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Board Diversity and Financial Performance: Evidence from Norway

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Abstract

This paper contributes to the growing body of research examining the link between gender diversity in decision-making organs and financial performance. Board diversity has been a hot topic in recent years, and a substantial body of literature point out that diversity in decision-making organs can have positive implications. Diversity induces a greater range of viewpoints and opinions, which is likely to enhance the quality of decision-making. We investigate whether there is a business case behind increasing the gender balance in corporate boards, and document that gender diversity in small boards have a sizeable impact on firm profitability. We take advantage of panel data methodology, which is powerful in controlling for unobserved heterogeneity in the data. The association we reveal is robust to various measures of firm profitability and diversity, and the inclusion of fixed effects. The results suggest that the mixture of men and women is the key to more effective boards.

1. Detailed Introduction

Women represent a high percentage of the Norwegian workforce, yet they are undoubtedly underrepresented on boards and in senior management positions. By 2017, 66.7% (72.4%) of women (men) are represented in the workforce.[1] Concurrently, women hold 18.4% of board positions and merely 16.2% of the CEO positions in private limited liability companies.[2] Norway is highly ranked in terms of gender equality in an international context (World Economic Forum, 2016, p. 10). However, these statistics reflect a low degree of gender diversity in decision-making organs today. Diversity can be defined as the heterogeneity inherent in the composition of the governing bodies, and can be measured on several dimensions such as gender, age, ethnicity, experience and educational background. Gender is arguably the most debated aspect of diversity in the context of board composition. Diversity in the Board of Directors (BoD) is further deemed one of the most significant governance issues facing managers, directors and shareholders of the modern corporation. (Campbell & Mínguez-Vera, 2008, p. 437; Smith, Smith & Verner, 2006, p. 570; Carter, Simkins & Simpson, 2003, p. 34).

Board diversity has been a hot topic in recent years, but the real motivation underlying the increased focus is ambiguous. The arguments comprise both ethical and economic aspects. Ethical arguments are based on principles of equality and morality, arguing that people should have the same career opportunities irrespective of gender. Economic reasons on the other hand, comprise the concern of ensuring high financial performance through effective boards composed of the best candidates (Campbell & Mínguez-Vera, 2010, p. 43). Karen J. Curtin, former Executive Vice President of Bank of America states "There is real debate between those who think we should be more diverse because it is the right thing to do, and those who think we should be more diverse because it actually enhances shareholder value. Unless we get the second point across, and people believe it, we're only going to have tokenism" (Brancato & Patterson, 1999). This statement illustrates how the debate revolves around the symbolic effect of increasing board diversity, relative to increasing diversity as a means of

[1] Statistics Norway, 2017a.
[2] Statistics Norway, 2017b.

boosting financial return. Whether there is a business case reasoned by economic arguments for increased gender diversity in the boardroom will be investigated in this paper.

It is well documented that board diversity can improve the quality of decision-making, which in turn can lead to high financial performance. Important channels through which gender diversity can enhance important board functions are laid out in section 2.1. Key arguments comprise that diversity ensures a greater range of viewpoints in the boardroom, enhances the creativity and innovation in such organs, and increases the pool of candidates for these positions. How diversity can enhance the governance of a corporation is further discussed through an agency framework in section 2.2. The board's independence and monitoring effort is positively linked to its level of gender diversity, which implies that diversity enhances board effectiveness.

We investigate the association between gender diversity in the BoD and financial performance using a remarkably large data sample of Norwegian companies over a period of fifteen years. Gender diversity is defined as the gender variety inherent in the BoD, measured by various proxies. The terms financial performance and firm profitability are used synonymously and is measured by the return on assets (ROA), calculated in three different ways to assure a robust measure. A comprehensive recent study by Christiansen, Lin, Pereira, Topalova and Turk (2016) documents a positive association between financial performance and gender diversity in senior positions and on corporate boards. These results have important implications, and it is suggested that increased gender diversity can boost the financial return of European companies. Previous research within this field is extensive. It is revealed in section 3 that empirical evidence leads to ambiguous results. The true association between gender diversity and financial performance is thus undetermined.

We use a multiple regression analysis to investigate the topic. The regression model and data sample is presented in section 4 and 5. Our analysis take advantage of panel data methodology, which is powerful in controlling for unobservable heterogeneity in the data sample. The methodology and estimation of fixed effects is laid out in section 6. The endogeneity problem commonly

facing corporate governance studies applies to our setting as well and is thoroughly discussed in section 7.

This paper reveals a significantly positive association between various measures of gender diversity in the boardroom and financial performance. The results are presented in section 8, and indicate that replacing one man with a woman on the average BoD is associated with a 6.6–8.9% increase in ROA. This illustrates a sizeable impact of increased board diversity. The results are robust to the inclusion of industry and time fixed effects, but are driven by the smaller companies in our sample. Specifically, the association is diminishing with board size, and becomes insignificant when excluding boards comprising less than four directors from the sample. Next, we investigate if the association is robust across enterprise types. Public limited liability companies (referred to as listed companies, registered as "ASA") are subject to a 40% gender quota as of 2006. Some point out that gender diversity imposed by law can affect firm profitability negatively. Section 2.3 contains relevant background information about the Norwegian gender quota and the intuition behind this reasoning. The association in listed companies is regarded separately from all other companies (referred to as non-listed companies) to formally investigate this hypothesis. We do not find that there are different economic incentives for increased diversity in listed relative to non-listed companies. The results imply that gender diversity does not have to be self-imposed to have positive implications. Further, we do an industry split of the sample to get insight into how the relevant association differs according to underlying characteristics of certain industries. Finally, we investigate if the association we detect is affected by the inherent gender balance on the board by allowing for nonlinearities.

2. Background Information

2.1 Building a Business Case for Gender Diversity

Carter et al. (2003, p. 36–37) and Campbell and Mínguez-Vera (2008, p. 439–440) argue that board diversity enhances a firm's competitive advantage and value in several ways, basing their arguments on the conceptual reasoning offered by Robinson and Dechant (1997). First, diversity increases the board's understanding of the marketplace by mirroring the gender composition of the board to that of its

customer base and employees. This is argued to facilitate successful market penetration. Second, creativity and innovation is positively linked to gender diversity as attitude and beliefs are assumed to vary systematically with demographic variables such as gender. Third, board diversity improves the board's ability to effectively solve problems. Heterogeneity in the boardroom induces a greater variety of perspectives and increases the number of alternatives that are taken into consideration. On the other hand, a homogeneous board is assumed to be more cooperative and encounter less emotional conflicts (Williams & O'Reilly, 1998). Although heterogeneity causes the decision-making process to be more time-consuming and increases the probability of conflicts, it is likely that taking a broader range of opinions into account will enhance the quality of decisions. Fourth, diverse decision-making organs are suggested to produce a better understanding of the complexities of the business environment as they obtain a broader perspective relative to one that is homogeneous.

Heterogeneity in the boardroom is further argued to relieve the occurrence of group thinking (Rhode & Packel, 2014, p. 393–394). Group thinking refers to the tendency of dysfunctional decision-making due to suppression of alternative viewpoints and outside influence. This arise when group members override their personal doubts and follow the suggestions of the group leader, striving for quick and painless decisions (Hart, 1991, p. 247, p. 257). Further, Smith et al. (2006, p. 571) argue that having a more gender diverse board can improve the corporate image. If the change in perception of the corporation affects customer behavior, it may lead to increased financial performance. It is furthermore suggested that under the common argument of work disadvantages facing minorities such as women in this setting, they must outperform male counterparts in order to achieve top management positions, board seats and promotions. This implies high competence of the female representatives that achieve such positions (Erhardt, Werbel & Shrader, 2003, p. 109). Another argument for aiming at a more diverse composition of the BoD, is that considering candidates of both genders for these positions significantly increases the pool of candidates. When a broader set of potential candidates are evaluated for these positions, the qualifications and competence of the directors is likely to increase, at least on average (Smith et al., 2006, p. 571).

2.2 Board Diversity and Corporate Governance

Central to our analysis is the impact board characteristics may have on the governance of a firm. Corporate governance refers to the system by which companies are directed and controlled (Cadbury, 1992, p. 15). More specifically, corporate governance revolves around the way in which suppliers of finance assure themselves return on their investments. The complex three-way relationship between the shareholders as owners, the BoD and the executive management has been subject to a substantial body of literature. The discrepancy between the inherent interests of these distinct organs is central to the governance of corporations (Bebchuk & Weisbach, 2010, p. 943).

Agency theory asserts a relationship between two parties in which one of the parties (the principal) engage the other (the agent) to execute certain tasks on their behalf. It is assumed that both parties act in their own self-interest, and their inherent interests may be unaligned, causing agency problems. Top managers of a corporation are entrusted with large blocks of the owners' personal wealth and are responsible for the daily operations of the firm. The top manager, acting as agent for the owner (principal) is expected to make decisions that maximize shareholder value, though it is in his best interest to maximize his own wealth. A fundamental governance problem is opportunistic executive behavior at the expense of shareholders (Eisenhardt, 1989, p. 57-60; Hermalin & Weisbach, 2003, p. 10; Ross, 1973, p.134). As originally brought up by Fama (1980), one potential conflict of interest between shareholders and managers arises because managers in general are concerned with their own reputation. Their professional reputation ultimately affects their future career prospects, which may induce actions that boost measures of short-term performance at the expense of long-run shareholder value (Stein, 2003, p. 120).

Agency problems can be alleviated through active monitoring of management, a task in which is often assumed infeasible for the owners. The board of directors, elected by the shareholders, has an intermediary role in this context. The board constitute the ultimate governing body in a corporation and has a fiduciary responsibility on behalf of the owners. Through active participation in the firm's decision-making, the board ensures that management act in accordance with

owners' best interests. The board of directors' primary function is to approve major strategic and financial decisions and advise and monitor executive management. In addition, the board can replace managers not acting in accordance with shareholders' best interests. When the board successfully fulfill their duty, they effectively control management such that manager misconduct is avoided or at least minimized. Effective monitoring should ensure that managers does not pursue career concerns that interfere with owners' best interests (Bebchuk & Weisbach, 2010, p. 948; Belcredi & Ferrarini, 2013, p. 191; Ferreira and Kirchmaier, 2013, p. 19, Goergen, 2012, p. 3-7; Hermalin and Weisbach, 2001, p. 7, p. 10).

The CEO's position may be at risk in this framework and it can be argued that he is incentivized to establish a close relationship with the board. This enhances his ability to affect board decisions which in turn reduces the risk of being replaced. A board that is "in the hand" of the CEO is unlikely to fulfill their fiduciary duty to the shareholders. This highlights the importance of board independence, which is often measured by the ratio of outside to inside directors (see for example Ferreira and Kirchmaier, 2013). In the context of making a business case for board diversity, it is central to pin down how diversity may affect the independence of the board. Adams and Ferreira (2009, p. 292) propose that as female directors do not belong to the "old boys club", they closely correspond to the concept of the independent directors. They offer evidence in support of this argument; female directors are found to be more independent from management than male directors. It follows that increased diversity enhances the board's level of independence. This is intuitive, as a heterogeneous board is more inclined to raise critical questions and thus potentially take a stand against the CEO. This makes the board less likely to succumb to pressure from management or the CEO, and more capable of acting in accordance with shareholders' best interests.

A common measure of board effectiveness is how inclined the board is to replace the CEO after poor stock performance. How sensitive CEO turnover is to poor stock return further reflects the board's monitoring effort. Adams and Ferreira (2009) find direct evidence that CEO turnover is more sensitive to stock return performance in firms with greater inherent gender diversity on the BoD. They

establish that gender-diverse boards are tougher monitors of management. The results clearly imply that diversity enhances the board's effectiveness.

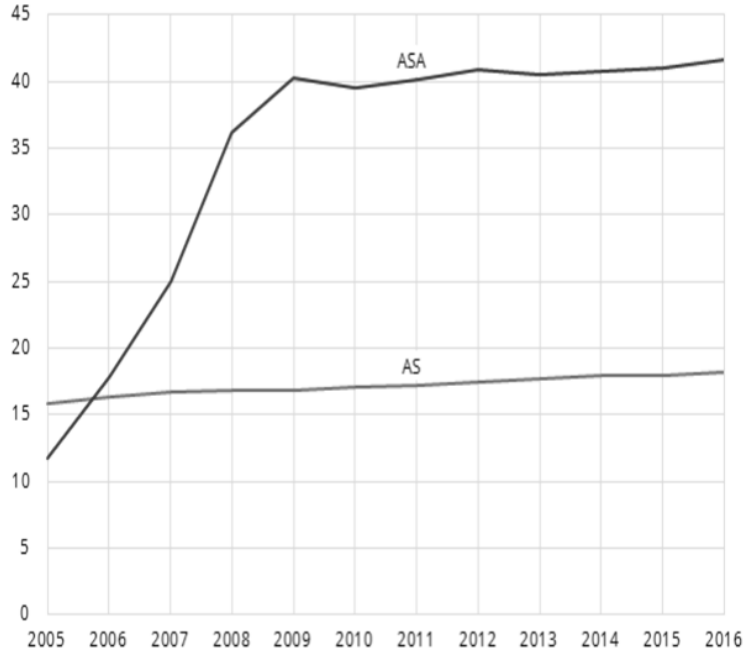
Effective monitoring is pivotal to good corporate governance, which is furthermore essential for a corporation's long-run financial performance. We do however stress that more monitoring and enhanced board independence does not have an obvious impact of the financial performance of a firm. Over-monitoring can in fact negatively affect the firm's financial performance, and empirical work examining the link between board independence and firm performance has not lead to a clear conclusion (Adams & Ferreira, 2009; Adams, Hermalin & Weisbach 2010; Hermalin & Weisbach, 1991).

2.3 Statutory Gender Diversity

In 2005, merely 15.5% of the directors in listed companies were female.[3] To ensure greater diversity in the boardroom, the Norwegian Government introduced a pioneering legislative gender quota in 2006. The quota requires 40% of each gender to be represented on corporate boards of listed companies (Ot.prp. nr. 97, 2002–2003, p. 6). The law was fully implemented in 2008, resulting in significantly increased gender diversity on these boards. As of 2017, 42.1% of the directors in listed companies are women. In comparison, private limited liability companies (registered as "AS") are not affected by the gender quota, and depict a low degree of gender diversity with only 18.4% female directors today.[4] The gender diversity improvement in listed companies following the quota was drastic compared to the monotonic improvement in non-listed companies (Figure 1).

[3] Statistics Norway, 2008
[4] Statistics Norway, 2017b

Figure 1: Percentage Women on Boards, 2005–2016[5]



The above discussion implies that the high diversity level in listed companies' boards is a direct consequence of the legal restriction. In the process of attaining a diversified board, the focus on gender was necessarily put before other requirements, such as experience and formal competence. This is likely to have come at the expense of appointing the most qualified directors, indicating that mandatory gender balance induced non-optimal boards.

Some point out that imposing regulatory limits on the board composition may have negative effects. Hermalin and Weisbach (1998) introduce a model in which directors appointed under regulations are likely to be less effective than those picked from a selection process initiated by the firm itself. Bøhren and Staubo (2012, p. 19) substantiate this, and argue that compulsory gender balance in the BoD reduces the pool of competent directors, which in turn destroy firm value.

While it is quite well documented that gender diversity can enhance board effectiveness, the above discussion implies that this may not apply when diversity is statutory. This leads us to suspect that the association is weaker in listed companies. Consequently, we find it necessary to account for enterprise type, and

[5] Source: https://www.ssb.no/virksomheter-foretak-og-regnskap/statistikker/styre/aar

run extended regressions in section 8.3 to test if mandatory gender diversity changes the proposed association.

3. Literature Review

The presumed link between gender diversity in the boardroom and financial performance has received a great deal of attention in recent years. Some papers detect a positive association (Christiansen et al. (2016); Terjesen et al. (2015); Campbell & Minguez-Vera (2008 and 2010); Smith et al. (2006); Carter et al. (2003)). This group of research indicates that increased gender diversity has economic benefits. Other papers conclude with the opposite, and reveal a negative association (Matsa & Miller (2013); Bøhren & Strøm (2010); Adams & Ferreira (2009)). This group of papers may imply that homogeneous boards are more effective.

Table I summarizes main findings and key information about relevant research. The empirical evidence is ambiguous, and it follows that the association between gender diversity in decision-making organs and firm performance remains unresolved at this point.

Table I: Financial performance and gender diversity, a literature review

Authors	Association	Region	Period	Enterprise type	Number of firms	Performance measure*	Diversity measure	Topic
Bøhren and Strøm (2010)	Negative	Norway	1989–2002	Listed	129 - 203	(1) ROA (2) ROS (3) Tobin's Q	%Women on the BoD	Governance and Politics: Regulating independence and diversity in the board room
Matsa and Miller (2013)	Negative	Norway	2006 and 2009	Listed	104	ROA	%Women on the BoD	A Female Style in Corporate Leadership? Evidence from Quotas
Christiansen et al. (2016)	Positive	34 European countries	2013	Listed and non-listed	2,000,000	ROA	%Women in senior management positions and on the BoD	Gender Diversity in Senior Positions and Firm performance: Evidence from Europe
Smith et al. (2006)	None to positive	Denmark	1993-2001	Listed and non-listed	2,500	(1) Firm's mark-up (2) ROA	(1) %Women among top CEOs and Vice Directors (2) %Women on the BoD	Do women in top management affect firm performance?
Adams and Ferreira (2009)	Negative	U.S.	1996-2003	Listed	1,939	(1) Tobin's Q (2) ROA	%Women on the BoD	Women in the board room and their impact on governance and performance
Terjesen et al. (2015)	Positive	47 countries worldwide	2010	Listed	3,876	(1) Tobin's Q (2) ROA	%Women on the BoD	Does the presence of independent and female directors impact firm performance? A multi-country study of board diversity
Campbell and Minguez-Vera (2008)	Positive	Spain	1995-2000	Listed	68	Tobin's Q	(1) Dummy for board diversity (2) %Women on the BoD (3) Blau Index (4) Shannon Index	Gender Diversity in the Boardroom and Firm Financial Performance
Campbell and Minguez-Vera (2010)	Positive	Spain	1989-2001	Listed	4,050	(1) Tobin's Q (2) Cumulative abnormal returns	(1) Dummy for board diversity (2) %Women on the BoD	Female board appointments and firm valuation: short and long-term effects
Carter et al. (2003)	Positive	U.S.	1997	Listed	638	Tobin's Q	(1) Dummy for board diversity (2) %Women on the BoD	Corporate Governance, Board Diversity, and Firm Value

* ROA = Various profit measures/Book Value of Assets
Tobin's Q = Market Value/Book Value of Assets
ROS = (Capital Gains + Dividends)/Market Value of Stock
Mark-up = Gross Profit/Net Sales, Contribution Margin/Net Sales,

We ask ourselves what possible drivers of the mixed results might be. The use of different methodology, varying time periods, country-specific reasons, enterprise type in question, the economic environment, as well as the variables used to measure financial performance are suggested as possible explanations (Rhode & Packel, 2014, p. 390). The level of gender equality in a country is an example of a country-specific characteristic that may influence the impact diversity has on firm performance. If the degree of gender equality is low, it is likely that the marginal impact women have on important strategic decisions is low, making their presence on boards less valuable. Gender equality varies systematically across countries, making it likely that the relevant association can differ from one country to another. However, Carter et al. (2006) and Adams and Ferreira (2009) draw opposite conclusions on the presumed association on samples of listed U.S. companies. Consequently, country-specific reasons do not appear to be the key driver of the mixed results.

The vast majority of the literature on this topic assume a linear relationship between gender diversity and firm performance. One possible explanation of the mixed results is that the presumed association might in fact be non-linear, illustrated by Joecks, Pull and Vetter (2013), that find the association to be U-shaped. Their results indicate that boards must have at least 10 percent female representation for the association between firm performance and gender diversity to become positive. A negative association is revealed when the boards comprise less than 10 percent women. They further reveal that boards must reach a “critical mass” of roughly 30 percent women before the firms they govern are associated with greater performance than firms with homogeneous boards. If the proposed association is U-shaped, the conclusions drawn from research on this topic could be affected by the diversity ratios in the data samples. This would imply that studies based on samples with overall low board diversity is likely to detect a negative relationship, whereas the opposite would be found in studies based on boards with relatively more inherent diversity.

When taking a closer look at various research on this topic, there is no obvious systematic relationship between the studies that reveal a positive association compared to those that find the opposite. In conclusion, the true association between gender diversity and firm performance appear to be complex, and

remains unresolved at this point.

4. Model Estimation

To determine the association between gender diversity and firm performance, we estimate the following multiple regression model. ROA is the dependent variable and gender diversity is the independent variable of interest.

$$ROA_{it} = \beta Diversity_{it} + \sum^{k} \gamma_k \, x_{kit} + \alpha_{i_n} + \lambda_t + \varepsilon_{it}$$

Where the symbols denote the following:

$\boldsymbol{ROA_{it}}$	ROA of firm i, in year t
$\boldsymbol{Diversity_{it}}$	%Women, Blau's Index and D_Div
$\boldsymbol{x_{kit}}$	Vector of firm-specific control variables; Firm Size, Firm Age, Board Size and %Tangibles
$\boldsymbol{\alpha_{i_n}}$	Industry Fixed Effects, assumed to be time invariant
$\boldsymbol{\lambda_t}$**:**	Time Fixed Effects, assumed to be constant cross-sectionally
$\boldsymbol{\varepsilon_{it}}$	Robust standard errors, clustered at company level

4.1 Measure of Financial Performance

Financial performance is measured in terms of ROA, in line with corporate finance literature. ROA is widely used in previous research to indicate firm profitability and takes the assets that are used to support business activities into account. It determines whether the firm is able to generate sufficient return on these assets (Hagel, Brown & Davison, 2010). ROA is thus an indicator of how efficiently the management utilize the company's assets to generate profit.

Three commonly used profit measures are taken into consideration when calculating ROA, allowing us to account for the robustness of the measure. ROA is calculated the following ways:

$$\text{ROA 1}_{\text{it}} = \frac{\text{Net Income}}{(\text{Total Assets}_{\text{t}} + \text{Total Assets}_{\text{t}-1})/2}$$

$$\text{ROA 2}_{\text{it}} = \frac{\text{Income Before Tax}}{(\text{Total Assets}_{\text{t}} + \text{Total Assets}_{\text{t}-1})/2}$$

$$\text{ROA 3}_{\text{it}} = \frac{\text{Operating Income}}{(\text{Total Assets}_{\text{t}} + \text{Total Assets}_{\text{t}-1})/2}$$

To increase the robustness of the results further, other indicators of firm performance could have been added. Return on equity (ROE) is widely used in financial research, and reveals the company's ability to assure shareholders sufficient return (Hagel et al., 2010). Tobin's Q is another frequently used measure, indicating whether the company's outstanding stocks are overvalued or undervalued by considering if the value of its stocks are greater than the cost of replacing a firm's assets. Using Tobin's Q to measure firm profitability thus limits the sample to publicly listed companies, which would drastically decrease our sample size.

4.2 Proxies for Gender Diversity

Gender diversity is measured in three ways. First, a dummy variable indicates whether both genders are represented on the BoD, taking the value 1 if the board comprise directors of both genders. It reveals the financial performance of a firm with a heterogeneous relative to a homogeneous board, without taking the level of gender diversity into account. 44.9% of the companies in question have diverse boards. Second, the share of women on the BoD (%Women) accounts for the extent of diversity, measured as the number of female directors over the total board size. The measure generally exhibits gender diversity as women overall are underrepresented on boards today. This may however not always be an appropriate measure of gender diversity. Boards with an overrepresentation of women actually exhibit a low degree of board heterogeneity. This is the case for some of the companies in our data sample, hence an additional measure is taken into account. Blau's index is proposed as a good alternative to measure diversity, and is a commonly used measure of diversity (Harrison & Klein, 2007, p. 1211). It is calculated as follows:

$$1 - \sum_{i=1}^{K} p_i^2$$

Where the symbols denote the following

p_i: The percentage of board members in each category

K: Total number of categories

The index ranges from 0 to *(K-1/K)* and its minimum and maximum value is thereby dependent on the number of categories. Operating with two categories (male and female), the index ranges from 0 to 0.5. Blau's index will thus take the value 0 if the board is homogeneous. The index takes its maximum value of 0.5 when the share of women and men is equal, i.e. when diversity is at a maximum. To sum up the statistical interpretation of the index, Harrison and Klein (2007, p. 1211) state that "Blau's index reflects the chance that two randomly selected group members belong to different categories".

It could also be considered whether the gender of the CEO affects firm performance. However, most Norwegian companies have only one CEO, meaning that the gender of the CEO does not tell us much about diversity. An alternative analysis could include diversity in top management. Unfortunately, gender specifications in top management of Norwegian companies are not available in our sample, making this infeasible.

4.3 Firm-Specific Control Variables

To control for firm-specific characteristics that is likely to affect the financial performance of the firm, four control variables are included in the main regression.

The book value of total assets is commonly used as a proxy of firm size. The size of the firm is assumed to affect firm profitability. The natural logarithm of total assets is used to smooth the great variability and high values of the variable. Campbell and Mínguez-Vera (2008) observe that firm size has a negative influence on firm value. Similarly, Samuels and Smyth (1968) find that profit rates tend to decrease with firm size. On the other hand, Hall and Weiss (1967) find the opposite. Due to the ambiguous results in previous research on firm size and profitability, no specific association is expected a priori.

The size of the BoD is included as a control variable, measured by the number of directors on the board. Boards comprising less than two directors are excluded from the sample as they do not depict diversity. Yermack (1996) find evidence of an inverse association between firm value and the size of the board in large U.S.

corporations. Eisenberg, Sundgren and Wells (1998) confirm that these results are also applicable to smaller firms. Similar findings have been observed in several other studies. Guest (2009) find that increased board size has a strong negative impact on profitability. This is in line with Jensen's prediction that smaller boards are more effective. It is suggested that increased group size induce coordination and communication problems, leading to decreased effectiveness (Jensen, 1993, p. 865). He further claims that "when boards get beyond seven or eight people they are less likely to function effectively and are easier for the CEO to control" (Jensen, 1993, p. 865). Based on the predictions of existing theories and empirical findings, we expect to find a negative association between board size and firm profitability.

The age of the firm, measured in years, is accounted for as it exhibits the phase of the life cycle the firm is in. Economic theory asserts a non-linear relationship between firm performance and a company's life cycle stages (Dickinson, 2011, p. 1970). Negative profit is presumed in the startup-phase, followed by a rapid growth in the early stage. The maturity stage is recognized by a slower growth, and finally declining profitability is expected (Selnes, 2011, p. 246–249). This is well-documented in previous research, and as stated by Fama and French (2000, p. 161) "there is a strong presumption in economics that profitability is mean reverting". Loderer and Waelchli (2010) reveal that older firms are outperformed by industry peers. This is manifested in less efficiency, slower growth, reduction in R&D and other investment activities, as well as declining corporate governance quality as firms grow older.

Lastly, tangible assets over total assets (%Tangibles) is included to reveal how the firms allocate capital. Intangible assets make up a substantial proportion of firm value in sectors where (information) technology, knowledge and innovation play a central role, which are growing fields in today's economy. Teece (1998, p. 79) points out knowledge, competence and related intangibles as key drivers of firms' competitive advantage, indicating high financial performance for firms investing heavily in these areas. Kaplan and Norton (2001, p. 87–88) further point out that there has been a clear shift in strategies for creating value the late 20th century from the management of tangible assets to greater focus on intangible assets such as information technology (IT), innovation and human capital. This highlights the

importance of intangible assets. In support of this intuition, Gamayuni (2015) finds a significant positive association between intangible assets and company performance measured by ROA. Based on these arguments, we expect firms in which tangible assets deploy a large amount of the book value to be associated with lower profitability.

5. Data and Summary Statistics

The data sample is retrieved from the Centre for Corporate Governance Research (CCGR) in January 2017. The unbalanced panel of data comprises 3,461,962 observations for Norwegian companies over the period 2000–2015. A large proportion of previous research is limited to listed companies. This results in relatively small sample sizes, especially in Norway where the number of listed companies merely amounted to 238 in 2015 (Knudsen, 2015). This can create difficulties regarding statistical significance of the results, particularly if the effect of gender diversity is small (McGuinness, 2016, p. 4). In addition, the results drawn from listed companies may not be applicable to describe the situation in all companies. The companies in our sample are both listed and non-listed, and we point out the variety of companies in question and the large sample size as a strength of this research.

To avoid distortion from large outliers, the variables are winsorized at the top and bottom 2.5%. Further, companies operating within *Financial and insurance activities* (industry code 64–66) are deleted from the data sample. After winsorization, adjusting for missing variables, and making other necessary adjustments to the data set, it contains 1,933,751 observations, which constitutes observations from around 125,000 companies each year.

Table II discloses relevant summary statistics. The size of the boards in our sample is revealed to be pivotal to the association we detect. Hence it is found necessary to include summary statistics for firms with more than two and three board directors, respectively.

Table II: Summary Statistics

	ROA 1	**ROA 2**	**ROA 3**	**Blau**	**%Women**	Firm Size	%Tangibles	Firm Age	Board Size
Board Size ≥ 2									
Mean	4.2 %	6.0 %	6.4 %	0.19	20.1 %	14.87	28.0 %	13.27	3.23
Min	-90.9 %	-92.5 %	-84.3 %	0	0 %	10.00	0 %	0	2
Max	91.4 %	98.0 %	94.9 %	0.5	100 %	19.49	98.9 %	344	16
#Obs	1,624,019	1,624,019	1,624,019	1,699,918	1,699,918	1,933,736	1,933,736	1,933,751	1,699,918
Board Size ≥ 3									
Mean	2.6 %	4.2 %	4.6 %	0.21	20.7 %	15.35	30.7 %	14.55	3.76
Min	-90.9 %	-92.5 %	-84.3 %	0	0 %	10.00	0 %	0	3
Max	91.4 %	98.0 %	94.9 %	0.5	100 %	19.49	98.9 %	344	16
#Obs	1,042,369	1,042,369	1,042,369	1,191,808	1,191,808	1,191,799	1,191,799	1,191,808	1,191,808

6. Methodology

The use of panel data facilitates us to control for unobservable heterogeneity that affects firm profitability. Failing to control for such factors can lead to biased coefficients if the characteristics are correlated with the explanatory variables. We estimate industry and time fixed effects to obtain consistent estimates of the parameter coefficients (Campbell & Mínguez-Vera, 2008, p. 443; Himmelberg, Hubbard & Palia, 1999, p. 356).

6.1 Industry Fixed Effects

Industry fixed effects can be estimated if the sources of unobserved heterogeneity are constant over time, but not across entities. The coefficient estimates are driven by the variation within each industry over time. The model assigns each industry (except for one base industry that is left out to avoid perfect collinearity) with a fixed effects intercept dummy (Brooks, 2008, p. 491). Intuitively, industry fixed effects imply that a firm's performance is compared to other firms within the same industry. A pooled regression, a fixed effects model and a random effects model are estimated. Hausman's test reveals that the use of a fixed effects model is appropriate.

6.2 Time Fixed Effects

The research is carried out over a period of fifteen years. There are obviously fluctuations in the economy and business environment affecting firm profitability during this time period. E.g., companies were affected by the financial crisis (2007–2009), thus reduced profitability is presumed during the period. A time fixed model control for factors affecting ROA and are constant across firms

(cross-sectionally) but varies over time (Brooks, 2014, p. 531). Time fixed effects can be said to be the estimated variation in firm profitability that is common to all firms in the sample in a specific year relative to the base year 2001. The estimated time fixed effects thus control for factors common for all companies that change each year. This can be factors such as tax rate changes, economic shocks or legislative changes. In an economic sense, time fixed effects deal with macro shocks that are common to all entities in the panel. The intuition behind this method is that a firm's performance is compared to that of other firms within the same time period. After estimating time fixed effects, it is formally tested whether the dummy coefficients for all years are jointly equal to zero. This hypothesis is rejected, revealing that time fixed effects are needed.

6.3 Clustered Standard Errors

ROA for a specific company is likely to be correlated over time, while ROA across different companies is assumed to be uncorrelated. Ignoring within-group correlation of the observations may lead to erroneous results and artificially low standard errors, narrow confidence intervals and consequently low p-values and large t-statistics (Cameron & Miller, 2015, p. 318). This increases the chance of committing type 1 errors, indicating an over-rejection of the null hypothesis and achieving misleading significance. Due to this, we cluster standard errors on company level.

7. Endogeneity

Christiansen et al. (2016, p. 7–8) address the issue of reverse causality. They point out that while it is likely that increased diversity improves firm performance, it could also be that better performing firms attract more women, or even that profitable firms "afford" to bring more women on their boards. A major challenge in our research is related to causality. A significant positive relationship between gender diversity and firm performance could be erroneous if relevant variables are omitted from the regression. Important determinants of firm performance such as corporate culture, the quality of corporate governance mechanisms, director's education level or relevant experience can be difficult to quantify or observe. The inability to observe such characteristics make them impossible to include as

explanatory variables, hence the effect they have on firm profitability is left in the error term. The endogeneity problem arises if the omitted variables are correlated with the explanatory variables, causing biased parameter estimates and severe problems with respect to reliable statistical inference (Roberts & Whited, 2012, p. 6–9). For example, information about director's education level is not available in our data sample. Firm performance could theoretically be explained by the director's education level rather than the gender composition of the board. If the female directors in addition have higher education level than men, the error term will be correlated with the diversity variable (measured as the percent women on the BoD). This would cause the parameter estimate to be biased upwards. In the most severe cases, the detected association can be spurious due to endogeneity issues.

Hermalin and Weisbach (2001, p. 8) address the endogeneity problem in examining board composition and firm value. They argue that almost all the variables of interest involved in empirical work on boards and corporate governance are endogenous. Roberts and Whited (2012, p. 6) present endogeneity problems as the most prominent concern in empirical corporate finance. Empirical research addresses this problem and attempt to solve it in various ways.

Christiansen et al. (2016, p. 6) use a simple difference-in-difference strategy, examining the underlying mechanisms of the simple correlation between gender diversity and firm performance. When attempting to identify possible reverse causality, they point out that if gender diversity matter, firms in industries that are characterized by tasks and output that are highly contingent on the positive implications that diversity may bring, should benefit more from gender diversity in top management. They find the association between women in senior positions and ROA to be more pronounced in high-tech and knowledge-intensive industries, as well as industries employing more women than men. The results are thus argued to prove that the causality goes from diversity to increased profitability and not the other way around.

Campbell and Mínguez-Vera (2008, p. 443) and Carter et al. (2003, p. 43) apply a two stage least squares (2SLS) method to investigate whether the relationship is endogenously determined. This method examines whether women are more likely to serve on boards of more profitable companies, which would imply that reverse causality is an issue. Carter et al. observe that firm value has a

significant impact on the percentage of women on the board, indicating that the problem of endogeneity is present. Campbell and Mínguez-Vera on the other hand do not find a significant reverse relationship, indicating that the association they detect is exogenously determined.

Bøhren and Strøm (2010, p. 1284) apply fixed and random effects to reduce the endogeneity problem. This is said to reduce the omitted-variable problem as the panel structure makes it possible to control for the effect of unobservable firm-specific characteristics (Hsiao, 2003, p. 314). It is further argued that the use of repeated observations of the same firm over time (compared to using a cross-sectional sample), increases the likelihood of revealing stable relationships, also in the presence of endogeneity.

Smith et al. (2006, p. 582) use the average length of education of CEO's spouses as an instrumental variable to assess the direction of causality. Valid instrument variables are difficult to find, and must be factors that do not affect firm performance, and concurrently affect the proportion of women in management positions. Their intuition behind choice of instrument is that CEOs with well-educated spouses have a less traditional gender view, making them more likely to acknowledge women's competence and thereby hire them in top positions.

Our regression output is robust to the inclusion of fixed effects, which as discussed above can reduce the omitted-variable problem. Roberts and Whited (2012, p. 76) argue that omitted variables is one of the most common causes of endogeneity and that the use of such techniques offer a partial, but far from perfect solution to the problem.

Knowledge-intensive and high-technology sectors are pointed out to rely heavily on characteristics that diversity is likely to bring. Additionally, female leadership is argued to be more efficient in industries where women is the dominating gender among the employees. Hence, if the causality goes from diversity to firm performance and not the other way around, the association should be stronger in named industries. Inspired by Christiansen et al. (2016), we carry out an industry split of our sample in section 8.4, attempting to find some support for the direction of causality.

8. Results

8.1 Main Results

A simple pooled regression is first carried out, before also estimating time and industry fixed effects. The main results are presented in table III–V, and reveal a positive and highly statistically significant association between gender diversity in corporate boards and financial performance, in line with our hypothesis.

Table III: Main Results
Board Size ≥ 2

	ROA 1					
Explanatory Variables						
Blau Index	0.041***	0.011***	-	-	-	-
	(0.001)	(0.002)				
%Women	-	-	0.041***	0.012***	-	-
			(0.0007)	(0.002)		
D_Diversity	-	-	-	-	0.019***	0.005***
					(0.0004)	(0.001)
Firm Size	0.027***	0.068***	0.027***	0.068***	0.027***	0.068***
	(0.000)	(0.001)	(0.0001)	(0.001)	(0.0001)	(0.001)
Firm Age	0.0004***	0.0003**	0.0004***	0.0003**	0.0004***	0.0003**
	(0.000)	(0.0001)	(0.00001)	(0.0001)	(0.00001)	(0.0001)
%Tangibles	-0.077***	-0.189***	-0.078***	-0.189***	-0.077***	-0.189***
	(0.000)	(0.002)	(0.0005)	(0.002)	(0.0005)	(0.002)
Board Size	-0.015***	-0.01***	-0.015***	-0.01***	-0.016***	-0.01***
	(0.000)	(0.0005)	(0.0002)	(0.0005)	(0.0002)	(0.0005)
Constant	-0.317***		-0.323***		-0.317***	
	(0.002)		(0.002)		(0.002)	
Industry and Time Fixed effects	No	Yes	No	Yes	No	Yes
R^2	0.049	0.053	0.049	0.053	0.049	0.053
Number of Observations	1,467,129	1,360,577	1,467,129	1,360,577	1,467,129	1,360,577
Number of Companies		211,546		211,546		211,546

*, ** and *** indicate significance level at the 10, 5 and 1 % level, respectively
Standard Errors are depicted in parenthesis
When including fixed effects, Robust Standard Errors are clustered at company level

Table IV: Main Results
Board Size ≥ 2

Explanatory Variables	ROA 2					
Blau Index	0.043***	0.013***	-	-	-	-
	(0.001)	(0.002)				
%Women	-	-	0.042***	0.015***	-	-
			(0.0009)	(0.002)		
D_Diversity	-	-			0.02***	0.006***
					(0.0004)	(0.001)
Firm Size	0.029***	0.074***	0.029***	0.074***	0.029***	0.074***
	(0.0001)	(0.0007)	(0.0001)	(0.0007)	(0.0001)	(0.0007)
Firm Age	0.0004***	0.0002*	0.0004***	0.0002*	0.0004***	0.0002*
	(0.00001)	(0.0001)	(0.00001)	(0.0001)	(0.00001)	(0.0001)
%Tangibles	-0.096***	-0.214***	-0.097***	-0.214***	-0.096***	-0.214***
	(0.0006)	(0.002)	(0.0006)	(0.002)	(0.0006)	(0.002)
Board Size	-0.019***	-0.011***	-0.018***	-0.011***	-0.019***	-0.011***
	(0.0002)	(0.001)	(0.0002)	(0.0005)	(0.0002)	(0.0005)
Constant	-0.318***		-0.324***		-0.318***	
	(0.002)		(0.002)		(0.002)	
Industry and Time Fixed effects	No	Yes	No	Yes	No	Yes
R^2	0.048	0.051	0.048	0.052	0.048	0.051
Number of Observations	1,467,129	1,360,577	1,467,129	1,360,577	1,467,129	1,360,577
Number of Companies		211,546		211,546		211,546

*, ** and *** indicate significance level at the 10, 5 and 1 % level, respectively
Standard Errors are depicted in parenthesis
When including fixed effects, Robust Standard Errors are clustered at company level

Table V: Main Results
Board Size ≥ 2

Explanatory Variables	ROA 3					
Blau Index	0.026***	0.012***	-	-	-	-
	(0.0009)	(0.002)				
%Women	-	-	0.029***	0.014***	-	-
			(0.0008)	(0.002)		
D_Diversity	-	-	-	-	0.013***	0.006***
					(0.0004)	(0.001)
Firm Size	0.022***	0.06***	0.022***	0.06***	0.022***	0.06***
	(0.0001)	(0.0006)	(0.0001)	(0.0006)	(0.0001)	(0.0006)
Firm Age	0.0002***	0.0003**	0.0002***	0.0003**	0.0002***	0.0003**
	(0.00001)	(0.0001)	-0.00001	(0.0001)	(0.00001)	(0.0001)
%Tangibles	-0.042***	-0.16***	-0.043***	-0.16***	-0.042***	-0.16***
	(0.0006)	(0.002)	(0.0006)	(0.002)	(0.0006)	(0.002)
Board Size	-0.017***	-0.01***	-0.017***	-0.009***	-0.017***	-0.01***
	(0.0002)	(0.0005)	(0.0002)	(0.0005)	(0.0002)	(0.0005)
Constant	-0.017***		-0.229***		-0.224***	
	(0.002)		(0.002)		(0.002)	
Industry and Time Fixed effects	No	Yes	No	Yes	No	Yes
R^2	0.03	0.033	0.031	0.033	0.03	0.033
Number of Observations	1,467,129	1,360,577	1,467,129	1,360,577	1,467,129	1,360,577
Number of Companies		211,546		211,546		211,546

*, ** and *** indicate significance level at the 10, 5 and 1 % level, respectively
Standard Errors are depicted in parenthesis
When including fixed effects, Robust Standard Errors are clustered at company level

The association is found to be robust to different calculations of ROA and different measures of diversity. All control variables are furthermore significant. Board Size and %Tangibles have an inverse relation with profitability as predicted. A positive relation between ROA and the age and size of the firm is detected. The association is robust to the inclusion of time and industry fixed effects, but becomes less pronounced than the simple pooled regression suggests. Hence, some of the positive implications following increased diversity observed in the pooled regression were caused by unobserved heterogeneity, causing overestimation of the beta coefficients. We will further focus only on the fixed effects estimation and thereby account for the unobservable factors.
The dummy coefficient indicates that having a heterogeneous board composition relative to one that is homogeneous increases ROA with 0.5–0.6%, depending on the way ROA is calculated. A strong association is furtherly detected when applying measures that also account for the level of diversity. A one percent increase in the percentage women on the BoD will boost ROA by 1.2–1.5%. Blau's index reveals a similar association, indicating that the economic reasons for increased gender diversity is not reasoned only by female presence in itself, but the representation of both genders in decision-making organs. The results are in line with the theoretical implications presented in section 2.1, and implies that taking a broader range of perspectives into account increases firm profitability.

Table VI shows that according to the parameter estimate for %Women, replacing one man with a woman on the average BoD is associated with a striking 6.6–8.9% (37–45 basis points) increase in ROA.

Table VI: Interpretation of Main Results

Board Size ≥ 2

	ROA 1	ROA 2	ROA 3
%Women	0.012***	0.015***	0.014***
	(0.002)	(0.002)	(0.002)
Mean ROA	4.2%	6.0%	6.4%
Mean %Women	20.1 %	20.1 %	20.1 %
Mean Board Size	3.23	3.23	3.23
Mean #Women on the Board	0.65	0.65	0.65
%Increase in ROA	8.9 %	7.5 %	6.6 %
BP Increase in ROA	37	45	42
Number of Observations	1,360,577	1,360,577	1,360,577
Number of Companies	211,546	211,546	211,546

*, ** and *** indicate significance level at the 10, 5 and 1 % level, respectively
Robust Standard Errors are clustered at company level and depicted in parenthesis
Note: All regressions include industry and time fixed effects, indicators for firm size, firm age, board size and the percent of tangible to total assets.

It is implicitly assumed that the association between firm performance and gender diversity is linear. The results indicate that greater diversity is associated with higher financial performance regardless of the current diversity level. In section 8.5, we investigate whether the proposed association actually is linear.

8.2 The Association in Larger Boards

Previous research on Norwegian companies has revealed a negative association between gender diversity and firm profitability and value (Bøhren & Strøm, 2010; Matsa & Miller, 2013). Our results contradict the implications of previous research, and we ask ourselves whether this could be caused by the fact that our data sample differs from others. Listed companies have been a focus in former research, whereas our sample includes many smaller, non-listed companies. The vast majority of Norwegian companies are however relatively small and non-listed and we argue that this makes our sample and hence our results quite representative for the population. Listed companies are typically larger, and board size tend to increase as companies grow (Yermack, 1996, p. 200). The average

number of directors on the boards in our sample is 3.23, which is very moderate compared to the average board size of 6.5 in the Norwegian listed firms in question in Bøhren and Strøm (2010). Hence, we investigate if the positive association revealed is driven by the smaller boards. Companies with less than three board members are thus excluded from the sample, and the results are presented in Table VII.

Table VII: The effect in larger boards

Board Size ≥ 3

Explanatory Variables	ROA 1			ROA 2			ROA 3		
Blau Index	0.007***	-	-	0.009***	-	-	0.008***	-	-
	(0.002)			(0.003)			(0.002)		
%Women	-	0.007***	-	-	0.009***	-	-	0.009***	-
		(0.002)			(0.003)			(0.002)	
D_Diversity	-	-	0.003***	-	-	0.004***	-	-	0.004***
			(0.001)			(0.001)			(0.001)
Firm Size	0.065***	0.065***	0.065***	0.069***	0.069***	0.069***	0.055***	0.055***	0.055***
	(0.0007)	(0.0007)	(0.0007)	(0.0008)	(0.0008)	(0.0008)	(0.0007)	(0.0007)	(0.0007)
Firm Age	0.0003**	0.0003**	0.0003**	0.0002*	0.0002*	0.0002*	0.0003**	0.0003**	0.0003**
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
%Tangibles	-0.173***	-0.173***	-0.173***	-0.194***	-0.194***	-0.194***	-0.141***	-0.141***	-0.141***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Board Size	-0.009***	-0.009***	-0.009***	-0.01***	-0.01***	-0.01***	-0.008***	-0.008***	-0.008***
	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)
R^2	0.047	0.047	0.047	0.046	0.046	0.046	0.029	0.029	0.029
Number of Observations	958,443	958,443	958,443	958,443	958,443	958,443	958,443	958,443	958,443
Number of Companies	153,372	153,372	153,372	153,372	153,372	153,372	153,372	153,372	153,372

*, ** and *** indicate significance level at the 10, 5 and 1 % level, respectively
Robust Standard Errors are clustered at company level and depicted in parenthesis
Note: All regressions include industry and time fixed effects

The coefficient of interest is still positive and statistically significant, but the association is found to be slightly weaker when excluding the smallest boards. The new parameter estimates for %Women indicate that increasing female representation on the board by one percent increases ROA with 0.7–0.9%. The results obtained when disregarding the smallest boards further indicate that replacing one man with a woman on the average board yields an increase in ROA of 5.2–7.2% (Table VIII). Thus, this effect has dropped by 18–20 basis points.

Table VIII: Interpretation of the effect in larger boards

Board Size ≥ 3

	ROA 1	**ROA 2**	**ROA 3**
%Women	0.007***	0.009***	0.009***
	(0.002)	(0.003)	(0.002)
Mean ROA	2.6 %	4.2 %	4.6 %
Mean %Women	20.7 %	20.7 %	20.7 %
Mean Board Size	3.76	3.76	3.76
Mean #Women on the Board	0.78	0.78	0.78
%Increase in ROA	7.2 %	6.0 %	5.2 %
BP Increase in ROA	19	25	24
Number of Observations	958,443	958,443	958,443
Number of Companies	153,372	153,372	153,372

*, ** and *** indicate significance level at the 10, 5 and 1 % level, respectively
Robust Standard Errors are clustered at company level and depicted in parenthesis
Note: All regressions include industry and time fixed effects, indicators for firm size, firm age, board size and the percent of tangible to total assets.

The sample is furtherly narrowed down to examine firms with at least four directors on the board, presented in Table IX.

Table IX: The effect in larger boards

Board Size ≥ 4

Explanatory Variables	ROA 1			ROA 2			ROA 3		
Blau Index	0.002	-	-	0.004	-	-	0.004	-	-
	(0.004)			(0.005)			(0.004)		
%Women	-	0.005	-	-	0.007*	-	-	0.008**	-
		(0.004)			(0.004)			(0.004)	
D_Diversity	-	-	0.002	-	-	0.002	-	-	0.003
			(0.002)			(0.002)			(0.002)
Firm Size	0.073***	0.073***	0.073***	0.078***	0.078***	0.078***	0.063***	0.063***	0.063***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Firm Age	0.0005***	0.0005***	0.0005***	0.0004**	0.0004**	0.0004**	0.0004***	0.0004***	0.0004***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0001)	(0.0001)
%Tangibles	-0.175***	-0.175***	-0.175***	-0.195***	-0.195***	-0.195***	-0.144***	-0.144***	-0.144***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)
Board Size	-0.007***	-0.007***	-0.007***	-0.008***	-0.008***	-0.008***	-0.007***	-0.007***	-0.007***
	(0.0008)	(0.0008)	(0.0008)	(0.0009)	(0.0009)	(0.0009)	(0.0008)	(0.0008)	(0.0008)
R^2 - overall	0.044	0.044	0.044	0.044	0.044	0.044	0.027	0.027	0.027
Number of Observations	408,097	408,097	408,097	408,097	408,097	408,097	408,097	408,097	408,097
Number of Companies	75,678	75,678	75,678	75,678	75,678	75,678	75,678	75,678	75,678

*, ** and *** indicate significance level at the 10, 5 and 1 % level, respectively
Robust Standard Errors are clustered at company level and depicted in parenthesis
Note: All regressions include industry and time fixed effects

The association remains positive but becomes insignificant in seven out of nine cases, implying that there is no linear association between gender diversity and firm performance in larger boards. Consequently, we fail to find evidence that larger boards benefit from increased gender diversity.

The marginal effect of gender diversity is found to be diminishing with board size. One explanation for the result being weaker in large boards could be that these boards by nature are more likely to be diverse in terms of other factors than gender, such as director's age, ethnicity, previous experience and educational background. Furthermore, larger companies could be more inclined to recruit directors from a wider circle of candidates, which is likely to induce greater diversity. The positive implications following gender diversity pointed out in section 2.1 can easily apply to other forms of diversity than gender. Greater diversity in terms of age or ethnicity may indeed induce different viewpoints and thereby enhance the quality of decision-making. We suggest that gender diversity matter in small boards because they generally are less diverse in terms of other dimensions than gender. Larger boards on the other hand may already be sufficiently diverse, hence they have already achieved some of the desired benefits that diversity brings. This makes the utility of increased gender balance diminishing with board size and finally gender diversity does not increase firm profitability in larger boards.

We note that boards comprising two directors are remarkably small, hence we exclude these boards when running the regressions in section 8.3 and 8.4. Furthermore, ROA_1 reveals a slightly weaker association between gender diversity and firm profitability compared to ROA_2 and ROA_3. Further regressions will be conducted with ROA_1 as dependent variable, hence we choose to consider the most conservative association.

8.3 Statutory Gender Diversity – does it make a difference?

It is statutory that listed companies are to have at least 40% of each gender in the BoD. Furthermore, listed companies are more exposed, and it can be argued that it is likely that they face a greater external pressure demanding them to be diverse. Section 2.3 argues that forced diversity might not have the same positive

implications on financial performance as board heterogeneity arising naturally over time. In support of this theory, Matsa and Miller (2013) find a decline in short-run profitability following the gender quota of 2006, suggesting that compulsory diversity causes ineffective board compositions. This leads us to believe that the association between gender diversity and financial performance in listed companies is less pronounced or even different from the association in non-listed companies. A dummy variable equal to 1 if the company is publicly listed is therefore added. Interaction terms depict the additional effect of diversity if a company is listed. They are included to examine the economic effect of increased diversity in listed companies relative to non-listed companies. Based on our initial reasoning, these coefficients should be significantly negative, implying a weaker association between increased diversity and firm profitability in listed companies. The results are presented in table X.

Table X: Enterprise type

Board Size ≥ 3

	ROA		
Explanatory Variables			
Blau Index	0.007***	-	-
	(0.002)		
%Women	-	0.007***	-
		(0.002)	
D_Diversity	-	-	0.003***
			(0.001)
Firm Size	0.065***	0.065***	0.065***
	(0.0007)	(0.0007)	(0.0007)
Firm Age	0.0003**	0.0003**	0.0003**
	(0.0001)	(0.0001)	(0.0001)
%Tangibles	-0.173***	-0.173***	-0.173***
	(0.002)	(0.002)	(0.002)
Board Size	-0.009***	-0.009***	-0.009***
	(0.0006)	(0.0006)	(0.0006)
D_ASA	-0.053***	-0.049***	-0.057***
	(0.013)	(0.013)	(0.013)
D_ASA * Blau	0.049		
	(0.03)		
D_ASA * %Women		0.035	
		(0.033)	
D_ASA * D_Diversity			0.027**
			(0.013)
R^2	0.048	0.048	0.048
Number of Observations	958.396	958.396	958.396
Number of Companies	153.372	153.372	153.372

*, ** and *** indicate significance level at the 10, 5 and 1 % level, respectively
Robust Standard Errors are clustered at company level and depicted in parenthesis
Note: All regressions include industry and time fixed effects

As it turns out, the interaction terms for Blau's index and %Women are positive, but insignificant. Hence, we do not find a systematically different effect of increased gender diversity in listed and non-listed companies. Our results suggest that gender diversity does not have to be optional for the positive implications to take place. Interestingly, the interaction term between the dummy for listed companies and the dummy for diversity is positive and significant. The results imply that diversity in its simplest form has more positive implications in listed firms compared to non-listed firms. Specifically, the coefficient estimate implies

that the economic effect of having a heterogeneous board is striking 2.7 percentage points greater in listed companies compared to non-listed firms. The association is however clearly not robust to various measures of diversity.

8.4 Industry Sample Split

Inspired by Christiansen et al. (2016), we employ an industry split of the sample. This strategy allows us to get insight into how the relevant association differs according to underlying characteristics of certain industries. Industries that are knowledge-intensive and high in technology are characterized by complex tasks and innovative output. These industries thus rely heavily on creativity and critical thinking in top management, characteristics that diversity can provide through an increased set of ideas as pointed out in section 2.1. A stronger positive association between the variables of interest is therefore expected in these industries (Christiansen et al. 2016, p. 6). Further, the impact of female representation in top positions is argued to be greater in industries where women is the dominating gender among the employees. Christiansen et al. (2016, p. 13) argue that female managers serve as role models for other women, leading to greater productivity. In support of this intuition, Smith et al. (2006, p. 571) argue that women in top positions may function as mentors and role models for women at lower levels in the corporation, and thus positively affect career development of younger female employees. This increases the pool of potential candidates for top positions, which indirectly may raise productivity. Intuitively, the benefit of having more women in decision-making positions should therefore be greater in female-intensive industries. Hence, we expect to find a more pronounced association between diversity and firm profitability in these industries. As mentioned in section 7, Christiansen et al. (2016) argue that this strategy also offers some support in addressing the issue of reverse causality. They argue that if the causality goes the way that one assumes, the association should be stronger in said industries.

The companies in our dataset are classified by different industry codes based on SN2007, made by Statistics Norway, which complies with the EU standard NACE Rev. 2 (Appendix I). Data from Statistics Norway are used to classify female-intensive industries (Appendix II), whereas high-tech & knowledge-intensive industries are classified by Eurostat (Appendix III). Dummy variables indicate 1) female-intensive (FI) and 2) high-tech & knowledge-intensive industries (HT&KI). Both hypotheses are accounted for in the regression, and the results are presented in Table XI.

Table XI: Industry sample split

Board Size ≥ 3

Explanatory Variables	ROA 1	ROA 2	ROA 3
%Women	0.007***	0.01***	0.01***
	(0.003)	(0.003)	(0.003)
Firm Size	0.065***	0.069***	0.055***
	(0.0007)	(0.0008)	(0.0007)
Firm Age	0.0003**	0.0002*	0.0003**
	(0.0001)	(0.0001)	(0.0001)
%Tangibles	-0.173***	-0.194***	-0.141***
	(0.002)	(0.0027)	(0.003)
Board Size	-0.009***	-0.01***	-0.008***
	(0.0006)	(0.0006)	-0.0006
D_FI * %Women	-0.008	-0.007	-0.007
	(0.008)	(0.009)	(0.009)
D_HT&KI * %Women	0.001	-0.0004	-0.00003
	(0.003)	(0.003)	(0.003)
R^2	0.047	0.046	0.029
Number of Observations	958,443	958,443	958,443
Number of Companies	153,372	153,372	153,372

*, ** and *** indicate significance level at the 10, 5 and 1 % level, respectively
Robust Standard Errors are clustered at company level and depicted in parenthesis
Note: All regressions include industry and time fixed effects

The diversity measure is still significantly positive, but interaction terms between the industries in question and board diversity do not reveal a significant association as initially predicted. Consequently, we do not find the impact of gender diversity in the BoD to be systematically different within these industries. We fail to find the effect that Christiansen et al. (2016) reveal to apply for a

Norwegian sample. Accordingly, this strategy does not yield any support for the direction of causality. The results further suggest that the gender composition of the workforce and the characteristics of the high-tech and knowledge-intensive industries do not describe important channels through which gender diversity in decision-making positions create value.

8.5 Nonlinearities

An implicit assumption when estimating a classical linear regression model is that the appropriate functional form is linear in its parameters. The estimated coefficients disclosed in table III–V imply that the increased profitability following enhanced diversity is the same regardless of the firm's current diversity level. This would imply that firm profitability is strictly increasing with the share of women in decision-making organs, even when women are overrepresented. This contradicts the proposition that the mixture of women and men are key to more effective boards. A more credible assumption is that the positive implications diversity brings is diminishing with the level of diversity, meaning that a board with low female representation yields greater financial benefits from increasing its level of diversity than a board that is close to being gender balanced. Following the business case for gender diversity, firm profitability should become negatively associated with the share of women when they make up the majority of the board.

We allow for nonlinearities by including a squared diversity term (%Women^2), and investigate if the association between the share of women on the board and financial performance is contingent on the board's inherent female representation. The parameter estimate for the quadratic term is significantly negative, meaning that the association is concave. Hence, we find that the association is indeed diminishing, and even negative after a certain level of diversity is reached. The results are presented in Table XII. The new coefficient estimates imply that a one percent increase in the share of women on the BoD will enhance the financial performance of a homogeneous board more than one that is more diverse. One should be careful to interpret the maximum point of this concave function due to a large confidence interval, but we mention that the results imply that the optimal share of women in the BoD is 86–87%.

Table XII: Nonlinearities
Board Size ≥ 2

Explanatory Variables	ROA 1	ROA 2	ROA 3
%Women	0.019***	0.023***	0.022***
	(0.0045)	(0.005)	(0.0046)
%Women^2	-0.011*	-0.013**	-0.013**
	(0.0057)	(0.0064)	(0.006)
Number of Observations	1,360,577	1,360,577	1,360,577
Number of Companies	211.546	211.546	211.546

*, ** and *** indicate significance level at the 10, 5 and 1 % level, respectively
Robust Standard Errors are clustered at company level and depicted in parenthesis
Note: All regressions include industry and time fixed effects, indicators for firm size, firm age, board size and the percent of tangible to total assets.

9. Conclusion

This paper asserts the association between gender diversity in the Board of Directors and financial performance in Norwegian companies. Potential channels through which diversity may enhance the firm's financial performance is laid out, and it is discussed whether there is a business case for board diversity. Theoretically, gender diversity improves the board's ability to effectively solve problems as it increases the variety of perspectives taken into account. Furthermore, heterogeneous boards are pointed out to be more independent and tougher monitors of management. Following this intuition, we propose that gender diversity indirectly improve firm performance.

Using a multiple regression analysis, we document a remarkably strong and significantly positive association between the variables of interest. The results indicate that there is in fact a business case for gender diversity in the boardroom. The association is robust to the inclusion of fixed effects and various measures of ROA and diversity. Main results imply that replacing one man with a woman on the average BoD is associated with a striking 6.6–8.9% increase in ROA. The observed association is however found to be strictly diminishing with board size, and become insignificant when excluding boards comprising less than four directors from the sample. Consequently, our results indicate that gender diversity has a sizeable impact in small boards, whereas it is not an important driver of profitability in larger boards. We suggest that gender diversity matter less in larger boards because they by nature are more diverse in terms of other

characteristics than gender, leading the impact gender diversity has on profitability to be insignificant.

Listed companies in Norway are statutory to have at least 40% of each gender on the BoD. We point out that compulsory gender diversity might not lead to more effective boards and investigate if the economic incentives of board diversity are different in listed relative to non-listed firms. We document that there is no systematic difference in the association between gender diversity and financial performance in the different enterprise types. Consequently, listed companies have the same economic incentives of having gender balanced boards as non-listed firms.

We do an industry split of the sample to get insight into how the relevant association differs according to underlying characteristics of certain industries. Firms operating within high-technology & knowledge-intensive industries and female-intensive industries are argued to benefit more from a diverse composition of the board. The results are however insignificant and does not indicate that any of the industries in question systematically benefit more or less from increased gender diversity.

A major challenge in this line of research is related to causality. We address the issue of reverse causality and the impact it may have on our results, but we do not provide any proof of the causality going from gender diversity to firm performance and not the other way around.

Finally, it is formally tested if the association we reveal is linear. We find that the association in fact is diminishing with the percentage women on the BoD. This is intuitive, and in line with the proposed business case for diversity.

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Appendices

Appendix I: Industry codes

NACE Rev. 2 / SN2007	Sector	Industry Code
A	Agriculture, forestry, and fishing	01 - 03
B	Mining and quarrying	05 - 09
C	Manufacturing	10 - 33
D	Electricity, gas, steam, and air conditioning supply	35
E	Water supply; sewerage, waste management, and remediation activities	36 - 39
F	Construction	41 - 43
G	Wholesale and retail trade; repair of moto vehicles and motorcycles	45 - 47
H	Transportation and storage	49 - 53
I	Accomodation and food service activities	55 - 56
J	Information and communication	58 - 63
K	Financial and insurance activities	64 - 66
L	Real estate activities	68
M	Professionals, scientific, and technical activities	69 - 75
N	Administrative and support service activities	77 - 82
O	Public administration and defense; compulsory social security	84
P	Education	85
Q	Human health and social work activities	86 - 88
R	Arts, entertainment, and recreation	90 - 93
S	Other service activities	94 - 96
T	Activities for huseholds as emplyers; undifferentiated goods- and services-producing activities of households for own use	97
U	activities of extraterritorial organizations and bodies	99

Appendix II: Female Intensive Industries

NACE Rev. 2 (SN2007)	Industry Code	Sector		Percent women in employment
A	01 - 03	Agriculture, forestry, and fishing		22 %
B	05 - 09	Mining and quarrying		18 %
C	10 - 33	Manufacturing		22 %
D	35	Electricity, gas, steam, and air conditioning supply		
E	36 - 39	Water supply; sewerage, waste management, and remediation activities		23 %
F	41 - 43	Construction		11 %
G	45 - 47	Wholesale and retail trade; repair of motor vehicles and motorcycles		46 %
H	49 - 53	Transportation and storage		21 %
I	55 - 56	Accomodation and food service activities	FI	56 %
J	58 - 63	Information and communication		28 %
K	64 - 66	Financial and insurance activities		49 %
L	68	Real estate activities		
M	69 - 75	Professionals, scientific, and technical activities		40 %
N	77 - 82	Administrative and support service activities		44 %
O	84	Public administration and defense; compulsory social security		48 %
P	85	Education	FI	67 %
Q	86 - 88	Human health and social work activities	FI	80 %
R	90 - 93	Arts, entertainment, and recreation		
S	94 - 96	Other service activities		
T	97	Activities for households as employers; undifferentiated goods- and services-producing activities of households for own use		
U	99	Activities of extraterritorial organizations and bodies	FI	59 %

Appendix III: High-tech & Knowledge Intensive Industries

	Industry	Industry Code
Manufacturing		
High-technology		
Manufacture of basic pharmaceutical products and pharmaceutical preparations (21)	Manufacturing	10 - 33
Manufacture of computer, electronic and optical products (26)	Manufacturing	10 - 33
Manufacture of air and spacecraft and related machinery (30.3)	Manufacturing	10 - 33
Medium-high-technology		
Manufacture of chemicals and chemical products (20)	Manufacturing	10 - 33
Manufacture of weapons and ammunition (25.4)	Manufacturing	10 - 33
Manufacture of electrical equipment (27)	Manufacturing	10 - 33
Manufacture of machineryand equipment n.e.c. (28)	Manufacturing	10 - 33
Manufacture of motor vehicles, trailers and semi-trailers (29)	Manufacturing	10 - 33
Manufacture of other transport equipment (30) excluding Building of ships and boats (30.1) and excluding Manufacture of air and spacecraft and related machinery (30.3)	Manufacturing	10 - 33
Manufacture of medical and dental instruments and supplies (32.5)	Manufacturing	10 - 33
Services		
High-tech knowledge-intensive services		
Motion picture, video and television programme production, sound recording and music publishing activities (59)	Information and communication	58 - 63
Programming and broadcasting activities (60)	Information and communication	58 - 63
Telecommunications (61)	Information and communication	58 - 63
Computer programming, consultancy and related activities (62)	Information and communication	58 - 63
Information service activities (63)	Information and communication	58 - 63
Scientific research and development (72)	Professionals, scientific, and technical activities	
Knowledge-intensive market services (excluding financial intermediation and high-tech services)		
Water transport (50)	Transportation and storage	49 - 53
Air transport (51)	Transportation and storage	49 - 53
Legal and accounting activities (69)	Professionals, scientific, and technical activities	69 - 75
Activities of head offices; management consultancy activities (70)	Professionals, scientific, and technical activities	69 - 75
Architectural and engineering activities; technical testing and analysis (71)	Professionals, scientific, and technical activities	69 - 75
Advertising and market research (73)	Professionals, scientific, and technical activities	69 - 75
Other professional, scientific and technical activities (74)	Professionals, scientific, and technical activities	69 - 75
Employment activities (78)	Administrative and support service activities	77 - 82
Security and investigation activities (80)	Administrative and support service activities	77 - 82
Knowledge-intensive financial services		
Financial service activities, except insurance and pension funding (64)	Financial and insurance activities	64 - 66
Insurance, reinsurance and pension funding, except compulsory social security (65)	Financial and insurance activities	64 - 66
Activities auxiliary to financial services and insurance activities (66)	Financial and insurance activities	64 - 66
Other knowledge-intensive services		
Publishing activities (58)	Information and communication	58 - 63
Veterinary activities (75)	Professionals, scientific, and technical activities	69 - 75
Public administration and defence; compulsory social security (84)	Public administration and defense; compulsory social security	84
Education (85)	Education	85
Human health activities (86)	Human health and social work activities	86 - 88
Residential care activities (87)	Human health and social work activities	86 - 88
Social work activities without accommodation (88)	Human health and social work activities	86 - 88
Creative, arts and entertainment activities (90)	Arts, entertainment, and recreation	90 - 93
Libraries, archives, museums and other cultural activities (91)	Arts, entertainment, and recreation	90 - 93
Gambling and betting activities (92)	Arts, entertainment, and recreation	90 - 93
Sports activities and amusement and recreation activities (93)	Arts, entertainment, and recreation	90 - 93

Source: Eurostat, European Commision websites:
http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:High-tech_classification_of_manufacturing_industries
http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Knowledge-intensive_services_(KIS)

Appendix IV: Preliminary Thesis

Working title:

Financial performance and gender diversity in senior positions: Evidence from Norway

1. Detailed Introduction

Women represent a high percentage of the workforce, yet they are undoubtedly underrepresented on boards and in senior management positions. Management diversity is furthermore deemed to be an important aspect of good corporate governance. It can be defined as the heterogeneity inherent in the composition of the governing bodies, and can be measured on several dimensions. Gender is arguably the most debated issue regarding diversity in terms of board and management composition (Campbell and Mínguez-Vera, 2008, p. 437; Smith, Smith and Verner, 2006, p. 570). The arguments regarding this debate comprise both ethical and economic aspects. This paper will focus on the potential effects on the financial performance of a company of gender diversity in boards and top management of Norwegian listed and non-listed companies. Existing theory does not lead to a clear conclusion regarding this association. Empirical research on this topic has led to ambiguous results, and the answer to this question is thus yet to be determined.

Christiansen, Lin, Pereira, Topalova and Turk (2016) have examined the relationship between gender diversity in senior corporate positions and financial performance of 2 million European companies on behalf of the International Monetary Fund (IMF). The magnitude of this study separates it from previous research. The study is conducted on a sample of both listed and non-listed companies, which significantly contributes to the literature on this field (McGuinness, 2016, p. 4). A large proportion of the previous research is limited to listed companies. This results in a small sample size, which creates difficulties regarding statistical significance of the results, in particular if the effect of gender diversity is small. In addition, the results drawn from listed companies may not be applicable to describe the situation in all companies. Christiansen et al. (2016) documents a positive association between the proportion of female representation in senior positions and ROA. Main findings comprise an 8-13 basis points higher ROA associated with a larger share of women in senior positions.

Previous research within the field is extensive, especially in the U.S, though limited for Norwegian companies. This paper aims to replicate the study conducted by Christiansen et al. (2016), using a sample of both listed and non-listed companies in Norway. As Norway has legislated a quota requiring 40% of each gender to be represented in the board of directors for listed companies, the research of this paper is of extra interest. The conclusion will therefore present a result in favor of this quota if the correlation is positive, whereas a negative correlation between gender diversity and financial performance will be a contradiction to the quota. If it is actually the case that an increased female representation in top management and board positions enhances the financial performance of a firm, this is a strong economic argument for including more women in the composition of top management and board entities.

2. Problem formulation

This paper investigates the association between gender diversity in senior positions and financial performance in Norwegian listed and non-listed companies. Diversity in senior positions is defined as the percentage of women in the top management and on boards. Financial performance is measured by return on assets (ROA).

3. Background information

3.1 Corporate Governance

Corporate governance is a term related to stock corporations, meaning companies that have outstanding shares trading on a stock exchange. A definition of corporate governance will typically state the major objective of the corporation. The objectives of corporate governance will however vary with the culture, legal systems and politics of the government where the corporation is located. The main idea is to ensure that the finance providers of a corporation yield returns on their investment (Goergen, 2012, p. 3-4). The purpose of corporate governance is also said to be to “ensure the survival and sustainable success of the organisation to be governed” (Davies, 2006, p. 12). The Cadbury Report (1992), is regarded to be one of the first reports on the best practice of corporate governance (Goergen, 2012, p. 6). The report defines corporate governance the following way:

"Corporate governance is the system by which companies are directed and controlled" (Cadbury A., 1992, p. 15). Corporate governance includes the interaction and connection between the owners of the corporation, the corporation's board of directors, the corporation's management, as well as other stakeholders (PwC, 2007, p. 14). Other stakeholders may be employees, customers, suppliers, government, and the society.

The Cadbury Report is mainly directed to listed companies in the UK, but the author encourages other companies to apply the principles it presents. Important aspects leading to best practice of corporate governance is pointed out. The first factor to be mentioned, is the importance of openness. A corporation has numerous stakeholders, and thereby transparency is seen as an essential aspect of good governance. Further, integrity with respect to the financial reports is important. Integrity of those who prepare them leads to integrity of the reports. Another factor supporting good governance is accountability. The board of directors is accountable for their shareholders and is thereby responsible for transferring information. Moreover, the shareholders are accountable for the responsibility they have as owners (Cadbury A., 1992, p. 16). By applying these principles of good corporate governance, the corporation may become more transparent and accountable for investors. This reduces the risk for potential investors, leading the corporation to an improved access to capital. This again may yield opportunities, economic growth, new investments and development. Good corporate governance may enhance effectiveness, serve as an important factor for good management and may mitigate various risk factors (International Finance Corporation, 2014).

Additionally, Carter, Simkins and Simpson (2003, p. 51) deems the relationship between board diversity and shareholder value creation to be a critical factor in good corporate governance. As mentioned initially, gender diversity is the most commonly discussed aspect of diversity. Gender being a measure of good corporate governance, and good corporate governance being important and crucial for corporations, this topic is found highly interesting to conduct research on.

Adrian Davies emphasizes eight core dimensions of corporate governance. The first dimension is identity. A company need to define who they are and their

personal characteristics. Building a corporate brand and thereby increasing reputation and loyalty is important. The second dimension is purpose. A company need to have clear thoughts on what they intend to do and why they exist. Purpose is also important to ensure that the company are heading in the right direction, as well as a motivation for the employees. The third dimension is leadership, which can be considered as one of the main drivers for corporate governance. Leaders set the example and should act as guidance for the employees, and the relationship between a leader and its followers is built on trust. The fourth dimension is distributing power. The power within the corporation should be spread rather than given to one single individual, to ensure best possible decision making. The fifth dimension is inclusiveness and communication, which goes hand in hand with openness and transparency. These are all important factors for good corporate governance. The sixth dimension is the requirement of pattern of accountability. The seventh dimension is maximizing effectiveness, which is a key factor in corporate governance. Effectiveness ensure quality for the customers as well as a sustainable reputation. The eighth and last dimension of corporate governance is ensuring sustainability. This includes the importance of a long-term perspective and always consider what is best for the future. When making decisions in a sustainable matter, the corporation ensure that they head in the direction which is proper for tomorrow's business (Davies, 2006, p. 12-14).

In 2015, The Organization for Economic Co-operation and Development (OECD) published a report about principles for corporate governance. The report points out that boards need to frequently evaluate whether they have a sufficient diversity among the directors (OECD, 2015). If this is done properly and act upon, the board will avert group thinking and ensure diversity in discussions. The report stresses the diversity in background, competence, as well as gender. To ensure diversity, countries might introduce legislative measures, an example being the quota of 40% of each gender on boards of directors in Norwegian listed companies.

3.2 Board diversity

The ultimate governing body within the corporation, is the board of directors. The members are elected by the shareholders, and are to look after the best interest of

the shareholders as well as other stakeholders. They thus have a fiduciary duty on behalf of the shareholders. Their task is to discuss and make decisions for issues that arise, especially within the fields of strategy and finance (Belcredi and Ferrarini, 2013, p. 191). The board of directors is furthermore considered to be a bridge between the corporation and its owners and various stakeholders (PwC, 2007, p. 38). One can distinguish between non-executive and executive directors. The non-executive directors are elected from outside of the corporation, but have experience and valuable insight from working in other corporations. Thereby they can be argued to provide a more unbiased opinion on issues discussed in the boardroom, though possessing less knowledge of the operations of the firm. Their role also comprises monitoring the top management of the firm, including the executive directors on the board. The executive directors are often employees, officers or stakeholders in the corporation, and thereby represent the interest of the shareholders and the employees (Goergen, 2012, p. 3-4). As the two types of directors represent various kinds of insight and bring different perspectives in the decision-making, it can be argued that this diversity in the composition of the board has beneficial implications. The idea that board diversity induces better decision-making is furthermore well established. Board or management diversity can be defined as the variety inherent in the composition of the board or management. It can be measured on several dimensions such as gender, age, ethnicity, experience, and educational background. The focus on gender is arguably the most debated issue regarding diversity in terms of board composition (Campbell and Mínguez-Vera, 2008, p. 437; Smith et al., 2006, p. 570).

3.3 Agency Theory

One of the main purposes of corporate governance is the focus on problems that arise between ownership and control (PwC, 2007, p. 15). Special attention is put to the principal-agent relationship between shareholders and managers of a corporation. According to Adrian Davies, the Agency Principle is “the doctrine that shareholders are the owners of their company and that company directors are solely agents to exercise the will of shareholders” (Davies, 2006, p. 7). An essential part of agency theory, is the conflict of interest that may arise in the relationship between the shareholders as principal and the management as the principal’s agent (Goergen, 2012, p. 7). Agency theory concerns the alignment of

the motives and goals of the principal and the agent, in order to avoid a situation where the agent puts his or hers interest before the best interest of the shareholder. The board of directors is responsible for solving potential conflicts between the shareholders and the management. This can involve replacing managers that are not acting in accordance with the best interest of the shareholders (Carter et al., 2003, p. 37). A critical factor for boards to protect the shareholder's interests, is to have non-executive board members. Carter et al. (2003) find that board independence increases with diversity, which again reveal how the gender composition affect good corporate governance.

3.4 Gender Diversity

3.4.1 Drivers of gender diversity

The gender, racial and cultural composition of the board of directors is deemed to be one of the most significant governance issues facing the modern corporation's managers, directors and shareholders (Carter et. al., 2003, p. 34). The real motivation underlying the increased focus on board diversity is however ambiguous. Karen J. Curtin, former executive vice president of Bank of America states that "There is real debate between those who think we should be more diverse because it is the right thing to do, and those who think we should be more diverse because it actually enhances shareholder value. Unless we get the second point across, and people believe it, we're only going to have tokenism" (Brancato and Patterson, 1999). Zhu, Small, and Flaherty (2010, p. 155) points out that the discussion around female board participation often focuses on the potential benefits of adding heterogeneity to a board that may increase firm value relative to tokenism. Campbell and Mínguez-Vera (2010, p. 43) divide the arguments for female representation into ethical and economic reasons, in line with the previous arguments made. Ethical arguments are based on equality and morality issues, whereas economic reasons comprise the concern of selecting the most qualified candidates for the board of directors, to assure high financial performance. Whether or not there is a "business case" reasoned by economic arguments for a gender diversity policy in the boardroom will be investigated in this paper.

3.4.2 The theoretical effect of gender diversity on financial performance

The motivation for examining the link between gender diversity in top management positions and financial performance can both be theoretical and empirical. In theory, board diversity is expected to affect the performance of the firm. This effect can however be both negative and positive according to existing theory (Smith et al., 2006, p. 586). Underlying the following arguments, it is assumed that men and women generally possess fundamental different qualities.

Campbell and Minguez-Vera (2008, p. 439-440) and Carter et al. (2003, p. 36-37) argues that greater board diversity increases the competitive advantage of a company due the following, basing their arguments on the conceptual reasoning offered by Robinson and Dechant (1997). (1) Board diversity increases the understanding of the marketplace by mirroring the gender composition of the board to that of its customer base and employees. This is argued to facilitate successful market penetration. (2) Creativity and innovation is systematically positively linked to gender diversity. (3) A greater variety of perspectives in a heterogeneous board has the potential to enhance the ability to solve problems and make decisions, as it increases the number of alternatives that are taken into consideration.

Additionally, heterogeneity in the boardroom may be a factor to avoid group thinking (Rhode and Packel, 2014, p. 393). The corporate image may improve as a consequence of a more gender diverse board. This may have a positive effect on customer behavior, leading to increased financial performance (Smith et al., 2006, p. 571). This argument connects the concept of tokenism relative to economic motivation for increased diversity, suggesting that regardless of the underlying motivation, board diversity may affect financial performance in a positive manner. Under the common argument of work disadvantages facing minorities such as women in this setting, it is suggested that women must outperform many male counterparts in order to achieve top management positions and achieve promotions. This suggests high competence of the female representatives in such positions (Erhardt, Werbel and Shrader, 2003, p. 109). The International Finance Corporation (2014) indicates that increased gender diversity may improve employee and customer satisfaction, induce higher confidence among investors and improve the reputation of a corporation. These factors may improve both financial performance and shareholder value.

There are also arguments suggesting that board heterogeneity may lead to reduced firm performance. The decision-making process may become more time-consuming and less effective due to the increased number of opinions and alternatives that are being evaluated. This furthermore increases the possibility of conflicts in the boardroom, enhancing the sluggishness of decision-making (Hambrick, Cho and Chen, 1996). A homogeneous board is furthermore assumed to be more cooperative and encounter less emotional conflicts (Williams and O'Reilly, 1998).

Based on theory, the issue regarding financial performance in relation to gender diversity on boards remains unresolved, and thus no specific outcome of such studies is to be expected a priori (Smith et al. 2006, p. 571; Campbell and Minguez-Vera, 2008, p. 441).

3.4.3 Gender diversity in Norway

Despite women's higher education level and their increasing share of the workforce, they are remarkable underrepresented on boards and in senior management positions. As the attention to gender diversity on boards and in top management has increased the later years, many countries have introduced quotas to increase the share of women's representation (Rhode and Packel, 2014, p. 378). The Norwegian government found the unbalanced gender compositions unhealthy, and saw the necessity of including more women in boards and top management to strengthen the social development. Introducing the legislation of a more diversified board will make use of women as resources and the competence they possess, as well as increase women's position in the Norwegian business, increase equality and democracy, and boost corporation's competitiveness (Ot.prp. nr. 97, 2002-2003, p. 6). The law was introduced in 2006, but gave the companies a period of two years to fulfill the quota. However, the legislation has faced some criticism, including the Confederation of Norwegian Enterprise (NHO). NHO argues that it is unlikely that a legal restriction will improve the corporate boards. Further, they state that the owners are most suited to elect the board of directors. Even though they criticize the quota, they suggest other alternatives to ensure female representation. They rather recommend the use of programs to encourage gender diversity in establishments and management (NHO, 2011, p. 11).

The share of women in the Norwegian workforce is considered to be high compared to other countries, and the last 43 years show a significant increase in the female participation in the workforce. By 2015, 68.3% of women were represented, indicating an increase of 26.3 percentage points since 1972. On the other hand, 73.9% of Norwegian men were in the workforce in 2015, a decline of 4.2 percentage points since 1972 (Statistics Norway, 2017a). The sharp increase in female participation in the workforce is however not reflected in the female representation in senior positions. By 2015, women held 34.9% of the management positions in Norwegian companies, whereas men held the rest. These numbers have been quite stable since 2008 (Statistics Norway, 2017b).

In Norwegian non-listed companies, 18.2% of the board directors are women. The share of women has been slightly increasing in these companies the last ten years. In listed companies, 41.6% of the board directors are women. The legislation of the gender diversity quota took effect in 2008, leading to a significant increase in the share of women on boards observed this year. The CEO positions in Norwegian non-listed and listed companies are clearly overrepresented by men by 84% and 92.8%, respectively (Statistics Norway, 2016).

4. Literature review

4.1 Empirical results

A positive link between board diversity and financial performance is presumed by several corporate managers and others interested in good governance (Carter et al., 2003, p. 35). The substantial literature on the concept of gender diversity does however not lead to clear conclusions (Christiansen et al., 2016, p. 7). Smith et al. (2006) reports an association ranging from none to positive depending on the degree qualification of the female top managers for a Danish sample. Bøhren and Strøm (2010) however observe a negative association between high gender diversity and high value creation for Norwegian listed non-financial companies. Carter et al. (2003) find a statistically significant positive relationship between the presence of women on the board and firm value, measured by Tobin's Q. McKinsey & Company (2007) conducted a study on 89 European listed

companies, and documented that companies with the most gender diverse management teams outperformed the average in the sector in terms of financial performance. The result of the study was significant, but does however not demonstrate causality. Terjesen, Couto and Francisco (2015) base their research on 3876 different companies across 47 countries, and conclude with a positive relationship between a higher amount of female directors and firm's performance. The performance is measured by Tobin's Q and ROA. In addition, their research finds that larger boards and firms in complex environment are more likely to have female directors in the boardroom. Other studies do not lead to clear conclusions, illustrated by Adams and Ferreira (2009) that conclude that the true relationship between board diversity and financial is complex, and find a positive relationship under certain conditions, and a negative association under other in U.S. public companies. See Appendix 1.

The mixed results may be explained by the different methodology used, different time periods, countries, types of company, economic environment, as well as the variable used for measurement of financial performance (Rhode and Packel, 2014, p. 390).

4.2 IMF Working Paper. Gender Diversity in Senior Positions and Firm Performance: Evidence from Europe

Christiansen et al. (2016) assesses the connection between gender diversity in top management and on boards and financial performance. Female representation is measured as the share of women in the company board or the senior management. Financial performance is measured by ROA, calculated in three different ways:

1. Net income over total assets
2. Profits before taxes (PBT) over total assets
3. Earnings before interest and taxes (EBIT) over total assets

The research is based on a data sample of 2 million European companies across 34 different countries in 2013. The companies in question are both listed and non-listed, and comprise at least two female members in the board or in the senior management.

A positive correlation between a larger share of women in senior positions and high ROA is found. It is further documented that replacing one man by a woman

in the senior management is associated with 8-13 basis points higher ROA. The results are more significant in sectors where women dominate the work force. Further, companies within knowledge intensive and high-technology sectors tends to have a more positive effect on financial performance when increasing the share of women in senior management. This is explained by the required creativity and critical thinking within these sectors, which is often associated with gender diversity.

5. Model

The dataset used for this research is ordered from Centre for Corporate Governance Research (CCGR). The panel data comprise information for the time period 1994 through 2013. The results from Christiansen et al. (2016) is retrieved from 2013, thus this year will be of specific interest. The choice of year of comparison is however contingent on the research results. As mentioned initially, financial performance will be measured in terms of ROA, and the gender diversity of the board and top management will be measured by the percentage of female representation. Further, there is need for control variables, such as the size and age of the company, industry sector and size of the board or management entity.

The model formulation will be similar to that of Christiansen et al. (2016). They specify the following regression model:

$$y_{inc} = \beta * sh_wmn_{inc} + \gamma * x_{inc} + \alpha_{nc} + \varepsilon_{inc}$$

Where the symbols denote the following:

y_{inc}: ROA of firm i, in industry n, operating in country c

sh_wmn_{inc}: the share of women in senior positions

x_{inc} : firm-specific control variables. Size and age of the firm, the number of directors/senior managers, the log of tangible assets

α_{nc} : country-industry fixed effects to control for time-invariant differences of firm performance across industry-country pairs

ε_{inc}: standard errors, clustered at industry level

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Appendix 1

Financial performance and gender diversity							
Authors	Association	Region	Period	Type of companies	Number of firms	Performance measure	Topic
Bøhren and Strøm (2010)	Negative	Norway	1989–2002	Listed	129 - 203	(1) ROA (2) ROS (3) Tobin's Q	Governance and Politics: Regulating independence and diversity in the board room
Matsa and Miller (2009)	Negative	Norway and other Nordic countries	2006 and 2009	Listed and non-listed	1,620	ROA	A Female Style in Corporate Leadership? Evidence from Quotas
Christiansen et al. (2016)	Positive	34 European countries	2013	Listed and non-listed	2,000,000	ROA	Gender Diversity in Senior Positions and Firm performance: Evidence from Europe
Smith et al. (2006)	None to positive	Denmark	1993-2001	Listed and non-listed	2,500	(1) Gross profit/net sales. (2) Contribution margin/net sales. (3) Operating income/net assets. (4) Net income after tax/net assets.	Do women in top management affect firm performance?
Adams and Ferreira (2009)	Negative	U.S.	1996-2003	Listed	1,939	(1) Tobin's Q (2) ROA	Women in the board room and their impact on governance and performance
Terjesen et al. (2015)	Positive	47 countries worldwide	2010	Listed	3,876	(1) Tobin's Q (2) ROA	Does the presence of independent and female directors impact firm performance? A multi-country study of board diversity
Ahern and Dittmar (2012)	Negative	Norway	2001-2009	Listed	248	(1) Tobin's Q (2) ATO (3) Cumulative abnormal returns (4) Leverage	The changing of the boards: the impact on the firm valuation of mandated female board representation
Campbell and Minguez-Vera (2008)	Positive	Spain	1995-2000	Listed	68	(1) Tobin's Q (2) Cumulative abnormal returns	Gender Diversity in the Boardroom and Firm Financial Performance
Campbell and Minguez-Vera (2008)	Positive	Spain	1989-2001	Listed	4,050	(1) Tobin's Q (2) Cumulative abnormal returns	Female board appointments and firm valuation: short and long-term effects

ROA = Net Income/Book Value of Assets
Tobin's Q = Market Value/Book Value of Assets
ATO = Sales/Book Value of Assets
ROS = (Capital Gains + Dividends)/Market Value of Stock