.003)	(0.053)	(0.016)
CEO tenure	-0.002***	-0.002***	-0.002***	-0.002***	-0.009***	-0.007***
	(0.001)	(0.000)	(0.001)	(0.000)	(0.003)	(0.001)
Directors' mean age	-0.000	-0.000***	-0.000	-0.000***	-0.003*	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)
CEO salary log	0.011***	0.003***	0.014***	0.002***	0.053***	0.035***
	(0.004)	(0.001)	(0.004)	(0.001)	(0.020)	(0.003)
CEO share	0.000	-0.000	0.000	-0.000	0.002**	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
Employees	-0.001**	-0.001***	-0.001**	-0.001***	-0.004**	-0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)
Leverage	-0.021	-0.015***	-0.042**	-0.046***	-0.303***	-0.250***
	(0.017)	(0.003)	(0.020)	(0.003)	(0.060)	(0.011)
Firm size ln(assets)	0.013***	0.018***	0.014***	0.021***	0.101***	0.120***
	(0.003)	(0.001)	(0.004)	(0.001)	(0.016)	(0.003)
Firm risk	0.040***	0.058***	0.043***	0.061***	0.114***	0.202***
	(0.007)	(0.001)	(0.008)	(0.001)	(0.032)	(0.005)
Board size	-0.010***	-0.007***	-0.011***	-0.008***	-0.031**	-0.028***
	(0.003)	(0.001)	(0.003)	(0.001)	(0.014)	(0.003)
Independent board members %	-0.008	-0.003*	-0.005	-0.004**	0.012	-0.030***
	(0.008)	(0.002)	(0.009)	(0.002)	(0.039)	(0.008)
Owners	-0.002**	-0.001***	-0.002	-0.001***	-0.006	-0.014***
	(0.001)	(0.000)	(0.001)	(0.001)	(0.005)	(0.002)
Constant	-0.082	-0.056**	-0.121*	-0.090***	-1.255***	-1.125***
	(0.063)	(0.028)	(0.074)	(0.028)	(0.325)	(0.168)
Observations	2730	110620	2730	110620	2730	110620
Overall R^2	0.1048	0.1077	0.0984	0.1018	0.0902	0.1000
Year dummies	yes	yes	yes	yes	yes	yes
Industry dummies	yes	yes	yes	yes	yes	yes

Robust standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

The results in table 18 show that *Female directors %* has a negative impact on all our profitability measures, both for family firms and non-family firms. The negative effects are weaker in family firms than for non-family firms. This might be explained by the study of Bøhren and Staudbo (2014) which found independent board members to be associated with lower profitability and that female directors are more likely to be independent than male directors. As we see in all our hypotheses, the negative effect is weaker in *ROA* than in *Adjusted ROA*, which might be due to the differences in risk aversion and financial expenses between male and females. The negative effect is strongest for *ROE*.

5.5.1 Robustness check: Alternative measure of diversity

We check if our results remain consistent when measuring diversity by *BGD* instead of *Female directors %*. The results are shown in table 19 below.

TABLE 19: The table shows the results of regressing *BGD* and a set of control variables on *Adjusted ROA* (column 1 and 2), *ROA* (column 3 and 4) and *ROE* (column 5 and 6), using the GLS model with random effects. The sample consists of 113350 AS firms in the period 2000-2018, divided by non-family firms (column 1, 3 and 5) and family firms (column 2, 4 and 6). The firm is a family firm if at least 50% of the firm is ultimately owned by families. *BGD* is a dummy variable that takes the value 1 if there are at least 40% of both genders on the BoD. *CEO tenure* is the number of years the CEO has been in the position. *Directors' mean age* is the mean age of the board of directors in the current year. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the percentage of shares owned directly by the CEO. *Employees* is the total number of employees. *Leverage* is the total debt relative to total assets. *Firm size ln(assets)* is measured as the natural logarithm of total assets. *Firm risk* is the standard deviation of growth in operating revenue. *Board size* is the number of directors on board. *Independent board members %* is the percentage of board members not employee elected and not in relation to owners or the CEO. *Owners* is the total number of owners. Year dummies controlling general effects in the period 2000-2018 are included, as well as industry dummies for each industry as shown in appendix 1. The standard errors are clustered at firm level. Significant levels are shown in stars.

	GLS with Random Effects					
	(1) Adjusted ROA	(2) Adjusted ROA	(3) ROA	(4) ROA	(5) ROE	(6) ROE
Sample	*Non-family firms*	*Family firms*	*Non-family firms*	*Family firms*	*Non-family firms*	*Family firms*
BGD	-0.014	-0.002	-0.013	-0.002	-0.081*	-0.007
	(0.009)	(0.002)	(0.010)	(0.002)	(0.046)	(0.010)
CEO duality	0.019**	0.012***	0.019*	0.015***	0.096*	0.057***
	(0.009)	(0.003)	(0.010)	(0.003)	(0.053)	(0.016)
CEO tenure	-0.002***	-0.002***	-0.002***	-0.002***	-0.009***	-0.006***
	(0.001)	(0.000)	(0.001)	(0.000)	(0.003)	(0.001)
Directors' mean age	-0.000	-0.000***	-0.000	-0.000***	-0.003*	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)
CEO salary log	0.011***	0.003***	0.014***	0.002***	0.053***	0.036***
	(0.004)	(0.001)	(0.004)	(0.001)	(0.020)	(0.003)
CEO share	0.000	-0.000	0.000	-0.000	0.002**	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
Employees	-0.001**	-0.001***	-0.001**	-0.001***	-0.004**	-0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)
Leverage	-0.020	-0.015***	-0.041**	-0.046***	-0.298***	-0.250***
	(0.017)	(0.003)	(0.020)	(0.003)	(0.060)	(0.011)
Firm size ln(assets)	0.013***	0.018***	0.015***	0.021***	0.105***	0.121***
	(0.003)	(0.001)	(0.004)	(0.001)	(0.016)	(0.003)
Firm risk	0.040***	0.058***	0.043***	0.061***	0.113***	0.202***
	(0.007)	(0.001)	(0.008)	(0.001)	(0.032)	(0.005)
Board size	-0.010***	-0.007***	-0.011***	-0.008***	-0.030**	-0.029***
	(0.003)	(0.001)	(0.003)	(0.001)	(0.014)	(0.003)
Independent board members %	-0.008	-0.003	-0.006	-0.004**	0.009	-0.030***
	(0.008)	(0.002)	(0.009)	(0.002)	(0.039)	(0.008)
Owners	-0.002**	-0.001***	-0.002	-0.001***	-0.006	-0.014***
	(0.001)	(0.000)	(0.001)	(0.001)	(0.005)	(0.002)
Constant	-0.106*	-0.063**	-0.145**	-0.097***	-1.355***	-1.156***
	(0.061)	(0.028)	(0.072)	(0.028)	(0.320)	(0.167)
Observations	2730	110620	2730	110620	2730	110620
Overall R^2	0.1037	0.1075	0.0975	0.1017	0.0895	0.0999
Year dummies	yes	yes	yes	yes	yes	yes
Industry dummies	yes	yes	yes	yes	yes	yes

Robust standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

When using *BGD* instead of *Female directors %*, the only significant result for this variable is the effect on *ROE* in non-family firms. This coefficient is still negative but weaker than when measuring for Female directors %. These results may imply that gender diverse boards on behalf of both genders are better than boards with a majority of women, for *ROE*. Regarding *ROA* and *Adjusted ROA*, we cannot infer whether boards with board gender diversity on behalf of both genders influence profitability.

5.5.2 Robustness check: Different firm sizes

The results related to hypothesis 5 for our two different firm sizes are shown in tables 20 and 21 below. As elaborated in hypothesis 4, we only separate small firms with 1 owner from small firms with multiple owners for family firms. Thus, table 20 shows the results for non-family firms with multiple owners, family firms with 1 owner and family firms with multiple owners. Table 21 shows results for medium-to-large non-family and family firms.

TABLE 20: The table shows the results of regressing *Female directors %* and a set of control variables on *Adjusted ROA* (column 1, 2 and 3), *ROA* (column 4, 5 and 6) and *ROE* (column 7, 8 and 9), using the GLS model with random effects. The sample consists of 81716 small AS firms in the period 2000-2018, divided by non-family firms with multiple owners (column 1, 4 and 7), family firms with 1 owner (column 2, 5 and 8) and family firms with multiple owners (column 3, 6 and 9). Firm size small is defined as when operating revenues are lower than 10 000 000 NOK (in 2015 kroners, price Adjusted per year). The firm is a family firm if at least 50% of the firm is ultimately owned by families. *Female directors %* is the percentage of female directors, relative to the total number of directors. *CEO tenure* is the number of years the CEO has been in the position. *Directors' mean age* is the mean age of the board of directors in the current year. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the percentage of shares owned directly by the CEO. *Employees* is the total number of employees. *Leverage* is the total debt relative to total assets. *Firm size ln(assets)* is measured as the natural logarithm of total assets. *Firm risk* is the standard deviation of growth in operating revenue. *Board size* is the number of directors on board. *Independent board members %* is the percentage of board members not employee elected and not in relation to owners or the CEO. *Owners* is the total number of owners. Year dummies controlling general effects in the period 2000-2018 are included, as well as industry dummies for each industry as shown in appendix 1. The standard errors are clustered at firm level. Significant levels are shown in stars.

GLS with Random Effects

	(1) Adjusted ROA	(2) Adjusted ROA	(3) Adjusted ROA	(4) ROA	(5) ROA	(6) ROA	(7) ROE	(8) ROE	(9) ROE
Sample	*Small non-family firms with multiple owners*	*Small family firms with 1 owner*	*Small family firms with multiple owners*	*Small non-family firms with multiple owners*	*Small family firms with 1 owner*	*Small family firms with multiple owners*	*Small non-family firms with multiple owners*	*Small family firms with 1 owner*	*Small family firms with multiple owners*
Female directors %	-0.013	-0.008***	-0.006**	-0.010	-0.007**	-0.004	-0.048	-0.016	-0.019
	(0.013)	(0.003)	(0.003)	(0.014)	(0.003)	(0.003)	(0.064)	(0.013)	(0.014)
CEO duality	0.013	0.015	0.013***	0.018	0.018	0.015***	0.104	0.072	0.069***
	(0.016)	(0.012)	(0.005)	(0.017)	(0.013)	(0.006)	(0.078)	(0.057)	(0.025)
CEO tenure	-0.002***	-0.003***	-0.001***	-0.002**	-0.002***	-0.001***	-0.005	-0.009***	-0.004***
	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.004)	(0.001)	(0.001)
Directors' mean age	-0.000	-0.000	-0.000***	0.000	-0.000	-0.000***	-0.003	-0.001**	-0.001*
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.002)	(0.000)	(0.001)
CEO salary log	0.008	0.003***	0.002	0.011*	0.002	0.001	0.031	0.037***	0.034***
	(0.005)	(0.001)	(0.001)	(0.006)	(0.001)	(0.001)	(0.025)	(0.005)	(0.005)
CEO share	-0.000	0.001***	0.000	-0.000	0.001***	0.000	0.001	0.004**	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)	(0.000)
Employees	-0.003**	-0.003***	-0.003***	-0.003**	-0.003***	-0.003***	-0.004	-0.003*	-0.011***
	(0.001)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.008)	(0.002)	(0.002)
Leverage	0.006	-0.004	-0.000	-0.008	-0.032***	-0.027***	-0.391***	-0.318***	-0.291***
	(0.020)	(0.004)	(0.004)	(0.024)	(0.005)	(0.005)	(0.076)	(0.016)	(0.016)
Firm size ln(assets)	0.010**	0.021***	0.020***	0.015**	0.025***	0.024***	0.075***	0.115***	0.139***
	(0.005)	(0.001)	(0.001)	(0.006)	(0.001)	(0.001)	(0.024)	(0.005)	(0.006)
Firm risk	0.049***	0.059***	0.063***	0.056***	0.063***	0.066***	0.146***	0.183***	0.219***
	(0.008)	(0.002)	(0.002)	(0.009)	(0.002)	(0.002)	(0.041)	(0.008)	(0.010)
Board size	-0.015***	-0.009***	-0.006***	-0.017***	-0.011***	-0.007***	-0.060***	-0.024***	-0.018***
	(0.005)	(0.002)	(0.001)	(0.006)	(0.002)	(0.001)	(0.023)	(0.009)	(0.005)
Independent board members %	-0.009	-0.002	-0.003	-0.007	-0.003	-0.004	0.022	-0.020**	-0.017
	(0.011)	(0.002)	(0.003)	(0.012)	(0.002)	(0.004)	(0.054)	(0.010)	(0.019)
Owners	-0.009***		-0.004***	-0.009***		-0.003***	-0.023**		-0.029***
	(0.003)		(0.001)	(0.003)		(0.001)	(0.011)		(0.004)
Constant	-0.009	-0.187***	-0.056	-0.123	-0.266***	-0.104**	-0.910**	-1.804***	-1.364***
	(0.090)	(0.057)	(0.044)	(0.102)	(0.066)	(0.044)	(0.416)	(0.265)	(0.260)
Observations	1449	40587	40108	1449	40587	40108	1449	40587	40108
Overall R^2	0.1271	0.1178	0.1120	0.1205	0.1101	0.1007	0.0936	0.1047	0.1029
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes
Industry dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes

Robust standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

As in previous regressions, all results of *Female directors %* for non-family firms are insignificant. The significant and negative effects on *Adjusted ROA* are smaller in family firms with multiple owners than family firms with 1 owner, possibly because more people involved may contribute to better decision making. For *ROA*, the only significant results from *Female directors %* are for family firms with 1 owner. The negative result is weaker than the result on *Adjusted ROA* for the same sample of firms. This is probably due to female directors being associated with lower financial expenses than male directors, which only impacts *Adjusted ROA*. *ROE* shows no significant impact from female directors.

TABLE 21: The table shows the results of regressing *Female directors %* and a set of control variables on *Adjusted ROA* (column 1 and 2), *ROA* (column 3 and 4) and *ROE* (column 5 and 6), using the GLS model with random effects. The sample consists of 30925 AS firms in the period 2000-2018, divided by medium-to-large non-family firms (column 1, 3 and 5) and medium-to-large family firms (column 2, 4 and 6). Medium-to-large firms are defined as when operating revenues are equal or above 10 000 000 NOK (in 2015 kroners, price Adjusted per year). The firm is a family firm if at least 50% of the firm is ultimately owned by families. *Female directors %* is the percentage of female directors, relative to the total number of directors. *CEO tenure* is the number of years the CEO has been in the position. *Directors' mean age* is the mean age of the board of directors in the current year. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the percentage of shares owned directly by the CEO. *Employees* is the total number of employees. *Leverage* is the total debt relative to total assets. *Firm size ln(assets)* is measured as the natural logarithm of total assets. *Firm risk* is the standard deviation of growth in operating revenue. *Board size* is the number of directors on board. *Independent board members %* is the percentage of board members not employee elected and not in relation to owners or the CEO. *Owners* is the total number of owners. Year dummies controlling general effects in the period 2000-2018 are included, as well as industry dummies for each industry as shown in appendix 1. The standard errors are clustered at firm level. Significant levels are shown in stars.

GLS with Random Effects

	(1) Adjusted ROA	(2) Adjusted ROA	(3) ROA	(4) ROA	(5) ROE	(6) ROE
Sample	*Medium-to-large non-family firms*	*Medium-to-large family firms*	*Medium-to-large non-family firms*	*Medium-to-large family firms*	*Medium-to-large non-family firms*	*Medium-to-large family firms*
Female directors %	-0.028*	0.001	-0.024	0.003	-0.135	-0.001
	(0.017)	(0.004)	(0.019)	(0.004)	(0.086)	(0.022)
CEO duality	0.015	0.010***	0.012	0.011***	0.091	0.027
	(0.012)	(0.004)	(0.013)	(0.004)	(0.073)	(0.024)
CEO tenure	-0.002**	-0.001***	-0.002*	-0.001***	-0.015***	-0.004***
	(0.001)	(0.000)	(0.001)	(0.000)	(0.005)	(0.001)
Directors' mean age	-0.001	-0.001***	-0.001	-0.001***	-0.005*	-0.005***
	(0.001)	(0.000)	(0.001)	(0.000)	(0.003)	(0.001)
CEO salary log	0.014***	0.005***	0.016***	0.005***	0.085**	0.034***
	(0.005)	(0.001)	(0.005)	(0.001)	(0.037)	(0.006)
CEO share	0.001**	-0.000***	0.001*	-0.000***	0.003*	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)
Employees	-0.001***	-0.001***	-0.001***	-0.001***	-0.006***	-0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.001)
Leverage	-0.118***	-0.096***	-0.168***	-0.138***	-0.105	-0.011
	(0.021)	(0.005)	(0.024)	(0.005)	(0.114)	(0.030)
Firm size ln(assets)	0.006	0.005***	0.007	0.006***	0.071**	0.044***
	(0.006)	(0.001)	(0.006)	(0.001)	(0.031)	(0.008)
Firm risk	0.029***	0.046***	0.030**	0.047***	0.085*	0.214***
	(0.011)	(0.003)	(0.012)	(0.003)	(0.048)	(0.012)
Board size	-0.006*	-0.006***	-0.006	-0.006***	-0.014	-0.034***
	(0.003)	(0.001)	(0.004)	(0.001)	(0.020)	(0.005)
Independent board members %	0.000	-0.003	0.001	-0.003	-0.000	-0.043**
	(0.011)	(0.003)	(0.012)	(0.003)	(0.062)	(0.017)
Owners	-0.002	-0.002***	-0.002	-0.002***	-0.006	-0.011***
	(0.001)	(0.000)	(0.002)	(0.001)	(0.006)	(0.002)
Constant	0.034	0.197***	0.040	0.199***	-0.963	0.475**
	(0.107)	(0.028)	(0.119)	(0.030)	(0.686)	(0.220)
Observations	1186	29925	1186	29925	1186	29925
Overall R^2	0.1511	0.1247	0.1541	0.1353	0.1124	0.0928
Year dummies	yes	yes	yes	yes	yes	yes
Industry dummies	yes	yes	yes	yes	yes	yes

Robust standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

Table 21 shows that the coefficient for *Female directors %* is only significant at the 10% level for *Adjusted ROA* in non-family firms. On the other profitability measures, *Female directors %* has no effect in medium-to-large firms, nor for family firms or non-family firms. Nadeem et al. (2019) suggest that females in top management may stand out from the population because of their education and experience. It is plausible to think that it is harder to obtain a director role in larger firms than small firms. Thus, gender differences in BoD may not be as evident in larger firms, as the people that manage to be appointed as directors are likely to be highly qualified, regardless of gender.

6.0 CONCLUSION

The purpose of this thesis is to investigate how gender in Norwegian AS firms' top management affects firm performance, measured by three different profitability measures; *Adjusted ROA*, *ROA* and *ROE*. We look at how the gender of the CEO and the percentage of female board members affect profitability and if these effects are different for family and non-family firms. Additionally, we examine whether the mandatory Gender Balance Law for ASA firms had an impact on how female directors in AS firms affect profitability. To conduct the research, a large data sample on Norwegian AS firms from 2000 to 2018 is retrieved from the CCGR database.

We conduct a series of regressions using GLS with random effects as our main model. In addition, we conduct Pooled OLS regressions and several robustness tests for each hypothesis. We find evidence that female CEOs negatively affect *Adjusted ROA* and *ROA*, while female directors negatively impact all our profitability measures. When dividing the sample into firm sizes, the negative results are only significant in small firms. In medium-to-large firms, female CEOs have a positive impact on all profitability measures, while female directors have no effect, perhaps indicating that females are less reluctant to take risks in big established firms. In addition, there are more people involved in larger firms, consequently improving decision-making.

Further, we see that the negative effect on profitability of female CEOs is only significant for firms without gender diversity. This may indicate that female CEOs have difficulties in performing when the firm's BoD is male-dominated. After the

Gender Balance Law was implemented for ASA firms, the negative impact of female directors in AS firms was reduced. Therefore, we suggest that when more females are included in top management, based on qualifications other than gender, females might be better integrated in firm decisions, thus improving their impact on firm performance.

When dividing into family and non-family firms, the negative impact from female CEOs is mainly significant for family firms, particularly those with family CEOs. The negative effects of female directors are stronger in family firms than non-family firms. These findings indicate that the unique governance mechanisms in family firms, including potential nepotism, might also impact how gender affects profitability.

In conclusion, our findings indicate that gender effects on profitability depend on various of factors, highlighting the importance of looking at gender issues through multiple lenses. Previous literature has tended to focus on diversity in BoD in widely held firms outside of Norway. Literature on Norwegian firms has mainly focused on the gender quota in ASA firms. Thus, research regarding Norwegian AS firms, CEO gender and how gender effects differ between family firms and non-family firms seem limited. To our knowledge, we are the only paper examining both gender of the CEO and the BoD for Norwegian AS firms, and how the effect of gender differ before and after the quota and between family and non-family firms. We thus perceive our master thesis to contribute to the existing literature and we suggest a similar perspective for future research.

However, as conducting a master thesis is limited regarding time and theoretical depth, there are some limitations to point out. Our results may be skewed due to different amounts of observations for our different subsamples. How one chooses to define variables or samples may also impact the results. If we choose to use other definitions for gender diversity, family firms, firm sizes or the profitability measures, the results can be different. As the item descriptions for the variables in the CCGR database are sometimes lacking, we are forced to apply our own understanding of some of the variables.

Our data may have problems related to endogeneity, such as reverse causality, self-selection and omitted variables. By applying appropriate regression methods and

including several variables deemed important, we try to diminish the endogeneity issues to the best of our extent. However, the issue of endogeneity may still exist to some degree.

There might also be several explanations to our findings other than what we have covered in our thesis, making it interesting for further research. Additionally, we argue that research conducted on Norwegian firms may not be directly transferable to other countries, as domestic contingencies may impact the results. Comparison with other countries may thus be of interest for future research, both to similar countries and countries with greater differences regarding culture and gender balance.

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8.0 APPENDICES

Appendix 1: The table below shows how the observations in our dataset are distributed into different industries. The industries are coded according to public industry definitions from Statistics Norway (2019, n.d.a, n.d.b). As definitions vary between different time periods, earlier industry codes were decoded to fit current standards.

Summary statistics over industries

	Observations	Percentage
Agriculture, forestry and fishing	15,259	1.69%
Mining and quarrying	2,723	0.30%
Manufacturing	57,801	6.42%
Electricity, gas and steam air	2,582	0.29%
Water supply	2,341	0.26%
Construction	123,190	13.68%
Wholesale and retail trade	202,599	22.52%
Transportation storage	37,101	4.12%
Accommodation and food services	32,398	3.60%
Information communication	29,950	3.33%
Real estate	131,369	14.59%
Professional, scientific and technical activities	129,219	14.35%
Administrative and support service activities	52,744	5.86%
Public administrative and defense	33	0.00%
Education	11,605	1.29%
Human health and social work activities	34,476	3.83%
Arts, entertainment and recreation	15,611	1.73%
Other service activities	18,839	2.09%
Activities of household as employers	425	0.05%
Activities of Extraterritorial organizations and bodies	3	0.00%
SUM	900,268	100%

Appendix 2: The tables below show the results from performing the Hausman test for our hypothesis 1. The sample consists of AS firms, both nonfamily and family firms, in the period 2000-2018. *Female CEO* takes the value 1 if the CEO is female and 0 otherwise. *CEO tenure* is the number of years the CEO has been in the position. *CEO age* is the age of the CEO in the current year t. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the percentage of shares owned directly by the CEO. *Employees* is the total number of employees. *Leverage* is the total debt relative to total assets. *Firm size ln(assets)* is measured as the natural logarithm of total assets. *Firm risk* is the standard deviation of growth in operating revenue. *Family firm* is a dummy variable that takes the value 1 if at least 50% of the firm is ultimately owned by families. *Board size* is the number of directors on board. *Independent board members %* is the percentage of board members not employee elected and not in relation to owners or the CEO. *Owners* is the total number of owners. Year dummies controlling general effects in the period 2000-2018 is included, as well as industry dummies for each industry as shown in appendix 1.

Hausman test for Adjusted ROA:

Hausman (1978) specification test

	Coef.
Chi-square test value	2170.132
P-value	0

Hausman test for ROA:

Hausman (1978) specification test

	Coef.
Chi-square test value	2234.684
P-value	0

Hausman test for ROE:

Hausman (1978) specification test

	Coef.
Chi-square test value	1138.659
P-value	0

Appendix 3: The tables below show the results from performing the Hausman test for our hypothesis 2. The sample consists of AS firms, both nonfamily and family firms, in the period 2000-2018. *Female directors %* is the percentage of female directors, relative to the total number of directors. *CEO tenure* is the number of years the CEO has been in the position. *Directors' mean age* is the mean age of the board of directors in the current year t. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the percentage of shares owned directly by the CEO. *Employees* is the total number of employees. *Leverage* is the total debt relative to total assets. *Firm size ln(assets)* is measured as the natural logarithm of total assets. *Firm risk* is the standard deviation of growth in operating revenue. *Family firm* is a dummy variable that takes the value 1 if at least 50% of the firm is ultimately owned by families. *Board size* is the number of directors on board. *Independent board members %* is the percentage of board members not employee elected and not in relation to owners or the CEO. *Owners* is the total number of owners. Year dummies controlling general effects in the period 2000-2018 is included, as well as industry dummies for each industry as shown in appendix 1.

Hausman test for Adjusted ROA:

Hausman (1978) specification test

	Coef.
Chi-square test value	2155.496
P-value	0

Hausman test for ROA:

Hausman (1978) specification test

	Coef.
Chi-square test value	2215.539
P-value	0

Hausman test for ROE:

Hausman (1978) specification test

	Coef.
Chi-square test value	1121.912
P-value	0

Appendix 4: The tables below show the results from performing the Hausman test for our hypothesis 3. The sample consists of AS firms, both nonfamily and family firms, in the period 2000-2018. *Female directors %* is the percentage of female directors, relative to the total number of directors. *Quota* is a dummy variable that takes the value 1 for years from and including 2008, and the value 0 otherwise. *CEO tenure* is the number of years the CEO has been in the position. *Directors' mean age* is the mean age of the board of directors in the current year t. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the percentage of shares owned directly by the CEO. *Employees* is the total number of employees. *Leverage* is the total debt relative to total assets. *Firm size ln(assets)* is measured as the natural logarithm of total assets. *Firm risk* is the standard deviation of growth in operating revenue. *Family firm* is a dummy variable that takes the value 1 if at least 50% of the firm is ultimately owned by families. *Board size* is the number of directors on board. *Independent board members %* is the percentage of board members not employee elected and not in relation to owners or the CEO. *Owners* is the total number of owners. Year dummies controlling general effects in the period 2000-2018 is included, as well as industry dummies for each industry as shown in appendix 1.

Hausman test for Adjusted ROA:

Hausman (1978) specification test

	Coef.
Chi-square test value	2034.743
P-value	0

Hausman test for ROA:

Hausman (1978) specification test

	Coef.
Chi-square test value	2155.018
P-value	0

Hausman test for ROE:

Hausman (1978) specification test

	Coef.
Chi-square test value	1033.622
P-value	0

Appendix 5: The tables below show the results from performing the Hausman test for our hypothesis 4. The sample consists of AS firms in the period 2000-2018 and divided into nonfamily and family firms. The firm is a family firm if at least 50% of the firm is ultimately owned by families. *Female CEO* takes the value 1 if the CEO is female and 0 otherwise. *CEO tenure* is the number of years the CEO has been in the position. *CEO age* is the age of the CEO in the current year t. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the percentage of shares owned directly by the CEO. *Employees* is the total number of employees. *Leverage* is the total debt relative to total assets. *Firm size ln(assets)* is measured as the natural logarithm of total assets. *Firm risk* is the standard deviation of growth in operating revenue. *Family firm* is a dummy variable that takes the value 1 if at least 50% of the firm is ultimately owned by families. *Board size* is the number of directors on board. *Independent board members %* is the percentage of board members not employee elected and not in relation to owners or the CEO. *Owners* is the total number of owners. Year dummies controlling general effects in the period 2000-2018 is included, as well as industry dummies for each industry as shown in appendix 1.

Hausman test for Adjusted *ROA* on non-family firms:

Hausman (1978) specification test

	Coef.
Chi-square test value	120.395
P-value	0

Hausman test for *ROA* on non-family firms:

Hausman (1978) specification test

	Coef.
Chi-square test value	125.512
P-value	0

Hausman test for *ROE* on non-family firms:

Hausman (1978) specification test

	Coef.
Chi-square test value	123.263
P-value	0

Hausman test for Adjusted *ROA* on family firms:

Hausman (1978) specification test

	Coef.
Chi-square test value	2092.655
P-value	0

Hausman test for *ROA* on family firms:

Hausman (1978) specification test

	Coef.
Chi-square test value	2151.901
P-value	0

Hausman test for *ROE* on family firms:

Hausman (1978) specification test

	Coef.
Chi-square test value	1064.369
P-value	0

Appendix 6: The tables below show the results from performing the Hausman test for our hypothesis 5. The sample consists of AS firms in the period 2000-2018 and divided into nonfamily and family firms. The firm is a family firm if at least 50% of the firm is ultimately owned by families. *Female directors %* is the percentage of female directors, relative to the total number of directors. *CEO tenure* is the number of years the CEO has been in the position. *Directors' mean age* is the mean age of the board of directors in the current year t. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the percentage of shares owned directly by the CEO. *Employees* is the total number of employees. *Leverage* is the total debt relative to total assets. *Firm size ln(assets)* is measured as the natural logarithm of total assets. *Firm risk* is the standard deviation of growth in operating revenue. *Family firm* is a dummy variable that takes the value 1 if at least 50% of the firm is ultimately owned by families. *Board size* is the number of directors on board. *Independent board members %* is the percentage of board members not employee elected and not in relation to owners or the CEO. *Owners* is the total number of owners. Year dummies controlling general effects in the period 2000-2018 is included, as well as industry dummies for each industry as shown in appendix 1.

Hausman test for adjusted *ROA* on non-family firms:

Hausman (1978) specification test

	Coef.
Chi-square test value	124.939
P-value	0

Hausman test for *ROA* on non-family firms:

Hausman (1978) specification test

	Coef.
Chi-square test value	107.319
P-value	0

Hausman test for *ROE* on non-family firms:

Hausman (1978) specification test

	Coef.
Chi-square test value	123.558
P-value	0

Hausman test for Adjusted *ROA* on family firms:

Hausman (1978) specification test

	Coef.
Chi-square test value	2069.012
P-value	0

Hausman test for *ROA* on family firms:

Hausman (1978) specification test

	Coef.
Chi-square test value	2126.098
P-value	0

Hausman test for *ROE* on family firms:

Hausman (1978) specification test

	Coef.
Chi-square test value	1037.693
P-value	0

Appendix 7: The table below show net financial expenses for firms with male CEOs and firms with female CEOs. The samples consist of 846,688 AS firms in the period 2000-2018.

Descriptive Statistics

Variable	Obs	Mean	Min	Max
Net financial expenses for male CEOs	698,409	-18468	-1584850	2478800
Net financial expenses for female CEOs	148,279	-9201	-1583280	2478920

Appendix 8: The table shows the results of regressing *Female CEO* and a set of control variables on *Adjusted ROA* (column 1), *ROA* (column 2) and *ROE* (column 3), using the Pooled OLS model. The sample consists of 112734 AS firms in the period 2000-2018. *Female CEO* takes the value 1 if the CEO is female and 0 otherwise. *CEO tenure* is the number of years the CEO has been in the position. *CEO age* is the age of the CEO in the current year t. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the percentage of shares owned directly by the CEO. *Employees* is the total number of employees. *Leverage* is the total debt relative to total assets. *Firm size ln(assets)* is measured as the natural logarithm of total assets. *Firm risk* is the standard deviation of growth in operating revenue. *Family firm* is a dummy variable that takes the value 1 if at least 50% of the firm is ultimately owned by families. *Board size* is the number of directors on board. *Independent board members %* is the percentage of board members not employee elected and not in relation to owners or the CEO. *Owners* is the total number of owners. Year dummies controlling general effects in the period 2000-2018 is included, as well as industry dummies for each industry as shown in appendix 1. The standard errors are clustered at firm level. Significant levels are shown in stars.

	Pooled OLS		
	(1)	(2)	(3)
	Adjusted ROA	ROA	ROE
Female CEO	-0.005***	-0.005***	-0.009
	(0.002)	(0.002)	(0.008)
CEO duality	0.015***	0.017***	0.077***
	(0.003)	(0.003)	(0.015)
CEO tenure	-0.002***	-0.001***	-0.006***
	(0.000)	(0.000)	(0.001)
CEO age	-0.000***	-0.000***	-0.001***
	(0.000)	(0.000)	(0.000)
CEO salary log	0.010***	0.009***	0.061***
	(0.001)	(0.001)	(0.003)
CEO share	-0.000	-0.000	-0.001***
	(0.000)	(0.000)	(0.000)
Employees	-0.001***	-0.001***	-0.002***
	(0.000)	(0.000)	(0.000)
Leverage	-0.012***	-0.043***	-0.206***
	(0.002)	(0.003)	(0.010)
Firm size ln(assets)	0.014***	0.016***	0.096***
	(0.001)	(0.001)	(0.003)
Firm risk	0.053***	0.057***	0.187***
	(0.001)	(0.001)	(0.005)
Family firm	0.010***	0.010***	0.080***
	(0.003)	(0.003)	(0.015)
Board size	-0.007***	-0.008***	-0.031***
	(0.001)	(0.001)	(0.003)
Independent board members %	-0.002	-0.003**	-0.027***
	(0.001)	(0.002)	(0.007)
Owners	-0.001***	-0.001***	-0.014***
	(0.000)	(0.000)	(0.002)
Constant	-0.080***	-0.106***	-1.180***
	(0.020)	(0.021)	(0.126)
Observations	112734	112734	112734
R-squared	0.110	0.103	0.101
Year dummies	yes	yes	yes
Industry dummies	yes	yes	yes

Standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

Appendix 9: The table shows the results of regressing *Female directors %* and a set of control variables on *Adjusted ROA* (column 1), *ROA* (column 2) and *ROE* (column 3), using the Pooled OLS model. The sample consists of 113350 AS firms in the period 2000-2018. *Female directors %* is the percentage of female directors, relative to the total number of directors. *CEO tenure* is the number of years the CEO has been in the position. *Directors' mean age* is the mean age of the board of directors in the current year t. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the percentage of shares owned directly by the CEO. *Employees* is the total number of employees. *Leverage* is the total debt relative to total assets. *Firm size ln(assets)* is measured as the natural logarithm of total assets. *Firm risk* is the standard deviation of growth in operating revenue. *Family firm* is a dummy variable that takes the value 1 if at least 50% of the firm is ultimately owned by families. *Board size* is the number of directors on board. *Independent board members %* is the percentage of board members not employee elected and not in relation to owners or the CEO. *Owners* is the total number of owners. Year dummies controlling general effects in the period 2000-2018 is included, as well as industry dummies for each industry as shown in appendix 1. The standard errors are clustered at firm level. Significant levels are shown in stars.

	Pooled OLS		
	(1)	(2)	(3)
	Adjusted ROA	ROA	ROE
Female directors %	-0.007***	-0.006***	-0.025***
	(0.002)	(0.002)	(0.009)
CEO duality	0.015***	0.017***	0.072***
	(0.003)	(0.003)	(0.015)
CEO tenure	-0.001***	-0.001***	-0.005***
	(0.000)	(0.000)	(0.001)
Directors' mean age	-0.000***	-0.000***	-0.002***
	(0.000)	(0.000)	(0.000)
CEO salary log	0.010***	0.009***	0.060***
	(0.001)	(0.001)	(0.003)
CEO share	-0.000	-0.000	-0.001***
	(0.000)	(0.000)	(0.000)
Employees	-0.001***	-0.001***	-0.002***
	(0.000)	(0.000)	(0.000)
Leverage	-0.013***	-0.043***	-0.208***
	(0.002)	(0.003)	(0.010)
Firm size ln(assets)	0.014***	0.016***	0.095***
	(0.001)	(0.001)	(0.003)
Firm risk	0.053***	0.056***	0.186***
	(0.001)	(0.001)	(0.005)
Family firm	0.010***	0.010***	0.080***
	(0.003)	(0.003)	(0.015)
Board size	-0.007***	-0.008***	-0.031***
	(0.001)	(0.001)	(0.003)
Independent board members %	-0.003*	-0.004**	-0.029***
	(0.001)	(0.002)	(0.007)
Owners	-0.002***	-0.001***	-0.014***
	(0.000)	(0.000)	(0.002)
Constant	-0.073***	-0.098***	-1.119***
	(0.020)	(0.021)	(0.125)
Observations	113350	113350	113350
R-squared	0.109	0.103	0.101
Year dummies	yes	yes	yes
Industry dummies	yes	yes	yes

Standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

Appendix 10: The table shows the results of regressing Female directors %, Quota and an interaction term between those two variables, as well as a set of control variables on Adjusted ROA (column 1), ROA (column 2) and ROE (column 3), using the Pooled OLS model. The sample consists of 113350 AS firms in the period 2000-2018. *Female directors %* is the percentage of female directors, relative to the total number of directors. *Quota* is a dummy variable that takes the value 1 for years from and including 2008, and the value 0 otherwise. *CEO tenure* is the number of years the CEO has been in the position. *Directors' mean age* is the mean age of the board of directors in the current year t. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the percentage of shares owned directly by the CEO. *Employees* is the total number of employees. *Leverage* is the total debt relative to total assets. *Firm size ln(assets)* is measured as the natural logarithm of total assets. *Firm risk* is the standard deviation of growth in operating revenue. *Family firm* is a dummy variable that takes the value 1 if at least 50% of the firm is ultimately owned by families. *Board size* is the number of directors on board. *Independent board members %* is the percentage of board members not employee elected and not in relation to owners or the CEO. *Owners* is the total number of owners. Industry dummies controlling for differences between the industries shown in appendix 1 are included. The standard errors are clustered at firm level. Significant levels are shown in stars.

	Pooled OLS		
	(1)	(2)	(3)
	Adjusted ROA	ROA	ROE
Female directors %	-0.008***	-0.007***	-0.068***
	(0.002)	(0.002)	(0.012)
Quota	-0.032***	-0.032***	-0.286***
	(0.001)	(0.001)	(0.005)
Quota*Female directors %	0.003	0.003	0.068***
	(0.003)	(0.003)	(0.014)
CEO duality	0.015***	0.016***	0.072***
	(0.002)	(0.003)	(0.013)
CEO tenure	-0.001***	-0.001***	-0.005***
	(0.000)	(0.000)	(0.000)
Directors' mean age	-0.000***	-0.000***	-0.002***
	(0.000)	(0.000)	(0.000)
CEO salary log	0.010***	0.009***	0.056***
	(0.001)	(0.001)	(0.003)
CEO share	-0.000	-0.000	-0.001***
	(0.000)	(0.000)	(0.000)
Employees	-0.001***	-0.001***	-0.002***
	(0.000)	(0.000)	(0.000)
Leverage	-0.012***	-0.044***	-0.170***
	(0.002)	(0.003)	(0.008)
Firm size ln(assets)	0.014***	0.016***	0.097***
	(0.000)	(0.001)	(0.002)
Firm risk	0.053***	0.057***	0.181***
	(0.001)	(0.001)	(0.005)
Family firm	0.010***	0.008***	0.105***
	(0.003)	(0.003)	(0.014)
Board size	-0.007***	-0.008***	-0.031***
	(0.000)	(0.001)	(0.003)
Independent board members %	-0.003**	-0.003**	-0.030***
	(0.001)	(0.001)	(0.006)
Owners	-0.002***	-0.001***	-0.013***
	(0.000)	(0.000)	(0.002)
Constant	-0.065***	-0.084***	-1.081***
	(0.021)	(0.024)	(0.143)
Observations	113350	113350	113350
R-squared	0.108	0.101	0.089
Year dummies	no	no	no
Industry dummies	yes	yes	yes

Robust standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

Appendix 11: The table shows the results of regressing *Female CEO* and a set of control variables on *Adjusted ROA* (column 1 and 2), *ROA* (column 3 and 4) and *ROE* (column 5 and 6), using the Pooled OLS model. The sample consists of 112734 AS firms in the period 2000-2018, divided by nonfamily firms (column 1, 3 and 5) and family firms (column 2, 4 and 6). The firm is a family firm if at least 50% of the firm is ultimately owned by families. *Female CEO* takes the value 1 if the CEO is female and 0 otherwise. *CEO tenure* is the number of years the CEO has been in the position. *CEO age* is the age of the CEO in the current year t. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the percentage of shares owned directly by the CEO. *Employees* is the total number of employees. *Leverage* is the total debt relative to total assets. *Firm size ln(assets)* is measured as the natural logarithm of total assets. *Firm risk* is the standard deviation of growth in operating revenue. *Board size* is the number of directors on board. *Independent board members %* is the percentage of board members not employee elected and not in relation to owners or the CEO. *Owners* is the total number of owners. Year dummies controlling general effects in the period 2000-2018 is included, as well as industry dummies for each industry as shown in appendix 1. The standard errors are clustered at firm level. Significant levels are shown in stars.

	Pooled OLS					
	(1) Adjusted ROA	(2) Adjusted ROA	(3) ROA	(4) ROA	(5) ROE	(6) ROE
Sample	*Nonfamily firms*	*Family firms*	*Nonfamily firms*	*Family firms*	*Nonfamily firms*	*Family firms*
Female CEO	-0.007	-0.005***	-0.008	-0.004***	-0.057	-0.008
	(0.009)	(0.002)	(0.009)	(0.002)	(0.038)	(0.008)
CEO duality	0.023**	0.014***	0.022**	0.016***	0.088*	0.071***
	(0.009)	(0.003)	(0.010)	(0.003)	(0.049)	(0.016)
CEO tenure	-0.002***	-0.002***	-0.002***	-0.001***	-0.010***	-0.006***
	(0.001)	(0.000)	(0.001)	(0.000)	(0.003)	(0.001)
CEO age	-0.000	-0.000***	0.000	-0.000***	-0.002	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)
CEO salary log	0.014***	0.010***	0.016***	0.009***	0.071***	0.061***
	(0.003)	(0.001)	(0.004)	(0.001)	(0.018)	(0.003)
CEO share	0.000	-0.000	0.000	-0.000	0.002*	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
Employees	-0.001*	-0.001***	-0.001**	-0.001***	-0.003*	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)
Leverage	-0.015	-0.012***	-0.037**	-0.043***	-0.247***	-0.206***
	(0.016)	(0.002)	(0.018)	(0.003)	(0.056)	(0.010)
Firm size ln(assets)	0.011***	0.014***	0.012***	0.016***	0.082***	0.096***
	(0.003)	(0.001)	(0.004)	(0.001)	(0.015)	(0.003)
Firm risk	0.040***	0.053***	0.042***	0.057***	0.109***	0.190***
	(0.007)	(0.001)	(0.008)	(0.001)	(0.031)	(0.005)
Board size	-0.011***	-0.007***	-0.012***	-0.008***	-0.033**	-0.030***
	(0.003)	(0.001)	(0.003)	(0.001)	(0.014)	(0.003)
Independent board members %	-0.003	-0.002	-0.001	-0.003**	0.028	-0.029***
	(0.008)	(0.002)	(0.008)	(0.002)	(0.037)	(0.008)
Owners	-0.001	-0.001***	-0.001	-0.001***	-0.005	-0.014***
	(0.001)	(0.000)	(0.001)	(0.000)	(0.005)	(0.002)
Constant	-0.142**	-0.067***	-0.174**	-0.093***	-1.418***	-1.090***
	(0.063)	(0.022)	(0.071)	(0.023)	(0.292)	(0.140)
Observations	2718	110016	2718	110016	2718	110016
R-squared	0.106	0.110	0.100	0.104	0.092	0.102
Year dummies	yes	yes	yes	yes	yes	yes
Industry dummies	yes	yes	yes	yes	yes	yes

Standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

Appendix 12: The table shows the results of regressing *Female directors %* and a set of control variables on *Adjusted ROA* (column 1 and 2), *ROA* (column 3 and 4) and *ROE* (column 5 and 6), using the Pooled OLS model. The sample consists of 113350 AS firms in the period 2000-2018, divided by nonfamily firms (column 1, 3 and 5) and family firms (column 2, 4 and 6). The firm is a family firm if at least 50% of the firm is ultimately owned by families. *Female directors %* is the percentage of female directors, relative to the total number of directors. *CEO tenure* is the number of years the CEO has been in the position. *Directors' mean age* is the mean age of the board of directors in the current year t. *CEO salary log* is the logarithm of the CEO's salary. *CEO share* is the percentage of shares owned directly by the CEO. *Employees* is the total number of employees. *Leverage* is the total debt relative to total assets. *Firm size ln(assets)* is measured as the natural logarithm of total assets. *Firm risk* is the standard deviation of growth in operating revenue. *Board size* is the number of directors on board. *Independent board members %* is the percentage of board members not employee elected and not in relation to owners or the CEO. *Owners* is the total number of owners. Year dummies controlling general effects in the period 2000-2018 is included, as well as industry dummies for each industry as shown in appendix 1. The standard errors are clustered at firm level. Significant levels are shown in stars.

	Pooled OLS					
	(1) Adjusted ROA	(2) Adjusted ROA	(3) ROA	(4) ROA	(5) ROE	(6) ROE
Sample	*Nonfamily firms*	*Family firms*	*Nonfamily firms*	*Family firms*	*Nonfamily firms*	*Family firms*
Female directors %	-0.022**	-0.006***	-0.022**	-0.006***	-0.099**	-0.025***
	(0.009)	(0.002)	(0.010)	(0.002)	(0.047)	(0.009)
CEO duality	0.022**	0.013***	0.022**	0.015***	0.087*	0.065***
	(0.009)	(0.003)	(0.011)	(0.003)	(0.049)	(0.016)
CEO tenure	-0.002***	-0.001***	-0.002***	-0.001***	-0.009***	-0.005***
	(0.001)	(0.000)	(0.001)	(0.000)	(0.003)	(0.001)
Directors' mean age	-0.000	-0.000***	-0.000	-0.000***	-0.002	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)
CEO salary log	0.013***	0.010***	0.016***	0.009***	0.071***	0.060***
	(0.003)	(0.001)	(0.004)	(0.001)	(0.018)	(0.003)
CEO share	0.000	-0.000	0.000	-0.000	0.002**	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
Employees	-0.001*	-0.001***	-0.001**	-0.001***	-0.003*	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)
Leverage	-0.016	-0.013***	-0.037**	-0.043***	-0.251***	-0.209***
	(0.016)	(0.002)	(0.018)	(0.003)	(0.056)	(0.010)
Firm size ln(assets)	0.010***	0.014***	0.011***	0.016***	0.080***	0.096***
	(0.003)	(0.001)	(0.004)	(0.001)	(0.016)	(0.003)
Firm risk	0.040***	0.053***	0.042***	0.057***	0.108***	0.188***
	(0.007)	(0.001)	(0.008)	(0.001)	(0.031)	(0.005)
Board size	-0.010***	-0.007***	-0.011***	-0.008***	-0.032**	-0.030***
	(0.003)	(0.001)	(0.003)	(0.001)	(0.014)	(0.003)
Independent board members %	-0.005	-0.002	-0.003	-0.004**	0.016	-0.030***
	(0.008)	(0.002)	(0.008)	(0.002)	(0.037)	(0.008)
Owners	-0.001	-0.001***	-0.001	-0.001***	-0.006	-0.015***
	(0.001)	(0.000)	(0.001)	(0.000)	(0.005)	(0.002)
Constant	-0.111*	-0.061***	-0.147**	-0.086***	-1.359***	-1.027***
	(0.062)	(0.022)	(0.070)	(0.023)	(0.296)	(0.138)
Observations	2730	110620	2730	110620	2730	110620
R-squared	0.107	0.110	0.101	0.104	0.094	0.102
Year dummies	yes	yes	yes	yes	yes	yes
Industry dummies	yes	yes	yes	yes	yes	yes

Standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

Appendix 13: The following pages is a direct copy of our preliminary thesis, handed in 15.01.2021.

Preliminary thesis

"Gender diversity in corporate top management and its effect on profitability"

Written by:

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Introduction

Area of research

Consistent with firms' emerging pressure around the world to choose female directors on the board (Adams & Ferreira, 2009), many scholars have studied the effect of women directors on firm performance (Heinonen & Hytti, 2011). However, empirical evidence of gender diversity and its effect on corporate financial performance is complex and shows inconsistent results across studies (González et al., 2020). This calls for further research on the topic.
We want to write about how gender diversity in firms' board of directors (BoD) and gender of the Chief Executive Officer (CEO) affects Norwegian firms' economic performance, by suitable measures of profitability. Comparing public limited companies (ASA) and private limited company (AS) as well as family and nonfamily firms is of particular interest. In contrast to AS companies, ASA companies can be listed on the Norwegian stock exchange and have more criterias regarding board characteristics (Allmennaksjeloven [Public Limited Liability Companies Act, 1997; Aksjeloven [Limited Liability Companies Act], 1997). There is no universal definition of family firms, but Fėlix and David (2019, p. 2) argue that "the heart of most definitions of a family business is the significant power wielded by the family, due to its significant degree of ownership concentration and occupying fundamental positions that affect management and decision-making processes (Anderson & Reeb, 2003; Sharma, 2004; Villalonga & Amit, 2006; Rodríguez-Ariza et al., 2017)".

Today, more women are taking higher education than before, and entering earlier male-dominated workforces (Matsa & Miller, 2013). Despite this, business leadership remains male dominated (De Silva et al., 2017, cited in Nadeem et al., 2019; Matsa & Miller, 2013). To increase gender diversity on corporate boards, different European governments have adopted or considered adopting quotas (Matsa & Miller, 2013). Norway was the first country to establish such a quota by introducing the gender balance law in 2003 (Matsa & Miller, 2013). The law required public limited companies (ASA companies) to have at least 40% representation of both genders on their boards by 2008, or 2006 for new companies (Allmennaksjeloven [Public Limited Liability Companies Act, 1997, §6-11; Bech, 2013). The question is whether firms' top management should be

more gender balanced because it is seen as ethically right and politically correct or because it shows to be economically valuable for companies.

Many studies point at fundamental differences in men and women and that this affects their decision making and managing of firms (Marini, 1990, Croson and Gneezy, 2009, Bertrand and Schoar, 2003, Graham and Narasimhan, 2004, Bloom and Van Reenen, 2010, Malmendier et al., 2011, cited in Matsa & Miller, 2013). Some researchers doubt the fact that there are big gender differences among people in top management (Matsa & Miller, 2013; Adams and Ferreira, 2008), as directors may stand out from the general population because of their education and training (Nadeem et al., 2019). However, gender differences may be present in family firms if a female has a seat in the board because of nepotism or dynastic management instead of talent (González et al., 2020). This might also apply for firms using gender quotas; Ahern and Dittmar (2012) found that using the gender quota of 40% in Norwegian public limited companies resulted in lower firm value, possibly because the law forced them to hire younger women with less experience. Matsa (2013), however, argues that the reduced profit was a result of change in the affected firms' employment policies.

In general, empirical results in existing literature regarding gender diversity in corporate top management and its effect on economic performance is mixed. Existing research on gender in family businesses is particularly limited (Sonfield and Lussier, 2009, cited in Heinonen & Hytti, 2011; Sarkar & Selarka, 2020), despite a majority of publicly held firms in the US and Western Europe being family-controlled (La Porta et al., 1999, Faccio and Lang, 2002, Burkart et al., 2003, cited in Maury, 2006). According to Maury (2006), family controlled firms in Western Europe are associated with higher valuations and profitability than firms with non-family owners. Family firms have unique agency problems related to ownership patterns, governance structure and management, among other things (Zahra et al., 2004, Pieper, 2010, cited in Sarkar & Selarka, 2020). Given these characteristics, will gender of the CEO or BoD have a different impact on firm performance than nonfamily firms? The effect of women in family firms' management continues to be an important area for family business literature (Campopiano et al., 2017, Meroño-Cerdán & López-Nicolás, 2017, cited in Fèlix & David, 2019).

Literature review

There is a growing literature which examines the effect of gender diversity in firms' top management on observable firm outcomes. As multiple studies conclude that there is a positive correlation between firm risk and returns, this relationship has received considerable attention and is heavily studied by researchers in business administration, economics and finance. Previous studies on individuals' risk preferences also reveals that women are more risk averse than men. (Nadeem et al., 2019)

Khan & Vieito (2013) examined the relationship between gender on the CEO, firm risk and firm performance, using a panel of new and old economy US firms over the period of 1992 to 2004. The empirical results was that firms with a female CEO are associated with an increase in performance, despite lower firm risk, compared to firms managed by male CEOs (Khan & Vieito, 2013). The study also shows that having a mix of women and men in top management positions leads to better firm performance and higher return to shareholders in the longer time period.

Nadeem et al. (2019) investigated whether firms with gender-diverse boards were likely to be less competitive in the industry than firms with less gender-diverse boards. They studied the risk and return implication of women on boards (WOB), using a relatively large dataset in the UK in the period of 2007-2016. The paper also explored another mechanism called "group dynamics" and found that there is a positive significant impact of WOB on observable dynamics of the board. Their findings support the group dynamics mechanism through which WOB may reduce risk but improve profitability, nullifying the stereotypical misconception of women as being risk averse.

Another study, done by Adams and Ferreira (2009), found that female directors behave differently than male directors and that the gender composition of the board is positively related to measures of board effectiveness. They show that female directors are more diligent monitors and require more audit efforts than their male counterparts. Hillman et al. (2007), cited in Liu and Xie (2014), found that female directors bring different perspectives as well as other experiences than male directors. As a result, the quality of board decisions improves.

Đặng et al. (2020) finds the presence of women on corporate boards to have a positive and significant effect on firm profitability measured by return on assets. They investigate the relation between board gender diversity and firm profitability using the control function (CF) approach recently suggested by Wooldridge (2015). The paper uses a sample of firms that made up the S&P 500 over the period 2004–2015.

Using a final sample of over 2000 firms and 16,964 firm-year observations, Liu and Xie (2014) examined the effect of board gender diversity on firm performance in China's listed firms from 1999 to 2011. A positive and significant relation between board gender diversity and firm performance were found. Female executive directors had a stronger positive effect on firm performance than female independent directors, indicating that the executive effect outweighs the monitoring effect. Moreover, boards with three or more female directors had a stronger impact on firm performance than boards with two or fewer female directors. The study found that firm performance was positively related to gender diversity measured as the percentage or the number of female directors on boards. The study also found that board gender diversity is positive and significant in legal person-controlled firms but insignificant in state-controlled firms. (Liu & Xie, 2014)

Kyaw et al. (2015), on the other hand, examines the effect of board gender diversity on earnings management in European countries. The findings reveal that a gender diverse board mitigates earnings management in countries where gender equality is high. The results show that it is the level of women’s rights empowered by the institutional setup that fosters the effect, not the proportion of female board members nor the gender regulations. The paper uses data from a total of 970 companies whose annual board and accounting data are available for the period from 2002 through 2013.

Norway, which is considered one of the world’s most gender equal countries (World Economic Forum, 2020), was the first country to implement a gender quota by the gender balance law for public limited companies (Bech, 2013). Comparing financial data for publicly listed firms in Norway with a matched sample of unlisted firms in Norway and listed and unlisted firms in other Nordic countries, Matsa and Miller (2013) studied the impact of gender quotas for

corporate boards on corporate decisions. Matsa and Miller (2013) found that affected firms undertake fewer employee layoffs than comparison firms, increasing employment levels and relative labor costs, thus short-term profits. Revenues and non-labor costs, however, were similar between the compared firms, indicating that an increase in women's board representation did not lead to less profitable business decisions overall, only to changes in human resources management (Matsa & Miller, 2013).

Ahern and Dittmar (2012) on the other hand, found that the quota led to a decline in firm value, measured by Tobin's Q, as the affected firms hired younger directors with less experience than their male counterparts. Their findings suggest that the quota led firms to grow in size, make more acquisitions, and realize worse accounting returns. The sample used was data from the annual reports of the 248 Norwegian public limited firms from 2003 to 2009 (Ahern & Dittmar, 2012).

Though finding evidence that female directors have value-relevant impact on board structure, Adams and Ferreira (2009) suggest that establishing quotas for company boards may not increase firm performance on average. Their results show that the effect of gender diversity on firm performance is positive in firms with otherwise weak governance but negative in firms with strong governance, possibly because greater gender diversity can lead to over-monitoring. The paper uses a sample consisting of an unbalanced panel of 86,714 director level observations from 1,939 firms for the period 1996–2003 (Adams & Ferreira, 2009).

Sarkar and Selarka (2020) further emphasizes the importance of governance structures for the impact of women directors on firm performance, in particular in emerging economies. Sarkar and Selarka (2020) provides empirical evidence on the effect of women directors on performance of family firms in the context of an emerging economy. The motivation for this paper was to focus on the growing scholarship documenting that ownership and governance structures of family firms are distinctly different from those of widely held firms, giving rise to corporate governance challenges that are specific to family firms. The data were gathered from India covering periods prior to and post institution of gender quotas, it finds evidence that the presence of woman directors on board leads to higher firm performance. The paper uses panel data from the period 2004-2015,

finding that when appointment of woman directors was voluntary, having a woman director on the board lead to higher firm performance.

Looking at data from 199 Portuguese family companies, from 2006 to 2014, the study of Fėlix and David (2019) shows that the presence of a female element in family firms' direction has positive impacts on their performance, compared to those with only male elements. Also, the results show that region and sector of activity are factors influencing family firm performance. Finally, the study confirms that company size and age are variables helping to explain these companies' life-cycle. The paper also states that, women may have a negative impact if the decision to appoint female board members is motivated by societal pressure for greater gender equality (Campbell & Mínguez-Vera, 2008, cited in Fėlix & David, 2019).

Gonzalez et al. (2020) found that female family directors have a negative effect on financial performance in Colombian family firms, consistent with the literature related to nepotism and dynastic management in family firms (Pérez, González 2006; Caselli & Gennaioli 2013, cited in González et al., 2020). However, outside female directors were found to have a positive effect on firm performance. The study was conducted by hand-collecting a unique sample of 523 closely held Colombian family firms and 5.094 firm-year observations, with 4907 board members, including 833 female board members (Gonzales et al., 2020).

The existing literature on gender diversity in firms' top management, hereunder BoD and CEO, and its impact on firms' financial performance shows mixed results. The field is particularly largely unexplored in family firms (Sonfield and Lussier, 2009, cited in Heinonen & Hytti, 2011). As González et al. (2020) suggests, the relationship between gender diversity and corporate financial performance is complex and calls for further empirical evidence. We will therefore look closer at what knowledge gaps there are in the existing literature.

Knowledge gap and our contribution

In general, empirical evidence in existing literature regarding gender in firms' top management and its effect on financial performance is mixed. Possible explanations for this can be that different researchers have used different samples, time horizons, methodologies and empirical specifications (Adams et al., 2015, Ferreira, 2015, cited in Đặng et al., 2020).

Consistent with Adams and Ferreira (2009), Đặng et al. (2020) believes that the inconsistent findings in existing literature may be because of failure to address endogeneity problems. When estimating board gender diversity's effect on firm performance, the prospect that board gender diversity is a conscious choice by firms should be taken into account, as well as controlling for various firm characteristics (Adams & Ferreira, 2009). We will therefore compare firms that were affected by the 2006 quota with firms that were unaffected, as well as controlling for firm characteristics such as size, age, industry, region and more. However, estimating a casual relationship between gender diversity and firm performance might be challenging as board characteristics are endogenously chosen by firms (Adams et al., 2010, Sila et al., 2016, cited in Đặng et al., 2020). We will therefore look closer at which models are most appropriate in order to tackle endogeneity problems.

Financial performance can be measured in multiple different ways. A majority of the studies included in this preliminary report use return on assets (ROA) and Tobin's Q. Tobin's Q equals the market value of a company divided by its assets' replacement cost. The ratio essentially looks at the market value versus the intrinsic value of a firm (Hayes, 2020). As this only can be applied to listed firms and therefore makes comparison to non-listed firms challenging, we have chosen to not use this measure. ROA is the net result divided by total assets (Goldberg, 2009) and is mentioned as one of the best measures on financial return and historical profitability (Jacobson, 1987, Horowitz, 1984, Hirschey & Wichern, 1984, cited in Frøseth & Five, 2013). We find it appropriate to use ROA, because it allows for comparison to previous studies. However, ROA has received criticism for not being appropriate for comparison between firms in different industries, as it does not take into account the change in capital structure (Than, 2011; Ingjeringen, 2018). As a possible answer to the issue, we suggest measuring

profitability by return on invested capital (ROIC). As ROIC is the net operating profit after tax (NOPAT) divided by operating net working capital and operating fixed assets (Breaking Into Wall Street, n. d.), a change in total assets due to more short term debt will not affect ROIC (Ingjeringen, 2018). Other advantages of using ROIC is that it allows for comparison with WACC, to see how well the firm meets investors' expectations (Breaking Into Wall Street, n. d.). Recent research on finance arguments for ROIC being a better measure on profitability than ROA (Koller et al., 2015, cited in Goldberg, 2009).

Gender diversity has been shown to be measured in several ways. Multiple studies use the number or percent of women directors on board, while others use a dummy variable based on whether a certain number of female directors is on board (Adams & Ferreira, 2009; Ahern & Dittmar, 2012; Simpson et al., 2010, cited in Liu & Xie, 2014). However, this may also include boards where female directors are overrepresented, which in such cases are no longer gender diverse. Hence, we will control for a variety of measures on gender diversity, as well as taking gender diversity for both genders into account. In addition, we will not only look at gender diversity on corporate boards, but also look at how the gender of the CEO affects the firms' profitability. Khan and Vieito (2013) claim they are among the first to focus on this query, making this a possible contribution to the existing literature, as the empirical evidence on the matter seems to be lacking.

Kyaw et al. (2015) finds that female directors mitigate earnings management where gender equality is high. We therefore argue that findings from research with samples from other countries are not directly transferable to Norway, as gender equality will vary from country to country. A majority of studies concerning gender diversity and firm profitability are based on the US (Sarkar & Selarka, 2020; Liu & Xie, 2014), calling the need for more research on this field in Norway. Most of the studies are also based on widely held firms, leaving research on gender diversity in family firms particularly limited (Sonfield and Lussier, 2009, cited in Heinonen & Hytti, 2011; Sarkar & Selarka, 2020). To the best of our knowledge, there does not exist research on gender diversity's impact on firm performance in Norwegian family firms. Investigating this might therefore be our biggest contribution to existing literature.

We find existing literature on gender diversity in family firms to be of great importance for our master thesis in terms of inspiration regarding methodology. Previous studies reveal that whether the director is independent or executive and has family ties or not, has an influence on the effect on performance (González et al., 2020; Liu & Xie, 2014; Sarkar & Selarka, 2020). We will therefore study whether this has an impact in Norway as well.

The definition of family firms varies substantially, affecting research findings and making replication and comparison with prior research challenging (Dyer, 2003, cited in Heinonen & Hytti, 2011). For example, Carlson et al. (2006) define family firms as firms where the CEO or the CEO's family own at least 50 percent of the stock, while Ensley and Pearson (2005) define it as privately held firms where a significant proportion of the top managers are founders or make up over 10 percent of the stakeholders (Heinonen & Hytti, 2011). How one determines to define family firms may substantially influence sample size and findings (Westhead and Cowling, 1998, cited in Heinonen & Hytti, 2011). We find it expedient to test for multiple definitions of family firms in order to enable comparison with previous studies and replicability for further studies.

Research question and hypotheses

Our research question will be "How does gender diversity in top management affect corporate financial performance?". However, with our current understanding of the published literature and empirical evidence, we understand that our research question may change as we develop our thesis. Nevertheless, in order to try and answer our research question, we will examine data with the following hypothesis:

Hypothesis 1:

H0: Gender of the CEO does not have an effect on profitability

H1: Gender of the CEO does have an effect on profitability

Hypothesis 2:

H0: Gender diversity in BoD does not have an effect on profitability.

H1: Gender diversity in BoD has an effect on profitability

Hypothesis 3:

H0: The effect of gender diversity in BoD on profitability is equal in family firms and nonfamily firms

H1: The effect of gender diversity in board of BoD on profitability is not equal in family firms and nonfamily firms

Hypothesis 4:

H0: The effect of gender on CEO on profitability is equal in family firms and nonfamily firms

H1: The effect of gender on CEO on profitability is not equal in family firms and nonfamily firms

Hypothesis 5:

H0: The introduction of the Norwegian quota in 2006 had no effect on profitability of affected firms.

H1: The introduction of the Norwegian quota in 2006 had an effect on profitability of affected firms.

Hypothesis 6:

H0: The introduction of the Norwegian quota in 2006 had no effect on profitability of unaffected firms.

H1: The introduction of the Norwegian quota in 2006 had an effect on profitability of unaffected firms.

First, we will look at the general effect on profitability of gender of the CEO and gender diversity in the BoD. We will then look closer at how the effect changes between family and nonfamily firms and between firms affected by the quota and firms unaffected by the quota. Under each hypothesis we will include multiple control variables to mitigate endogeneity issues. Control variables of interest can for example be industry, firm age, firm size, CEO duality, type of director (family ties or not, or executive or independent).

Introduction to methodology and data

To answer our research question "How does gender diversity in top management affect corporate financial performance?" we will follow a deductive approach as we develop our hypothesis based on existing theory and test them using a range of statistical techniques. We will further have a methodological quantitative approach where we will examine the relationship between variables of our sample data. Archival data is planned to be our only source of data, making this a mono method quantitative study. As we want to describe the relationship between the variables and be careful to infer why these relationships are like they are, we conduct our thesis as a descriptive study. We want to use panel data to make comparisons over different firms over a long period of time. In order to apply the data we will be using regression analysis with the help from the software program STATA.

Due to the nature of our thesis, we will need a large sample of observations. In order to obtain a desired large dataset of secondary data, we will gather data from the Centre for Corporate Governance Research database (CCGR). The center has a focus on family firms, non-listed firms as well as knowledge about the corporate landscape of Norway (BI.edu, n.d.). According to their annual report of 2019, they are currently conducting research on boards, the governance of family firms, gender diversity in governance and corporate governance in a historical perspective among others (CCGR, 2019).

Plan for thesis progression

In order to deliver our thesis proposal before the deadline of July 1st, 2021, preferably with some time buffer, we will strive to follow the plan for thesis progression as suggested in the table below.

In order to gather the information we need to answer our research question, we would like to start as soon as possible and work steadily and thoroughly throughout the semester. We want to establish clear self-proclaimed deadlines, to ensure that we manage to conduct every necessary step in the process. This will give us a realistic timeframe to when we will do each step on our plan.

We have chosen to divide our plan into two main parts. The first part is to gather the necessary information. We have chosen to focus solely on secondary data, due to the need for large data samples, the availability of secondary data in Norway as

well as to be independent of any uncertainties regarding information gathering through third parties. The data will then be analyzed so that we can be confident that we have gathered the necessary data, in order to answer our research question. When the first part has been completed, we will start on the second part. The second part will consist of incorporating our gathered data, to help us answer our research question.

Work plan for our thesis progression:

Part 1 - Gathering of information	**Finished by**
Hand-in the preliminary thesis	15.01.2021
Gain further insight into the established literature	22.01.2021
Write a plan for how to gather the necessary data and how to apply the established data in our thesis (define which variables to be included and how they should be measured)	31.01.2021
Finish gathering literature and data	07.02.2021
Part 2 - Analyzing, interpreting of results and writing of the thesis	
Analyze the gathered literature and data and conclude whether it is sufficient to answer our research question	14.02.2021
Treat the data so it becomes ready for analysis in STATA, and experiment with regressions	21.02.2021
Finish the regressions and statistical analysis	14.03.2021
Interpret our results and findings	28.03.2021

Finish writing the necessary number of pages (Introduction, literature review, research question and hypothesis, data and descriptive statistics, research methodology, results)	25.04.2021
Finish the conclusion, limitations and abstract and acknowledgements	09.05.2021
Have a first draft ready for supervision	16.05.2021
Revise the draft until a satisfactory draft is reached	30.05.2021
Receive verification from supervisor of the revised draft	13.06.2021
Hand-in the final thesis	20.06.2021

Simultaneously as working on the things listed in the table above, we will document how we work. Regularly meetings with our supervisor is preferred in order to ensure the best quality as possible on our master thesis.

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