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Exploring the Link Between Gender Diversity and Financial Performance on Norwegian Boards

Master Thesis

by

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MSc in Business with Major in Finance

Supervisor

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BI Norwegian Business School, Oslo,
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Abstract

In recent years, gender diversity has become a much-debated topic with regards to optimal board compositions. This paper studies the relationship between gender diversity on Norwegian boards and firms' financial performance. Using annual data for Norwegian firms from 2000 to 2020, we find that gender diversity on the boards of financial firms create more value for its owners. Our results suggest that gender diversity should be a priority when considering board compositions in financial firms. Contrarily, we find that gender-diverse boards in the overall industry decrease firm performance. However, as we only conduct this analysis from an economic point of view, other factors such as ethics and morality should be considered when constructing the ideal board.

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1.0 Introduction

Gender diversity has become a hot topic for policymakers and is being pushed forward as a part of companies' growing focus on ESG. In Norway in 2023, women are highly represented in the workforce, but only make up around 20% of board directors in private limited firms (SSB, 2023). This indicates that women are underrepresented across the Norwegian board of directors, despite the implementation of a mandatory gender quota law.

Board diversity is defined as the variety inherent in the board composition, which can be measured through factors such as age, ethnicity, gender, educational background, and experience (Campbell & Minguez-Vera, 2008). In our context we focus on gender diversity on the board, as this has become a much-debated topic.

Former Vice president of Bank of America, Karen J. Curtin, stated “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 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 brings attention to the issue of whether increasing board diversity is only for a symbolic purpose or for the actual purpose of increasing firm value.

Since the early 2000s, many companies as well as the government have introduced quotas for the minimum number of women a board should consist of (Ahern & Dittmar, 2012). Some are inclusive of gender diversity for economic benefit, believing diversity in the workplace will ensure higher financial performance for the firm. On the other hand, some are including gender diversity for ethical reasons, following equality and morality. They believe everyone should have the same opportunities regardless of gender. However, many companies do this in compliance with the laws of their nation, which require them to have a set percentage of women on their boards. These rulings are set in place by policymakers who see the benefits of women’s involvement in business leaderships.

Norway was the first country to mandate a gender quota for boards of directors. This law was passed in 2003 and officially enforced in 2008. It required all

publicly traded firms to have at least a 40% proportion of female members on the board of directors (Wang & Kelan, 2013). If firms did not comply, this would result in liquidation of the firm. Immediate results would be such as the companies giving in to pressure, and hiring women who were not necessarily qualified only to fill the criteria. However, we assume that the effects of this law have now stabilized.

According to the World Economic Forum's *Global Gender Gap Report* from 2022, Norway ranked third for having the highest level of gender equality. Furthermore, as of 2022, Norwegian boards possess the highest proportion of female board members with a 45% occupation of board seats in public limited companies, holding a 1st place ranking over Sweden and Denmark (SpencerStuart, 2022). Due to the large number of female representations on the boards in Norway, we deem it reasonable to base our research on this country. This comes as we are able to analyze the effects better within a country with a large representation of women, where they have been met with equal rights and respect for a longer time. This makes for better research grounds in comparison to a country with fewer female directors whose performance may be affected by a lack of role models.

The matter of gender diversity on boards is very relevant and highly researched due to the increased focus on gender equality in many different fields, including the corporate field. Moreover, gaining knowledge about the effect of different compositions of board members may help companies construct the ideal boards that will deliver the best results. As more countries are taking inspiration from Norway's gender quota laws, this is the perfect opportunity to research whether more gender diversity leads to an increase in economic results.

The main objective of this paper is to provide new evidence on the relationship between gender-diverse boards and firm performance in Norway. We run 2SLS regressions with fixed effects to investigate whether there is a relationship between the various measures of gender diversity and firm performance in the overall, non-financial and financial industry in between 2000 - 2020. Furthermore, we also investigate whether the results have changed in the period 2015 - 2020.

We find that the correlation is negative between gender diversity on boards and ROE in the overall- and non-financial industry between 2000 and 2020. However,

in the same period we also find that the relationship between ROA and gender diversity is positive and significant in the financial industry. In between 2015-2020, gender diversity does not have a significant effect on firm profits in any case. Furthermore, we find that these results are robust to alternative diversity measures.

In section 2 of this paper, we present the theory and literature related to the research question. In section 3 we lay out our hypothesis and our expectations. Sections 4 and 5 thoroughly describes the methodology we use to prepare the data in order to perform our analysis. Lastly, we present and conclude the results in sections 6 and 7.

2.0 Theoretical Background and Literature Review

According to studies performed by Campbell and Mignuez-Vera (2008), Carter et. al. (2003) and Robinson and Dechant (1997), heterogeneous boards enhance a firm's competitive advantage and value in many ways. Gender diversity creates an environment in the boardroom that promotes creativity and innovation as attitudes and beliefs are assumed to vary with gender. It makes way for a larger spectrum of perspectives and opinions that are taken into consideration when solving problems. However, it is mentionable that a less diverse board is assumed to be more cooperative and have fewer emotional conflicts in comparison to a more diverse board (William & O´Reilly, 1998). Even though diverse boards may lead to more time-consuming decision-making due to more alternatives and the increased likelihood of conflicts, they may also enhance the quality of the decisions that are being made. Lastly, it is suggested that diverse decision-making organs have a better understanding of the business environment as they possess a broader perspective in comparison to a less diverse board.

Furthermore, the principal-agent theory is often used as an argument for more gender diversity. This theory focuses on the conflicts that occur in organizations due to the contractual relations between the principal and the agent. These conflicts often occur due to the presence of asymmetric information and incomplete contracts that create differences in interests between the owners and

the managers. Such conflicts can be resolved through improving corporate governance structures, which will in turn reduce these costs and become important drivers of performance (Reguera-Alvarado et al., 2017). Accordingly, weak governance creates agency costs and has an undesirable impact on the firm's profitability (Core et al. 2006). The board of directors are crucial for coordinating the interests of shareholders and managers. Gender diversity on the boards can be utilized to lower agency costs as a more diverse board will provide a larger range of viewpoints and increase board independence. This will in turn increase the value of the firm (Hillman and Dalziel, 2003).

Siciliano (1996) and Robinson & Dechant (1997) find that heterogeneous boards have the benefit of several different director profiles that may be able to match and improve relations with competitors and customers, gaining information about the market, and have the potential access to finance. Hence, increased diversity can benefit firm performance.

The relationship between diversity on the board and a company's profitability has been studied for many years as it is argued that it can increase the effectiveness of boardrooms. Even though there has been a lot of research on this topic, which has used different performance measures and econometric approaches, the link remains unclear. Some of the previous studies have concluded that gender diversity positively contributes to better firm performance, some conclude that more women negatively affect the output while others state that there is no clear connection between the variables of interest.

Robinson & Dechant (1997) argue that more women on the board will lead to different skills, views, knowledge, and experiences. Consequently, it will lead to more creativity and business innovations and create a competitive advantage for the firm. These findings suggest that there should be a positive link between more gender diversity on the board and firm performance. This is what studies such as Campbell & Minguez-Vera (2008), Mahadeo et al. (2012) and Reguera-Alvarado et al. (2017) conclude. These studies determine that there exists a positive relationship between the number of females on the board, Tobin´s Q (a proxy for firm value) and ROA. Campbell & Minguez-Vera (2008) and Reguera-Alvarado et al. (2017) used data from Spanish companies up until 2009, while Mahadeo et al. (2012) used 2007 data from Mauritius. The researchers explain this positive

link by arguing that board diversity brings new ideas, different skills, and new perspectives (Reguera-Alvarado et al., 2017). Additionally, the researchers believe that gender balance contributes more to firm value than only focusing on the presence of women (Campbell & Minguez-Vera, 2008). Although these results may look promising, studies conducted elsewhere have concluded differently.

Chapple & Humphrey (2014) conclude that more diversity does not have a direct effect on firm performance. The authors have used data from Australia (2004-2011) to argue that diverse boards do not lead to better or worse portfolio performances. It is mentionable that these results might be affected by the fact that only a small percentage of Australian boards include women. Therefore, these results may not be true for Norwegian firms, as the percentage of female directors is remarkably higher.

Previous studies on Norwegian firms have concluded that there is a negative link between firm performance and gender diversity in the boardroom (Bøhren & Strøm, 2010; Ahern & Dittmar, 2012). These authors argue that Tobin´s Q declined as a result of the gender quota law passed in 2003 (Ahern & Dittmar, 2012) and that heterogeneous boards are less effective decision makers (Bøhren & Strøm, 2010). Similarly, Earley & Mosakowski (2000) have concluded that homogeneous groups perform better as they communicate more often due to similar interests. However, these conclusions may change when using newer data, different inputs, and methods.

Another reason why some results could be negative may be explained by the Glass Cliff theory presented by Ryan & Haslam (2006). This theory in essence suggests that women are more likely to find themselves promoted under difficult circumstances for the firm, when the firm is already on the verge of failure. Hence, they will be the leaders of companies that have a history of poor performance. This way they are set up for failure and their actual effect on firm performance would not be correctly represented in the data.

Furthermore, Ahern & Dittmar (2012) find that new female directors were on average 8 years younger than their average male counterparts along with being more educated but had less CEO experience. As they were considerably younger when becoming directors, they would have less experience both as CEOs and in

corporate roles which in turn may have led to less optimal performance in comparison to the existing male directors.

In previous studies, many different econometric approaches have been used. To mention some, we have the two-stage instrumental variable (IV) regression (Reguera-Alvarado et al., 2017) and ANOVA test (Bøhren & Strøm, 2010). The majority of previous studies assume a linear relationship between diversity and performance, while many of the newer ones assume a non-linear relationship (Joecks et al., 2013; Konrad et al., 2008; Torchia et al., 2011). These typically use standard OLS and RE regressions with dummy variables. At the same time some studies use a stock portfolio performance approach and test the relationship using factor models (Chapple & Humphrey, 2014).

In the later years there has been an increasing number of female leaders in Norwegian firms; in 2020, 44% of the board members were women (Spencer Stuart, 2020). Ahern & Dittmar (2012) look at performance from 2001 - 2009, but they are aware that their results may be affected by the passing of the gender quota law in 2003 and the official enforcement in 2008.

Furthermore, Ahern & Dittmar (2012) expected some firms would change from ASA to AS in order to avoid the legislation, as the law only applies to ASA. In fact, they find that the number of public limited firms in Norway in 2009 is less than 70% of the same number in 2001. Additionally, they find that the number of private limited firms increase by over 30%. Therefore, our study includes both enterprise types, as only using ASA in the regression might produce biased results while including both enterprise types might provide more reliable results. Our research will reveal whether the results are different now that the effects of the law are more stabilized in comparison.

Our work contributes to the existing literature in several ways. First, it adds to the scarce empirical evidence on the topic in Norway. This study includes a larger time sample and more performance measures compared to earlier studies. The larger sample will make it possible to check whether the relationship between gender diversity and economic performance has changed over the years. Secondly, it studies more recent and uninterrupted data that is not affected by any new exogenous laws or regulations, while the previous research in Norway is based upon older data that might be affected by the introduction of the gender

quota law. Moreover, unlike Ahern & Dittmar (2012) and Bøhren & Strøm (2010), this study includes both listed, unlisted firms, private and public limited firms as well as it distinguishes between financial and non-financial firms.

3.0 Testable Hypothesis

Some studies suggest that heterogeneous boards make better choices due to access to a larger variety of ideas (Robinson & Dechant, 1997). This indicates that there should be a positive correlation between gender diversity on boards and firm profits. However, if the decision is motivated by social pressure to provide equality between both genders or by the restrictions from the government to have a certain number of women on the board, one should not expect a positive correlation.

We hypothesize that the results of our regression should point towards a positive relationship between gender diversity and firm profits. This comes as we are working with larger data samples than earlier studies and as the effects of the gender quota law should have settled. We expect to see a positive correlation between gender diversity, ROE and ROA. However, in line with Ahern & Dittmar (2012), we expect the effect of increased gender diversity on Norwegian boards to be smaller compared to other nations that have a less progressive stance on gender equality.

Hence, we have constructed the following hypothesis:

> H_0^1*: More gender diversity on boards leads to a significant increase in firm profitability*

while the alternative hypothesis then becomes

> H_A^1*: More gender diversity on boards leads to a significant decrease in firm profitability*

Additionally, we look into the differences in correlation between gender and firm profits in the overall industry, non-financial and in the financial industry. This comes as the finance industry is known to be a male dominated field (Statistics Norway, SSB). Different results are expected as the finance industry is characterized by more knowledge-intensive work and requires complex tasks to

be performed. These types of industries are characterized by the need for innovative ideas and critical thinking which both can be accessed through increased diversity on the board, as mentioned above. We hence expect that an increase in gender diversity would result in an increase in firm profits within this industry. This will make our hypothesis about the true effect of gender diversity on boards consistent.

As this industry started with low diversity, we expect a stronger positive and significant correlation between gender diversity and profitability in financial firms with increased gender diversity.

Our hypothesis for the finance industry is

> H_0^2*: More gender diversity on the financial boards lead to a significant increase in firm profitability*

while the alternative hypothesis is that

> H_A^2*: More gender diversity on the financial boards lead to a significant decrease in firm profitability*

We expect stronger associations when regressing between 2015 and 2020 as the effects of the gender quota law will have stabilized and leaders would have been chosen based on their skills instead of as a tool for filling the quota.

4.0 Methodology

In this study, two-stage least squares (IV) panel regressions with fixed effects are performed to analyze the effects gender diversity on boards might have on ROE and ROA. We examine whether different measures of gender diversity in a company's board significantly affects their financial performances. Furthermore, we test whether the results vary across financial and non-financial industries, as well as across the years.

We define the model including firm-specific control variables such as ROE, ROA, firm age (COMPAGE), board characteristics such as board size (BSIZE), percentage of fixed assets (ASSETS), and board gender diversity (GENDER). Additionally, the variation in gross domestic product (GDP) is included to capture the general trend in the Norwegian economy. We describe our variable constructions in the next sections.

4.1 Model

$$ROE_{it} = \beta_1 \, x \, \widehat{GENDER} + \beta_2 \, x \, BSIZE + \beta_3 \, x \, GDP + \beta_4 \, x \, COMPAGE + \beta_5 \, x \, ASSETS + \beta_6 \, x \, LEVERAGE + \beta_7 \, x \, ROE_{t-1} + \mu_i + \lambda_t + \varepsilon_{it}$$

$$ROA_{it} = \beta_1 \, x \, \widehat{GENDER} + \beta_2 \, x \, BSIZE + \beta_3 \, x \, GDP + \beta_4 \, x \, COMPAGE + \beta_5 \, x \, ASSETS + \beta_6 \, x \, LEVERAGE + \beta_7 \, x \, ROA_{t-1} + \mu_i + \lambda_t + \varepsilon_{it}$$

Variable description:

GENDER	Consists of percentage women, Blau index and Shannon index
BSIZE:	Board size. Number of members in the boardroom
GDP:	Annual variation in gross domestic product
COMPAGE:	Numbers of years since establishment of the company
ASSETS:	Fixed assets as percentage of total assets
LEVERAGE:	Leverage ratio as debt over assets
ROE_{t-1}:	The lagged ROE from the previous year
$\mu_i + \lambda_t$:	Industry and time fixed effects, respectively
ε_{it}:	Error term

4.2 Variable Description

In order to measure financial performances, we use accounting measures (ROA and ROE) as our dependent variables. These are defined as the firm's net income divided by their average total assets and average total equity book values, respectively.

$$ROA = \frac{Net\ Income}{\left(Total\ Assets_t + \ Total\ Assetst_{t-1)}\right)/2}$$

$$ROE = \frac{Net\ Income}{\left(Total\ Equity_t + \ Total\ Equity_{t-1)}\right)/2}$$

Most of the previous literature on this topic has used either Tobin's Q as a measure of firm profitability, such as Ahern & Dittmar (2012) and Campbell & Minguez-Vera (2008) have done, while other studies such as Mahadeo et al. (2012) and Adams & Ferreira (2009) choose accounting measures such as ROE and/or ROA. In alignment with the latter mentioned studies, we choose to measure firm performance through ROE and ROA. This allows us to include both listed and unlisted firms, as Tobin's Q would limit the samples to listed firms that have publicly available information in order to calculate the firm’s replacement costs.

In order to capture gender diversity, we use different measures: the percentage of females on the board and the Blau Index of heterogeneity. Additionally, we use the Shannon diversity index in order to test whether the relationship between gender diversity and firm performance remains robust when using a different measure. This division of the diversity measures align with previous literature, such as Reguera-Alvarado et al. (2017) and Campbell & Minguez-Vera (2008).

The values of the Blau index will vary from a minimum of 0 to a maximum of 0.5 if the board consists of an equal number of men and women. The Shannon index

will be 0 if there is no diversity on the board and approximately 0.693 if the presence of both genders is equal. Due to the Shannon Index being a logarithmic measure of diversity, it is more sensitive to differences in the gender composition of boards and yields a higher number than the Blau Index. Stirling (1998) argues that diversity consists of two attributes; variety and balance, where the first refers to the consideration of both gender categories and balance refers to the evenness of the distribution of board members in the categories. Therefore, both Blau and Shannon indexes are included in order to capture this "dual concept" of diversity.

In addition to the diversity measures, we have defined six other control variables. In accordance with previous literature (e.g., Adams & Ferriera, 2009; Lückerhart-Rovers, 2011; Joecks et al., 2013) the board size is included. Empirically, it has been shown that there is an inverse relationship between board size and firm profitability, as smaller boards might be more effective due to fewer communication and coordination challenges (e.g. Guest, 2009; Jensen, 1993). Hence, it is expected that the estimated coefficient for board size is negative. Firm age is also included as a control variable as increased firm age might indicate that the firm is more well-established and well-known, which in turn could indicate higher returns.

Percentage of fixed assets is included as a measure of firm size and is defined as the ratio between fixed assets and total assets. As historical values of ROE and ROA can somewhat forecast new values, we also choose to include the lagged values as control variables, in line with Adams & Ferreira (2009). As our model includes lagged variables, our regression period starts from 2001 instead of 2000.

As returns on assets as well as equity are somewhat affected by macroeconomic trends in the economy, we include variation in GDP as another control variable. Previous studies such as Trujillo-Ponce (2012) support this as they have revealed a positive relationship between GDP growth and ROE and ROA. Lastly, we include leverage in line with Campbell and Minguez-Vera (2008) as it is known to affect firm performance.

4.3 Instrumental Variable Method

Previous literature, such as Adam & Ferreira (2009), Campbell & Minguez-Vera (2008) and Srindihi et al. (2011), has found that the relationship between gender diversity and firm financial performance is subject to endogeneity and causality problems. In order to address these problems, we choose to do a 2SLS regression.

The percentage of women on the boards, and thus also Blau and Shannon indexes, are believed to be endogenous variables. Therefore, these can be estimated using an instrumental variable (IV). The inclusion of IVs will help control for unobserved heterogeneity or potential omitted variable bias related to the number of females on the board. As it is reasonable to believe that the percentage of women is affected by the mandatory 40% quota, this can be used as an IV. We define IV_LAW as a dummy variable that takes a value of 1 if the enterprise type is ASA and the year is beyond 2008, and 0 otherwise. This IV is correlated with the percentage of women, Blau and Shannon indexes, and is essentially uncorrelated with firm performance.

Furthermore, a first-stage regression is performed to determine the relationship between the percentage of women, the Blau and Shannon indexes, and the instrumental variable. To do this, the endogenous variables are regressed on IV_LAW to obtain the predicted values through an OLS regression. In the second stage regression, we use the predicted values from the first-stage regression as an independent variable to investigate the causal relationship between financial performance and the control variables.

<u>First stage regression</u>

(i)

$$GENDER = \beta_0 + \beta_1 x\ IV_{LAW} + \varepsilon_1$$

The endogenous variable GENDER consists of three proxies of gender diversity: percentage of women, Blau and the Shannon index.

Second stage regression

(ii) I.

$$ROE_t = \alpha + \delta_1 \, x \, \widehat{GENDER} + \delta_2 \, x \, BSIZE + \delta_3 \, x \, GDP + \delta_4 \, x \, COMPAGE + \delta_5 \, x \, ASSETS + \delta_6 \, x \, LEVERAGE + \delta_7 \, x \, ROE_{t-1}$$

(ii) II.

$$ROA_t = \alpha + \delta_1 \, x \, \widehat{GENDER} + \delta_2 \, x \, BSIZE + \delta_3 \, x \, GDP + \delta_4 \, x \, COMPAGE + \delta_5 \, x \, ASSETS + \delta_6 \, x \, LEVERAGE + \delta_7 \, x \, ROA_{t-1}$$

There are also alternative research methodologies that can be implemented. Mahedeo et al. (2012) and Joecks et al. (2013) carry out an ordinary least squares (OLS) regression analysis, while other studies, such as Chapple & Humphrey (2014), use a stock portfolio approach using a four-factor model.
We, in line with Adams & Ferreira (2009), Reguera-Alvarado et al. (2015) and Campbell & Minguez-Vera (2008), believe that the IV methodology is best suited for our data. This methodology addresses the challenges that are present in our data sample, such as omitted variable bias and the endogeneity problem that arises due to reverse causality between ROA and gender diversity.

Our data sample includes many firms that differ in size and profitability; hence it might make more sense to look at the within-firm variation as opposed to the between-firm variation. The inclusion of fixed effects will reflect the characteristics at the firm level and generate more accurate estimates while avoiding omission bias (Reguera-Alvarado et al., 2015).

In order to find if the optimal estimation method includes fixed or random effects, we run a Hausman test. The results reveal a large test statistic and a low p-value which is significant at the 1% level, therefore we reject the null hypothesis that there is no correlation between the fixed effects term and the other control variables. Accordingly, we choose to include fixed effects as the Hausman test reveals this to be the most suitable estimation method.

4.4 Clustered Standard Errors

In accordance with Ahern & Dittmar (2012) we use clustered standard errors, as ROE and ROA for a specific company are believed to be correlated over time. According to Bertrand et al. (2004), this approach will account for the serial correlation in the time series of within-company variation. Ignoring the correlation within each cluster (company) may lead to inaccurate results; abnormally low standard errors and narrow confidence intervals resulting in high t-statistics and low p-values. Therefore, we cluster based on the company IDs to reduce the chances of committing Type-I-errors.

If the results of the main regressions estimate positive and significant coefficients for the gender diversity measures, the Blau and Shannon indexes, we can conclude that more gender diversity on boards leads to better financial firm performance. Furthermore, a finding of any effect, positive or negative, would verify that board composition influences firm performance.

5.0 Data

Our dataset consists of unbalanced data retrieved from the *Centre for Corporate Governance Research* (CCGR). CCGR mainly focuses on non-listed firms, family firms, and the corporate landscape of Norway. Their database contains unusually detailed ownership data for listed firms and high-quality accounting data for Norwegian firms. It also contains data that reflects institutional environments that are unique internationally i.e., the mandatory representation of employees and females on the board.

The sample comprises Norwegian firms from the years 2000-2020, which provides us with data on around 200,000 unique companies each year. This data contains information on the enterprise type, company IDs, industry codes, company age, board size, number of female directors and balance sheet values on assets, net income, and equity each year.

We extract public limited companies (ASA) and private limited companies (AS). Much of the previous research done on this matter in Norway is limited to either public limited firms or only listed firms. As this study uses listed, non-listed,

private, and public limited companies, it differentiates and strengthens our study from others.

We choose to define our dependent variables (ROE and ROA) as the firm's net income divided by their average total equity and average total assets book values, respectively, which we calculate by using existing data, as shown earlier. We then combine the files containing data from each year and lag the variables total assets, total equity, ROE, and ROA.

Furthermore, we use our data on the composition of the boards to calculate the percentage of females, which is again used to calculate the Blau and Shannon indexes.

The Blau Index is defined as:

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

The Shannon Index is defined as:

$$H = -\sum_{i=1}^{n} p_i \ln p_i$$

Where p_i, in both formulas, denotes the percentage of board members in each category (two categories: men and women).

Taking the fixed assets and dividing it by the total assets we find the percentage of fixed assets. Additionally, we get GDP values from the National Statistical Institute of Norway (SSB), in order to capture the general trend in the Norwegian economy and add it to our dataset. Using asset and equity data we calculate leverage as debt over assets and add this to our dataset as additional explanatory variables.

In order to see the differences between the financial industries and non-financial industries, two subsets are created to run the regressions. The subsets are based on the firm's industry codes. All financial industries (with industry codes 64-69) are put in one subset, while the rest of the industries are in the other subset.
Also, new subsets are created to test whether the results are consistent with the newer data from 2015-2020.

5.1 Descriptive Statistics

We start with 4,272,915 observations distributed among 11 variables received from CCGR. In order to avoid inconsistencies in our data, we choose to drop the firm-year observation for the variables if some of the variables of interest are not available, in accordance with Ahern & Dittmar (2012). As our research is based on the percentage of women on the boards, we filter out any companies that have a board size of 0. As we are using lagged variables, the regression will only make use of data from 2001-2020, hence leaving out the year 2000. After calculating our variables of interest and adding them to our dataset, this leaves us with 26 variables and 3,647,841 observations.

The data provided is later split into financial and non-financial industries. The finance industry includes 918,030 observations while the rest of the industry has 2,729,811 observations. Furthermore, we create a subset containing data from 2015-2020 which includes 1,368,374 observations.

Table 1 provides a summary of the dependent variables in our dataset from 2000-2020. Although the percentage of women on Norwegian boards has increased since the introduction of the gender quota law (see *Figure 1*), the number remains small at only 16% on average. *Table 1,* in line with Joecks et al. (2013) and Reguera-Alvarado et al. (2017), confirms the underrepresentation of women in the boardrooms. As can be seen in *Figure 1,* the presence of women only drastically increased after 2008 for public limited firms (ASA) that are subject to the law, and not for the private limited firms (AS). The number of women on Norwegian boards in ASA increased by almost 24 percentage-points from 2005-2008, while the increase in AS was only 1 percentage-point. The composition of the boards of directors each year is given in *Appendix 1.1-1.3*. These statistics demonstrate that

the presence of women on boards is still small, despite the introduction of the mandatory gender quota law.

Table 1: Summary Statistics

Variable	Mean	Median	Standard deviation	Minimum	Maximum
Female %	0.16	0.00	0.29	0.00	1.00
Blau	0.10	0.00	0.19	0.00	0.50
Shannon	0.14	0.00	0.27	0.00	0.69
Board size	2.14	2.00	1.36	1.00	16.00
Company age	12.05	8.00	12.51	0.00	173.00
Lag_ROE	0.28	0.12	1.11	- 6.75	7.37
Lag_ROA	0.01	0.00	0.87	- 34.89	34.94
GDP	0.01	0.01	0.01	- 0.02	0.04
Leverage	0.84	0.68	1.79	- 26.00	34.77
Fixed assets %	0.41	0.30	0.37	- 0.68	1.49
Observations: 3,647,841					

Table 2 shows the Pearson correlation coefficients for the independent and dependent variables in our main dataset from 2000-2020. The most relevant relationships appear between the board size and the gender diversity measurements. It is revealed that a larger board increases the probability of gender diversity. As expected, the three measures of gender diversity (percentage of females, Blau and Shannon index) are highly correlated with each other. The correlation between the gender diversity proxies does not disturb our results, as we control for multicollinearity by running separate regressions for the different proxies. The remaining variables are not significantly correlated.

Table 2: Correlation Matrix

Variable	Female %	IV LAW	Blau	Shannon	Board size	Company age	Lag_ROE	Lag_ROA	GDP	Leverage	Fixed assets %	ROE	ROA
Female %	1.0000												
IV LAW	0.0234	1.0000											
Blau	0.4898	0.0546	1.0000										
Shannon	0.4870	0.0541	0.9993	1.0000									
Board size	0.0846	0.0748	0.4220	0.4340	1.0000								
Company age	0.0341	0.0268	0.1026	0.1047	0.1175	1.0000							
Lag_ROE	-0.0006	-0.0009	-0.0018	-0.0018	-0.0014	-0.0022	1.0000						
Lag_ROA	-0.0002	0.0000	-0.0002	-0.0002	-0.0005	0.0003	0.0002	1.0000					
GDP	-0.0094	-0.0092	0.0083	0.0089	0.0405	0.0078	0.0000	0.0000	1.0000				
Leverage	-0.0024	-0.0003	-0.0027	-0.0027	-0.0023	-0.0002	0.0001	-0.0022	0.0002	1.0000			
Fixed assets %	-0.0301	0.0111	0.0116	0.0122	0.0274	0.0104	-0.0041	-0.0002	-0.0090	-0.0074	1.0000		
ROE	-0.0009	-0.0002	-0.0019	-0.0019	-0.0009	-0.0018	0.0099	0.0000	0.0000	-0.0001	-0.0036	1.0000	
ROA	-0.0003	0.0000	-0.0003	-0.0003	-0.0005	0.0001	0.0000	-0.0010	-0.0001	0.0140	-0.0003	0.0003	1.0000

6.0 Results and Analysis

All the tests are conducted using 2SLS IV regression with clustered standard errors and fixed effects. The main results of the second-stage regressions for ROE and ROA in the overall, financial and the non-financial industry are presented in *Tables 3-6,* respectively. The overall industry consists of both financial and non-financial firms.

6.1 The Overall Industry

When testing the effects of gender diversity on ROE and ROA in the overall industry between 2000 and 2020, we obtain the results as shown in *Table 3*.

The results indicate that gender diversity, measured through the Blau index, has a negative impact on ROE contrary to our hypothesis as these coefficient estimates are negative and significant at the 5% significance level. The coefficient for female percentage on boards is also negative for ROE, although not significant. We do not obtain any significant coefficients for the gender diversity measures for ROA when looking at the industries combined.

The results also reveal that company age and percentage of fixed assets are highly negatively correlated with ROE. In line with Guest (2009), we observe that the coefficient for board size is inversely associated with ROE and ROA, however it is not statistically significant at the 10% level.

Table 3: The effect of gender diversity in all industries on ROE and ROA (2000-2020)

	Overall Industry 2000-2020			
	ROE		ROA	
Explanatory variable				
Female %	-	-0.11743	-	-0.01654
		(0.09000)		(0.03810)
Blau	-0.25853 **	-	0.07984	-
	(0.11922)		(0.10915)	
IV law	-0.08127	-0.07512	0.09472	0.09209
	(0.29958)	(0.29966)	(0.12499)	(0.12298)
Board size	-0.00579	-0.00757	-0.06844	-0.06771
	(0.00867)	(0.00871)	(0.05150)	(0.05092)
Company age	-0.00259 ***	-0.00257 ***	0.00259 ***	0.00260 ***
	(0.00082)	(0.00082)	(0.00040)	(0.00039)
Lag ROE / ROA	0.01085 ***	0.01086 ***	-0.00094 ***	-0.00094 ***
	(0.00411)	(0.00411)	(0.00036)	(0.00036)
Fixed assets %	-0.12475 ***	-0.12470 ***	-0.06931	-0.06936
	(0.03440)	(0.034383)	(0.09120)	(0.09124)
Leverage	-8.07e-06 **	-8.11e-06 **	0.00799	0.00799
	(4.08e-06)	(4.07e-06)	(0.00892)	(0.00892)
GDP	-0.03104	-0.02623	-1.68643	-1.69392
	(0.74602)	(0.74643)	(2.23387)	(2.23855)
***R*^2**	0.000115579	0.00001157562	0.0001962514	0.0001962498

*, ** and *** represents significance at 10%, 5% and 1% level, respectively
Standard errors in paranthesis

6.2 The Financial Industry

Table 4 shows the results when regressing the profit measures on gender diversity in only the financial industry between 2000-2020. We observe that, in line with our hypothesis, the effect of gender diversity on ROA is positive and significant for financial firms at the 5% level. Furthermore, we assumed that the effect would be greater in the financial industry compared to the non-financial industry, this is shown to be true for ROA between 2000-2020, but not for ROE. However, contrary to the results from the overall industry the effect on ROE in the financial industry is non-significant.

Furthermore, we hypothesized that the effect of gender diversity would be greater in the financial industry compared to the non-financial industry. This is shown to be true for ROA between 2000-2020, but not for ROE. In line with our second hypothesis, ROA in the financial industry is positively and significantly affected by more gender diversity. Although, this result only holds true for the period 2000-2020 and not for the newer sample.

Table 4: The effect of gender diversity in financial firms on ROE and ROA (2000-2020)

	Financial Industry 2000-2020			
	ROE		ROA	
Explanatory variable				
Female %	-	-0.21513	-	0.02565
		(0.14749)		(0.03171)
Blau	-0.20730	-	0.08397 **	-
	(0.26487)		(0.04240)	
IV law	-0.25417 ***	-0.25167 ***	0.00134	-0.00040
	(0.092131)	(0.09351)	(0.03140)	(0.03126)
Board size	0.02574	0.02492	-0.01915 ***	-0.01860 ***
	(0.02224)	(0.02273)	(0.00571)	(0.00564)
Lag ROE / ROA	-0.00241 ***	0.00465 ***	0.03797 ***	0.03797 ***
	(0.00149)	(0.00149)	(0.01168)	(0.01170)
Company age	0.00465 **	-0.00239 **	0.00046 *	0.00046 *
	(0.00117)	(0.00117)	(0.00028)	(0.00028)
Fixed assets %	-0.20750 ***	-0.20747 ***	-0.00721	-0.00729
	(0.06740)	(0.06739)	(0.012459)	(0.01246)
Leverage	-8.04e-06	-8.06e-06	-0.00447 ***	-0.00447 ***
	(9.10e-06)	(9.11e-06)	(0.00149)	(0.00149)
GDP	-1.11930	-1.12070	0.24851	0.24924
	(1.53470)	(1.53440)	(0.79693)	(0.79695)
***R*^2**	5.682989e-05	5.737839e-05	0.02727919	0.02727841

*, ** and *** represents significance at 10%, 5% and 1% level, respectively
Standard errors in paranthesis

6.3 The Non-financial Industry

Our results from testing the effect of gender diversity in the non-financial industry between 2000 – 2020 are shown in *Table 5.* When removing the financial firms from our sample, the result from the overall industry regression still holds true. Gender diversity is still negatively associated with ROE as Blau is significant at the 5% level, contrary to our hypothesis. None of the gender diversity measures have a significant effect on ROA.

Table 5: The effect of gender diversity in non-financial firms on ROE and ROA (2000-2020)

	Non-financial Industry 2000-2020			
	ROE		ROA	
Explanatory variable				
Female %	-	-0.10689	-	-0.02993
		(0.11385)		(0.05418)
Blau	-0.32920 **	-	0.06270	-
	(0.13834)		(0.14680)	
IV law	-0.03409 **	-0.02623	0.13987	0.13776
	(0.41682)	(0.41695)	(0.18821)	(0.18579)
Board size	-0.01312	-0.01528	-0.08587	-0.08532
	(0.00939)	(0.00940)	(0.07042)	(0.06975)
Company age	-0.00281 **	-0.00280 **	0.00332 ***	0.00333 ***
	(0.00109)	(0.00109)	(0.10860)	(0.108662)
Lag ROE / ROA	0.01276 **	0.01276 **	-0.00099 ***	-0.00099 ***
	(0.00541)	(0.00541)	(0.00050)	(0.00050)
Fixed assets %	-0.10537 ***	-0.10525 ***	-0.09063	-0.09069
	(0.03908)	(0.03904)	(0.00032)	(0.00032)
Leverage	-8.13e-06 *	-8.19e-06 *	0.01008	0.01008
	(4.54e-06)	(4.52e-06)	(0.01057)	(0.01057)
GDP	0.45749	0.46638	-2.68114	-2.68784
	(0.86767)	(0.86810)	(3.48254)	(3.48832)
***R*^2**	0.0001517145	0.0001498676	0.0002673128	0.0002673123

*, ** and *** represents significance at 10%, 5% and 1% level, respectively
Standard errors in paranthesis

6.4 Recent data (2015 – 2020)

In order to evaluate whether the effects of gender diversity on financial performance have changed in recent years, we execute the same regressions as above for more recent data. Running the regressions on the overall, non-financial and financial industry for the years 2015-2020 yields higher and more positive coefficient estimates, though these are not significant. We hence disregarded these results as they exceed our maximum acceptable probability of making a Type-I-error at 10%. We assumed that the effect of gender diversity would be stronger in recent data. However, we cannot confirm nor reject this due to the statistical insignificance.

Table 6 presents the results for the overall industry, while the results for the financial and non-financial industries can be seen in *Appendix 2.*

Table 6: The effect of gender diversity in all industries on ROE and ROA (2015-2020)

	Finacial Industry 2015-2020			
	ROE		ROA	
Explanatory variable				
Female %	-	-0.16609	-	0.06937
		(0.16819)		(0.05246)
Blau	0.04965	-	0.32465	-
	(0.26979)		(0.23416)	
IV law	-0.64913	-0.65044 ***	0.38983	0.38488
	(0.20574)	(0.20611)	(0.42390)	(0.42049)
Board size	0.03024 ***	0.03059 **	-0.15555	-0.15420
	(0.01492)	(0.01523)	(0.14129)	(0.14036)
Company age	-0.00346 ***	0.00952 ***	-0.00119	-0.00119
	(0.00123)	(0.00366)	(0.00010)	(0.00010)
Lag ROE / ROA	0.00952 ***	-0.00346 ***	0.00071 ***	0.00069 ***
	(0.00366)	(0.00123)	(0.00137)	(0.00139)
Fixed assets %	-0.09922 **	-0.09923 **	-0.13762	-0.13766
	(0.04238)	(0.04238)	(0.15942)	(0.15945)
Leverage	-4.29e-06	-4.28e-06	0.01565	0.01565
	(2.99e-06)	(2.99e-06)	(0.01779)	(0.01780)
GDP	-2.48330	-2.50120 *	-1.10467	-1.10462
	(1.39560)	(1.39690)	(1.06905)	(1.07299)
***R*^2**	0.0001083793	0.0001089261	0.0003864093	0.0003864037

*, ** and *** represents significance at 10%, 5% and 1% level, respectively
Standard errors in paranthesis

6.5 Robustness Check

In addition to accounting for clustered standard errors and fixed effects, we conduct a robustness check. We do this to see whether the variables remain significant when incorporating the Shannon Diversity Index as a measure of gender diversity, instead of the Blau Index or the percentage of women. This test will assess the reliability and sensitivity of the previously obtained results. The results of these regressions are displayed in *Table 7*.

We observe that our findings are robust to the inclusion of other diversity measures. The results point in the same direction as the initial regression with the Blau Index, and they have a similar magnitude and significance. Hence, we conclude that our results are robust and not sensitive to changes in different gender diversity measures.

For 2015-2020, Shannon is non-significant in all industries, in line with the previous results. Results for 2015-2020 are presented in *Appendix 3*.

Table 7: Results of regression when using Shannon Index as a measure of gender diversity (2000-2020)

	2000 - 2020					
	Overall Industry		Non-financial Industry		Finacial Industry	
Explanatory variable	**ROE**	**ROA**	**ROE**	**ROA**	**ROE**	**ROA**
Shannon	-0.19280 **	0.05447	-0.24207 **	0.04262	-0.16531	0.05900 **
	(0.07959)	(0.08193)	(0.09879)	(0.11082)	(0.18170)	(0.02937)
IV law	-0.08199	0.09472	-0.03483	0.13987	-0.25499 ***	0.00139
	(0.35520)	(0.12514)	(0.41681)	(0.18841)	(0.09231)	(0.03141)
Board size	-0.00558	-0.06844	-0.01291	-0.08587	0.02600	-0.01917 ***
	(0.00760)	(0.05155)	(0.00939)	(0.07048)	(0.02230)	(0.00571)
Company age	-0.00259 ***	0.00259 ***	-0.00281	-0.09063	-0.00241 **	0.00047 *
	(8.159e-04)	(0.00040)	(0.00109)	(0.10860)	(0.00117)	(0.00028)
Lag ROE / ROA	0.01085 ***	-0.00094 ***	0.01276 **	0.00332 ***	0.00465 ***	0.03797 ***
	(5.740e-04)	(0.00036)	(0.00541)	(0.00050)	(0.00149)	(0.01168)
Fixed assets %	-0.12480 ***	-0.06931	-0.10539 ***	-0.00099 ***	-0.20754 ***	-0.00721
	(0.01874)	(0.09120)	(0.03909)	(0.00032)	(0.06741)	(0.01246)
Leverage	-8.068e-06 **	0.00800	-8.1231e-06 *	0.01008	-8.0287e-06	-0.00447 ***
	(3.327e-05)	(0.00892)	(4.5393e-06)	(0.01057)	(9.1008e-06)	(0.00149)
GDP	-0.03196	-1.68664	0.45679	-2.68130	-1.11890	0.24844
	(0.74240)	(2.23368)	(0.86776)	(3.48229)	(1.53470)	(0.79693)
***R*^2**	0.0001157562	0.0001962513	0.0001519201	0.0002673127	5.703541e-05	0.02727918

*, ** and *** represents significance at 10%, 5% and 1% level, respectively
Standard errors in paranthesis

6.6 Analysis

Our results give different conclusions based on the industry we test. The results suggesting a negative relationship between gender-diverse boards and firm performance in terms of ROE, align with previous studies conducted in Norway. These are studies by Ahern & Dittmar (2012) and Bøhren & Strøm (2010) where they obtain negative correlations between gender diversity and their firm performance measures.

The negative relationship could be explained by increased diversity causing more conflicts and difficulties in cooperating (William & O'Reilly, 1998). The Glass Cliff theory could also explain this occurrence as Ryan & Haslam (2006) find that females are often assigned to higher positions when firms are already experiencing difficult times. This means that the results that are recorded for their firm performance may be incorrectly assigned in the data.

Moreover, Ahern & Dittmar (2012) argue that the negative relationship between board diversity and firm value can be explained by the introduction of the gender quota law in Norway. They argue that the exogenous law forced the firms to change their board composition independent of director characteristics, as they had to act quickly in order to not be dissolved. This theory is consistent with our results, as we find the relationship to be negative when we include the years affected by the law. These findings support the idea that boards are selected to

maximize shareholder value and that enforcing a mandatory gender quota on boards leads to economically significant declines in value.

Both above-mentioned Norwegian studies were conducted in times where gender diversity was quite low (*Appendix 1.1 - 1.3*). The first one was done in 2001-2009, while the second one in 1989-2002, however the results remain consistent till this day. Our research does deviate somewhat from these studies, as it also analyzes the financial industry alone, revealing a positive and statistically significant relationship between ROA and the proxies for gender diversity.

As predicted, firm performance in the financial industry seems to be positively affected by increased gender diversity, however only in terms of ROA. We expected the financial industry to be more positively affected by gender-diverse boards, as it was previously man-dominated. Statistics Norway (SSB, 2023) has reported that women in Norway only make up 36.5% of the workforce in the private sector, which is the sector in which financial firms usually operate. As Ahern & Dittmar (2012) and other diversity studies suggest, increased gender diversity has the most effect in samples where the gender diversity was low to begin with. Hence, we now observe a positive relationship between firm performance and gender diversity within the financial industry.

We observe non-significant gender diversity coefficients between 2015-2020 for all industries, this could be explained by the lack of variety in gender diversity within these years. As can be seen in *Appendix 1.1* gender diversity does not increase much from 2015 to 2020 as it only increases less than 4.5%, whilst from 2001 to 2020 it increased around 27.7% across all industries. Another explanation might be that the relationship between gender diversity and firm financial performance is weaker in newer data.

We also observe that our financial performance measures, ROE and ROA, are not significant at the same time. Our findings indicate that not all areas of a firm's financial success are impacted by gender diversity. Accordingly, this study implies that the effect of gender diversity on corporate boards will differ depending on the industry the firm operates in and the financial performance metric that is employed.

Furthermore, our results reveal that the coefficient for the percentage of females on the boards is not significant in any case, even if the other gender diversity

measures are. These observations indicate that it is the presence of both genders, the increased diversity, that significantly declines ROE, and not exclusively the increase of females on the board. These findings are in line with the study conducted by Earley & Mosakowski (2000), where they find that homogeneous boards perform better due to less communication problems.

At the same time, our results differ from studies conducted in other countries, such as Reguera-Alvarado (2015) and Campbell & Minguez-Vera (2008). Both studies found positive correlations between gender diversity and firm performance. One main reason behind this could be the difference in samples. Both studies use data from Spanish firms, thus different cultures and norms may affect the results. Although both Spain and Norway have introduced a quota law on gender, the participation of Spanish women in the workforce has been scarce (Reguera-Alvarado et al., 2015). Prior to the introduction of the laws, the percentage of female board directors was 9% in Norway and only 3.5% in Spain. Hence, the implications of increased gender diversity might vary depending on how diverse the boards and the workforce were before.

7.0 Conclusion

This study offers new insights into the relationship between gender diversity on the board and financial performance. In this paper, we analyze the correlation of gender diversity on firm performance in Norwegian firms in an empirical setting, considering the ongoing discussion on the desirable qualities of a successful board.

Contrary to Chapple & Humphrey (2014) and other studies that find that boards do not influence firm performance, we find that gender diversity does have a significant effect. In alignment with previous Norwegian studies such as Ahern & Dittmar (2012) and Bøhren & Strøm (2010), and contradictory to our own hypothesis, our study reveals a negative statistical relationship between heterogeneous boards and firm performance in the overall, and non-financial industry from 2000-2020.
Our assumption about the gender quota law being the reason as to why previous studies acquired negative results did not prove to be correct as we find that this relationship still holds in newer uninterrupted data.

In alignment with our second null hypothesis and contradictory to the overall results, the relationship between gender diversity and ROA in the financial industry is found to be positively significant, meaning gender diverse boards in financial industries are contributing to better firm performance.

However, the implications of these results cannot be transferred to more recent data, as we find no significant association between gender diversity and firm performance in between 2015 and 2020. Hence, we do not find that the effect is stronger than for 2000 – 2020, as previously assumed. All our results are robust to the inclusion of alternative diversity measures, tested using the Shannon index.

We can conclude that the effects of gender diversity on the boards in Norway depend on the industry characteristics. When assessing diversity on the boards of financial firms we find that more diversity benefits firm performance. Hence gender diversity should be considered when constructing profit-maximizing boards within this industry.

However, in the overall industry we find that gender diverse boards decrease firm performance. This paper looks at the topic of diversity from an economical perspective only, but other considerations should not be disregarded when discussing optimal board composition. Even though it may look like more gender diversity on the board does not pay off economically for the overall industry in Norway, other factors such as morality and ethics should be considered. Requiring gender-diverse boards should be seen as an essential component of a larger political plan to provide equal opportunities. Even though implementing the quotas might seem expensive for investors, it could be beneficial for the overall society.

We believe that these findings provide useful insight into the questions surrounding optimal board composition, especially for the financial industry. For further research, we suggest differentiating between more industries, as the gender distribution and its implications could be skewed between them. We recommend researching whether the results of more gender diversity will be different in female-dominated industries compared to well-diverse and male-dominated industries. Also, it could be interesting to know what attributes the financial industry has that make gender diversity positive compared to the non-financial industries.

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9.0 Appendix

Appendix 1.1: Composition of boards of directors in AS & ASA (2000-2020)

AS & ASA	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Directors (n)	256 565	232 748	301 987	300 709	315 117	332 886	370 076	387 266	400 214	404 448
Women directors (n)	38 741	36 128	46 373	49 787	51 533	55 933	62 948	67 216	69 550	71 026
Total women directors (%)	15,10	15,52	15,36	16,56	16,35	16,80	17,01	17,36	17,38	17,56

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Directors (n)	408 802	417 061	434 906	445 391	453 450	465 041	343 589	499 484	511 504	534 803
Women directors (n)	72 603	74 483	78 474	80 918	83 432	87 216	64 605	83 853	97 604	103 124
Total women directors (%)	17,76	17,86	18,04	18,17	18,40	18,75	18,80	16,79	19,08	19,28

Appendix 1.2: Composition of boards of directors in ASA (2000-2020)

ASA	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Directors (n)	2 243	1 996	2 460	2 287	2 188	2 118	1 895	1 814	1 628	1 568
Women directors (n)	151	152	212	412	360	470	606	732	638	624
Total women directors (%)	6,73	7,62	8,62	18,01	16,45	22,19	31,98	40,35	39,19	39,80

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Directors (n)	1 511	1 439	1 277	1 183	1 179	1 174	758	1 299	1 126	1 059
Women directors (n)	624	579	506	484	482	487	319	412	464	445
Total women directors (%)	41,30	40,24	39,62	40,91	40,88	41,48	42,08	31,72	41,21	42,02

Appendix 1.3: Composition of boards of directors in AS (2000-2020)

AS	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Directors (n)	254 322	232 748	298 751	298 422	312 929	330 768	368 181	385 452	398 586	402 880
Women directors (n)	38 590	36 128	46 062	49 375	51 173	55 463	62 342	66 484	68 912	70 402
Total women directors (%)	15,17	15,52	15,42	16,55	16,35	16,77	16,93	17,25	17,29	17,47

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Directors (n)	407 291	415 622	433 629	444 208	452 271	463 867	342 831	498 185	510 378	533 744
Women directors (n)	71 979	73 904	77 968	80 434	82 950	86 729	64 286	83 441	97 140	102 679
Total women directors (%)	17,67	17,78	17,98	18,11	18,34	18,70	18,75	16,75	19,03	19,24

Appendix 2: Results of regression from 2015-2020, using Blau Index and percentage of females

	2015 - 2020											
	Overall Industry				Non-financial Industry				Finacial Industry			
Explanatory variable	**ROE**		**ROA**		**ROE**		**ROA**		**ROE**		**ROA**	
Female %	-	-0.16609	-	0.06937	-	-0.03595	-	0.06957	-	-0.43367	-	0.07803
		(0.16819)		(0.05246)		(0.22199)		(0.07225)		(0.24387)		(0.08244)
Blau	0.04965	-	0.32465	-	-0.20849	-	0.45315	-	0.43738	-	0.14176	-
	(0.26979)		(0.23416)		(0.27608)		(0.37400)		(0.61132)		(0.11762)	
IV law	-0.64913	-0.65044 ***	0.38983	0.38488	-0.69007 **	-0.68707 **	0.61580	0.60928	-0.57309	-0.58316	-0.05442	-0.05638
	(0.20574)	(0.20611)	(0.42390)	(0.42049)	(0.27828)	(0.27841)	(0.64706)	(0.64196)	(0.13053)	(0.13636)	(0.03514)	(0.03520)
Board size	0.03024 ***	0.03059 **	-0.15555	-0.15420	0.00978	0.00897	-0.22803	-0.22627	0.09077	0.09366	-0.00395	-0.00339
	(0.01492)	(0.01523)	(0.14129)	(0.14036)	(0.01754)	(0.01761)	(0.21021)	(0.20884)	(0.02912)	(0.03093)	(0.00286)	(0.00287)
Company age	-0.00346 ***	0.00952 ***	-0.00119	-0.00119	-0.00242	-0.00241	-0.00123	-0.00123	0.00689	0.00689	0.05279	0.05279
	(0.00123)	(0.00366)	(0.00010)	(0.00010)	(0.00168)	(0.00168)	(5.9037e-05)	(5.9036e-05)	(0.00206)	(0.00206)	(0.01040)	(0.01039)
Lag ROE / ROA	0.00952 ***	-0.00346 ***	0.00071 ***	0.00069 ***	0.01092 *	0.01092 *	0.00230 ***	0.00227	-0.00569	-0.00572	-0.00020 ***	-0.00020 ***
	(0.00366)	(0.00123)	(0.00137)	(0.00139)	(0.00571)	(0.00571)	(0.00127)	(0.00129)	(0.00200)	(0.00201)	(0.00026)	(0.000267)
Fixed assets %	-0.09922 **	-0.09923 **	-0.13762	-0.13766	-0.07820 *	-0.07817 *	-0.16452	-0.16459	-0.20603	-0.20628	-0.00878	-0.00883
	(0.04238)	(0.04238)	(0.15942)	(0.15945)	(0.04521)	(0.04519)	(0.19219)	(0.19225)	(0.09039)	(0.09049)	(0.00693)	(0.00694)
Leverage	-4.2933e-06	-4.2791e-06	0.01565	0.01565	-2.5232e-06	-2.5144e-06	0.01698	0.01698	-2.6894e-05	-2.6274e-05	-0.00225 ***	-0.00225 ***
	(2.9952e-06)	(2.9917e-06)	(0.01779)	(0.01780)	(2.8743e-06)	(2.8759e-06)	(0.01939)	(0.01939)	(1.0062e-05)	(1.0007e-05)	(0.00084)	(0.00084)
GDP	-2.48330	-2.50120 *	-1.10467	-1.10462	-3.08790 *	-3.08940 *	-1.13650	-1.13400	-1.33430	-1.41540	-0.01918	-0.01746
	(1.39560)	(1.39690)	(1.06905)	(1.07299)	(1.81540)	(1.81640)	(1.09950)	(1.10150)	(2.03270)	(2.03830)	(0.43539)	(0.43593)
***R*^2**	.0001083793	0.0001089261	0.0003864093	0.0003864037	0.0001241374	0.0001236624	0.0004239311	0.0004239235	0.0001288252	0.00013061	0.04935389	0.0493508

*, ** and *** represents significance at 10%, 5% and 1% level, respectively

Standard errors in paranthesis

Appendix 3: Results of regression from 2015-2020, u sing Shannon Index

2015 - 2020						
	Overall Industry		Non-financial Industry		Finacial Industry	
Explanatory variable	**ROE**	**ROA**	**ROE**	**ROA**	**ROE**	**ROA**
Shannon	0.01282	0.24060	-0.16043	0.33954	0.26746	0.09815
	(0.18668)	(0.17419)	(0.19586)	(0.27914)	(0.41289)	(0.08180)
IV law	-0.64962 ***	0.39031	-0.69049 **	0.61652	-0.57389 ***	-0.05439
	(0.20576)	(0.42425)	(0.27830)	(0.64762)	(0.13083)	(0.03514)
Board size	0.03037 **	-0.15569	0.00990	-0.22822	0.09100 ***	-0.00396
	(0.01495)	(0.14138)	(0.01756)	(0.21036)	(0.02921)	(0.00286)
Company age	-0.00346 ***	0.00071	-0.00242	0.00230 *	-0.00570 ***	0.05279
	(0.00123)	(0.00137)	(0.00168)	(0.00127)	(0.00200)	(0.01039)
Lag ROE / ROA	0.00952 ***	-0.00119 ***	0.01092 *	-0.00123 ***	0.00689 ***	-0.00020 ***
	(0.00367)	(0.00010)	(0.00571)	(5.9037e-05)	(0.00206)	(0.00026)
Fixed assets %	-0.09922 **	-0.13762	-0.07821 *	-0.16452	-0.20605 **	-0.00878
	(0.04238)	(0.15942)	(0.04521)	(0.19218)	(0.09040)	(0.00693)
Leverage	-4.2923e-06	0.01565	-2.5257e-06	0.01698	-2.6854e-05 ***	-0.00226 ***
	(2.9948e-06)	(0.01780)	(2.8738e-06)	(0.01939)	(1.0057e-05)	(0.00084)
GDP	-2.48400 *	-1.10557	-3.08720 *	-1.13800	-1.33910	-0.01985
	(1.39570)	(1.06952)	(1.81550)	(1.10030)	(2.0330)	(0.43534)
***R*^2**	0.0001083542	0.0003864099	0.0001242294	0.0004239321	0.0001282693	0.04935358

*, ** and *** represents significance at 10%, 5% and 1% level, respectively
Standard errors in paranthesis

10.0 Figures and Tables

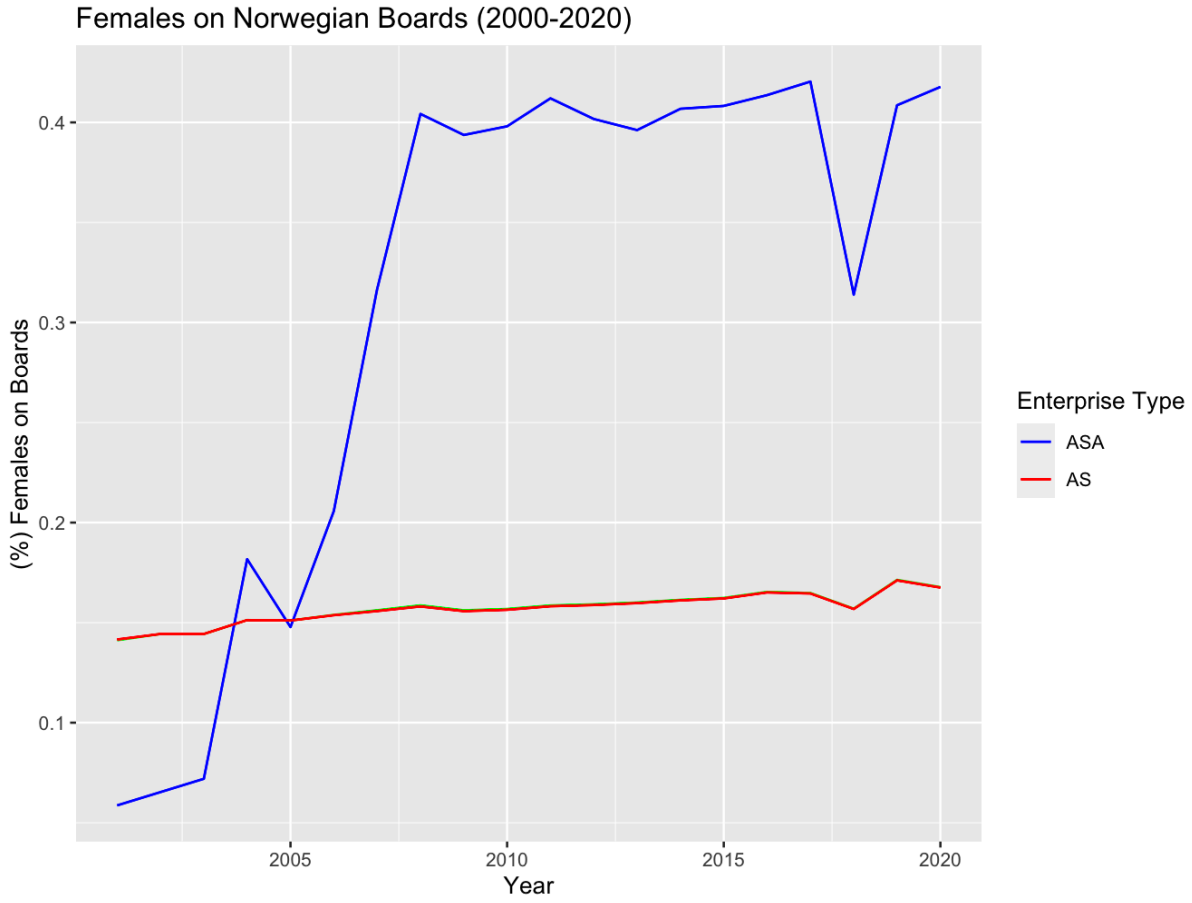

Figure 1: Percentage of females on Norwegian Boards from 2000-2020 in AS and ASA