

Gender and Age Diversity in the Boardroom

*The effect of gender and age diversity in the boardroom
on financial firm performance for enterprises in the
United States, Norway and Japan*

Bachelor Thesis Financial Economics

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29 January 2019

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Abstract:

The boys clubs of days are fading into obscurity (Kiradjian, 2018). Corporate governance discussions in recent years focus on the increase of diversity in the boardroom. This paper examines the relationship between board gender and age diversity on the firm's financial performance for enterprises in the United States (S&P 500), Japan (Nikkei 225) and Norway (Oslo Børs), over the period 2010 to 2016. Gender diversity is measured as the fraction of female directors in the boardroom and the overall presence of women in the boardroom. Age diversity is measured as the standard deviation of age and the average age of board directors. Financial firm performance is measured by the approximation of Tobin's Q and the Return on Assets (ROA).

This paper describes the monitoring and controlling role of the board of directors for the three national corporate governance systems. Various theories and empirical examinations present different conclusions concerning the effect of board gender and age diversity on firm financial performance.

Using differences of means tests and panel regressions controlling for board-level-, financial- and industrial variables, the results show a positive relationship of gender diversity on Tobin's Q and a negative relationship on Return on Assets for corporations on the S&P 500 index. The positive effect of gender diversity in Japan (Nikkei 225) on Tobin's Q is larger than for the S&P 500 firms. Age diversity in the boardroom has a negative effect on financial firm performance, measured by Tobin's Q, for S&P 500 enterprises.

Unfortunately, the results for the Norwegian corporations are not statistically significant at conventional levels.

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Section 1: Introduction

'The boys clubs of days are fading into obscurity (Kiradjian, 2018). The new and first chairwoman of the United States' House Financial Service Committee, Maxine Waters, proposed creating a subcommittee that focuses on more women and minorities in the top of Corporate America (Warmbrodt, 2019). This development follows the recent discussion in corporate society. Some people argue that more women in corporate boards would have prevented the financial crisis of 2008. One of the circumstances that caused the financial crisis in 2008 is the excessive amount of risk taking, which is caused by the risk-taking nature of men, and would have been prevented by women, according to Syed in 2008. This raises the question if more female board directors indeed positively influence firm performance.

Many corporate managers believe that there is a positive link between board diversity and shareholder value (Carter et al., 2003). Various studies determined the influence of board diversity and board structure on strategic management (Del Carmen Triana et al., 2014) and firm performance (Carter et al., 2003; Bonn et al., 2004). Especially gender diversity in the boardroom has received increased attention in recent years (Adams and Ferreira, 2009; Peterson and Philpot, 2007). Over the period of 2010 to 2016 the average percentage of female board members increased from 12,2% to 20,0% in the Organization for Economic Co-operation and Development (OECD)¹, according to the OECD statistics. This increase is the result of a changing corporate culture and governmental quotas and guidelines (Ferrero-Ferrero et al., 2013). The Interfaith Center on Corporate Responsibility (ICCR) is promoting the increase of board gender diversity at large corporations. Also, corporate managers and board directors have discovered the significance of this issue. The CEO of Sun Oil in 1996, stated: *'Often what a female board member can bring to the board is some perspective, which a company has not had before— adding some modern-day reality to the deliberation process. Those perspectives are of great value, and often missing from an all-white, male gathering. They can also be an inspiration to the company's diverse workforce'* (Campbell, 1996).

¹ OECD.stat, 20 November 2018 (<https://stats.oecd.org/index.aspx?queryid=54753>)

The fraction of female board directors increased over the period 2010 to 2016 in the OECD. This paper will examine the effect of gender diversity over this period on financial firm performance for listed companies in the OECD, where financial firm performance is measured by Tobin's Q (Adams and Ferreira, 2008; Carter et al., 2003) and Return on Assets (ROA (Adams and Ferreira, 2008; Garcia-Meca et al., 2015)). The percentage of female board members and its increase differs enormously between all countries within the OECD. For this reason, this paper will examine the effect of board gender diversity in the OECD for three different countries with respectively the highest female board director's rate, the lowest female board director's rate and the biggest economic influence: Norway (Oslo Stock Exchange), Japan (Nikkei 225) and the United States (S&P 500). Norway is ranked first on the scale of board gender diversity in the OECD, with an average percentage of female directors of 40%, over 2010 to 2016. Japan has the lowest average rate of female board members with a percentage of 2%, over the period 2010-2016. The research will specifically focus on the largest economy in the world, the United States, based on its GDP (not PPP adjusted (International Monetary Fund, 2018)). The United States offers the most reliable and available data.

Next to board gender diversity, the relationship between age diversity in the boardroom and financial firm performance will be examined. Younger managers follow more risky and innovative strategies (Guthrie and Olian, 1991) and focus on new and creative ideas (Campbell, 1987), which can positively influence firm performance. On the other hand, older managers are more experienced, which increases performance (Bonn et al., 2004).

The structure of this paper is as follows. In section 2 this paper describes the national context of corporate governance in Norway, Japan and The United States, as well as various theoretical and empirical studies concerning the issue of gender and age diversity. Section 3 and 4 discuss the data and methodology used for this research. The results of the different examinations can be found in section 5. In section 6 this paper concludes on the results and provides some possible avenues for further research.

Section 2: Literature and Theoretical Background

2.1 National Contexts of Norwegian, Japanese and American Corporate Governance

A countries' corporate governance system influences board diversity through the national applied board structure and diversity quotas. To determine the different systems of corporate governance, it is important to define corporate governance and the role of the board of directors within the system. Shleifer and Vishny describe the general definition of corporate governance as follows: '*corporate governance deals with the ways in which suppliers of finance to corporations assure themselves of getting a return on their investment*' (Shleifer and Vishny, 1997). Hence, corporate governance is the system that harmonizes the interest of shareholders with the interest of managers. The board of directors has the controlling and monitoring role over the executive managers in favor of the shareholders. Fama and Jensen (1983) defined the board of directors as the *apex (top) of the firm's decision control system*.

All around the world, countries use different systems and approaches of corporate governance, which can be theoretically divided into two main systems, according to Bonn et al. (2004). The first system is especially used in Continental Europe, while the second, market-based system is connected with the Anglo-Saxon countries as the United States and the United Kingdom. The system in Continental Europe uses a two-tiered board, with a non-executive board that controls and monitors the executive board. The Anglo-Saxon system uses a single-tiered board. The non-executive board directors (elected by shareholders) dominate this single-tiered board and have the controlling and monitoring role over the executive board directors.

To examine the effects of board gender and age diversity on firm value it is important to understand the systems of corporate governance and its key characteristics in the three examined countries. The United States is the largest economy in the world with a GDP of 18.624 trillion U.S. dollars, according to the World Bank and the International Monetary Fund (2018). The country's stock market influences the financial world. My study focuses on

corporations on the S&P 500 index, which provides me a very reliable representation of the US stock market. The S&P 500's corporations use the single-tiered board system and for over half of them CEO-chair duality is present (O Emmerich et al., 2017). CEO-chair duality means that one person fulfills the role of CEO as well as the role of the board's chairman. An increase in gender diversity in the US stock market is commonly discussed in the US government and corporate society. The corporations have an average percentage of female directors of 13.6 percent (OECD Statistics, 2018), which equals the average for all OECD countries.

The Anglo-Saxon corporate governance system in the United States is market-oriented. The system focuses on shareholders' power (Bonn et al., 2004) with an active external market for corporate control (Weimer and Paper, 1999). The mechanism helps independent shareholders to affect the companies' decision making (Bonn et al., 2004), while managers strongly focus on shareholder value and the creation of shareholder wealth (Carati and Tourani Rad, 2000), which supports solving agency problems. However, as stated by Jackson (2010): *'the solution to agency problems in United States' corporations is too often based on excessive incentives for managers, too little responsibility by investors, and too little genuine scrutiny by independent boards.'* Paragraph 2.2 will further elaborate on the agency theory.

In Norway and the Oslo Stock Exchange (Oslo Børs) corporations use the two-tiered board system. The board of directors has a supervising role over the day-to-day executive managers and its CEO. Corporations with over 200 employees are obliged to appoint a corporate assembly (Knudsen and Langseth, 2017). The corporate assembly is responsible for the board elections and other corporate governance related operations. One third of the directors is elected by employees and between employees (Knudsen and Langseth, 2017). These directors represent the employees, but have the same authority and responsibility as the board directors elected by the general meeting of shareholders. In total, the board of Norwegian listed firms consists of six to ten members, on average (Knudsen and Langseth, 2017).

In 2007, the Norwegian government introduced a gender diversity quota for the election of board directors by the general meeting (Knudsen and Langseth, 2017). In public limited corporations, both genders need to represent at least 40% of the directors elected by the general meeting (Knudsen and Langseth, 2017). The effect of this quota is visible in Norwegian corporate society, because the fraction of female directors in the boardroom is 41 percent in 2016 (OECD statistics, 2018). However, this quota might diminish the efficiency and performance of the board. New board directors are not only chosen because of their quality, but might instead be chosen just to reach the gender quota. This gender quota, the high average gender ratio and the fact that employees choose one third of the board may altogether influence the relationship between gender and age diversity in the boardroom and financial firm performance.

The corporate governance system in Japan was network-oriented for many years. Long-term relationships between different stakeholders influenced the strategic decision-making (Weimer and Pape, 1999). The system was called keiretsu. The big banks financed the firms and performed as supervisory boards over the executive management (Bonn et al., 2004; Lessambo, 2014). Insiders dominated the boards, because the board directorship was seen as the ultimate job for long-serving employees (Charkham, 1994). The dominance of insiders in the board influenced the board's objectivity to monitor and control the executive management (Bonn et al., 2004). Furthermore, gender diversity did not exist in the Japanese boardroom.

Since the last decade, Japan's corporate governance system is developing into a market-oriented system (Lessambo, 2014). The old system with the firm's stable ownership and a monitoring bank was not operating perfectly and had to be restructured (Bonn et al., 2004). Most corporations in Japan now use a one-tiered board system with a controlling board of directors that is authorized to make strategic decisions (Harada and Nakayama, 2017). The shareholders elect all board directors (Harada and Nakayama, 2017). Board gender diversity does still not play an important role in Japan's corporate governance, with an average female ratio of 2% over 2010 to 2016 (OECD stat., 2018). However, in 2018 the Tokyo Stock Exchange

developed a new regulation that focuses on board diversity (Financial service Agency, Japan, 2018). Unfortunately, it is not possible to include this development in the empirical examination.

2.2 Theories behind the impact of board diversity

The impact of board structure and board diversity is theoretically examined in previous studies. Board characteristics as the number of board directors, the structure of the board committee, the number of meetings held annually, the ownership of inside directors, the relationship between the outside directors relatively to the inside directors, age diversity, gender diversity (Carter et al., 2003; Hermalin and Weisbach, 2000) etc., have been investigated. The framework that is most often used in this examination is the underlying agency theory (Carter et al., 2003). The agency theory focuses on differences between managers' interests and the interests of shareholders. Fama and Jensen (1983) state that the board's function is to monitor and control managers and to deal with agency problems. The goal is to create a higher firm value for shareholders by replacing executives and offering bonuses (Fama and Jensen, 1983).

Carter et al. (2003) expounds that board independency is crucial for the functioning of the board, for representing the interests of shareholders and overcoming agency problems. For this reason, the relationship between board independency and board diversity can be important in my examination. When board diversity improves board independency it suggests that board diversity positively influences shareholder's interests and firm value. In addition Carter et al. (2003) state that diverse people come up with different ideas and ask different questions than the more traditional, male directors. The non-traditional, outside directors are the ultimate outsiders that will improve the overall independency of the board (Carter et al., 2003). Other studies state that agency problems will diminish with the increase in gender diversity based on the transparency of female directors (Upadhyay and Zeng, 2014). Female directors grant different viewpoints and help represent the shareholders in a more valuable way (Letendre, 2004). However, these theories are all based on intuitive expectations. Hermalin and Weisbach (2000) state that the agency theory cannot give a clear-cut prognosis on the connection between board phenomena and firm value. To interpret the effects of board diversity it is important to develop a solid theoretical framework, which will let us understand the advantages of board diversity in the corporate arena (Erhardt et al., 2003).

Various previous studies have developed other theories concerning the impact of gender diversity in the boardroom on firm value. Watson, Kumar and Michaelsen (1993) and Mattis (1993) see gender diversity in the boardroom as a competitive advantage relative to their rivals, because diversity contributes to more creativity, innovation and a broader knowledge in the boardroom. Other studies indicate that female directors have better communication-, human resources- and public relation skills than male directors (Zelechowski and Bilimoria, 2004), while male directors possess more operation- and marketing skills, according to Zelechowski and Bilimoria (2004). Another theory towards a positive relationship between female directors and firm value is based on the so-called 'glass ceiling phenomenon' (Garcia-Meca et al., 2015). This theory suggests that it is more difficult for women to achieve a directorship position, which means that it requires higher proficiency to be elected in comparison to men. These higher election requirements signify a greater competency when women eventually achieve the directorship position (Eagly and Carli, 2003). However, gender quotas, for example in Norway, could diminish this effect. Female directors can be elected based on the gender quota, instead of their competency. Garcia-Meca et al. (2015) concludes that the presence of female board directors positively influences corporate governance and the corresponding firm value in the banking sector. *'However, female directors are not substitutes for traditional corporate directors with identical abilities but qualified female directors have unique characteristics that create additional value in banks'* (Garcia-Meca et al., 2015).

On the contrary, other studies provide theories towards a negative relationship between female directors and firm performance. Dobbin and Jung (2011) suggest a negative relationship because traditional oriented investors react negative to the appointment of female directors. Adams and Ferreira (2009) point out the idea behind the over-monitoring effect of female board directors. Women positively influence the board's monitoring role, but over-monitoring can decrease firm value, since management is being restricted (Adams and Ferreira, 2009).

In addition to gender diversity, various studies developed theories concerning age diversity. Younger directors or managers are more focused on new and creative ideas (Campbell, 1987)

and prosecute more innovative and risky strategies (Guthrie and Olian, 1991), while older executives avoid risky decisions (Carlson and Karlsson, 1970). Burke and Light (1981) indicate the decrease of cognitive abilities with age. In addition, the education of younger directors is more 'up-to-date' and more targeted on recent developments and technologies, which positively influences the director's necessary knowledge (Bantel and Jackson, 1989). On the contrary, older directors have more accumulated experiences, which positively influence their ability to handle operations and decisions (Bonn et al., 2004). As Bonn et al. (2004) states, *the effect of age diversity depends on the industry and the market*. A fast growing market requires more 'younger skills', while other markets may require more experienced board directors (Bonn et al., 2004).

2.3 Previous empirical evidence

This study investigates the effect of board gender and age diversity on financial firm performance, measured by Tobin's Q and Return on Assets (ROA), over the period 2010 to 2016. In the past ten to twenty years, different studies have empirically examined the effect of board gender and age diversity for different countries, different markets and industries and over different time frames. The various studies do not provide one general outcome on this relationship. Some research found a positive relationship (Carter et al., 2003; Garcia-Meca et al., 2015; etc.), while others found an insignificant (Smith et al, 2006) or negative relationship (Shrader et al, 1997), between board gender diversity and financial firm performance.

Carter et al. 2003 investigated the gender and nationality of board directors and its effect on financial firm value, for Fortune 1000 firms. They used the approximation of Tobin's Q, constructed by Chung and Pruitt (1994) to measure financial firm performance and the fraction of female board directors to measure board gender diversity. Carter et al. (2003) discovered a statistical, significant, positive relationship between women and minorities in the board and firm value. In the banking sector, Garcia-Meca et al. (2015) examined the effect of women and different nationalities in the boardroom on bank performance, measured by Tobin's Q and Return on Assets (ROA). Garcia-Meca et al. (2015) concluded for 159 banks that the effect of diversity differs between different types of diversity. Nationality mix had a negative effect, while gender diversity positively influenced bank performance. Female directors create additional value according to Garcia-Meca et al. (2015). Erhardt et al. (2003) investigated board diversity in 2003 for 127 large US companies over the period 1993 to 1998. This examination focused on women and minorities in the boardroom and financial firm performance, measured by Return on Assets (ROA) and Return on Investment (ROI). The results show a positive relationship between diverse boards and firm financial performance (Erhardt et al., 2003). For enterprises in Japan and Australia, Bonn et al. (2004) examined the effect of board gender diversity. The study found a positive correlation between the female ratio and the firm performance (MB ratio and ROA) in Australia. However for Japan, the paper was not able to

find significant support for an effect between the female ratio and firm performance. The reason Bonn et al. (2004) appoints for this insignificant effect in Japan is the low amount of female directors in Japan over the sample period. These results correspond with the findings of Liu et al. (2014), who found a positive relationship between gender diversity and firm performance. However, Liu et al. (2014) noted that at least an amount of three female directors is necessary to obtain this positive relationship. The corporate governance system is changing in Japan and the gender diversity rate is slightly increasing, which may improve significant results. Moreover, female board directors are able to diminish operating costs (Chakrabarty and Bass, 2014), but corporations are not utilizing human resources such as females enough (Katzenbach et al., 1995).

On the contrary to these positive results, various empirical studies provide an insignificant or even negative relationship between board gender diversity and firm value. In 1997 Shrader et al. examined the influence of a higher percentage of female directors on the financial firm value, measured as ROA and Return on Equity (ROE), for a sample of 200 firms on the Fortune 500. The results show a significant negative relationship between the percentage of female directors and financial firm value. According to this research, board diversity increases the capacity of decision-making, but also increases conflict within the board. Smith et al. (2006) discovered a significant negative relationship between board gender diversity and the GP ratio (Gross profit to sales), for Danish firms. Denmark lags behind with gender diversity in the boardroom compared to the other Scandinavian countries, as Norway, according to an article of Preisler in the Nordic Labour Journal of 2013. When financial performance was measured by different accounting ratios, Smith et al. (2006) found an insignificant result for Danish corporations. Adams and Ferreira discovered in 2009 a positive effect between board gender diversity and the monitoring role of the board, but this effect was negatively related to firm performance. These results are in paragraph 2.2 described as the *over-monitoring* effect (Adams and Ferreira, 2009). Del Carmen Triana (2009) discovered both positive and negative relationships between gender diversity and firm value.

2.4 Hypotheses

On the base of recent empirical studies and theories discussed in previous paragraphs, the following hypothesis is constructed, on the relationship between the fraction of female directors and the financial firm performance, measured as Tobin's Q and ROA, for corporations on the S&P 500 index, the Oslo Stock Exchange and the Nikkei 225 index, over the period 2010 to 2016. The height of the effect may differ significantly between the three countries, because of differences in corporate governance and gender diversity approaches.

Hypothesis 1:

There is a positive relationship between the fraction of female board directors and the financial firm performance, measured as Tobin's Q and ROA over the period 2010 to 2016.

In addition, this research focuses on the effect of age diversity, measured as the standard deviation of the director's age, on financial firm performance (Tobin's Q and ROA). In 1992 Wiersma and Bantel discovered a positive relationship between younger managers and the amount of major changes in corporate strategy. Other studies showed a negative relationship between the age of board directors and different accounting measures as ROA and the MB ratio (Bonn et al., 2004) and corporate growth (Child, 1974). Based on these empirical studies and theories described in paragraph 2.2, the following hypothesis is constructed on the relationship between the standard deviation of age and firm performance, measured as Tobin's Q and ROA, for corporations on the S&P 500 index, the Oslo Stock Exchange and the Nikkei 225 index, over the period 2010 to 2016:

Hypothesis 2:

There is a positive relationship between the standard deviation of age and the financial firm performance, measured as Tobin's Q and ROA, over the period 2010 to 2016.

Section 3: Data Collection and Descriptive Statistics

3.1 Data collection

To investigate the effect of board gender and age diversity on financial firm performance, panel data samples of the S&P 500 (United States), the Nikkei 225 (Japan) and the Oslo Børs (Norway) are obtained. With 500 firms of the United States stock market the S&P 500 index provides a very reliable image of the developments of listed firms in the United States and their firm value. Only the firms that have been part of the S&P 500 index for the whole period 2010 to 2016 are examined. The sample was narrowed down to all corporations with necessary data available and ended in a sample of 345 firms. The Nikkei 225 index contains 225 firms of the Tokyo Stock Exchange and provides a very reliable image of the developments of listed firms in Japan and their firm value. The same criteria, as for the S&P 500, are applied. However, the necessary board data was scarce and this largely decreased the data sample to 30 firms. The effect in Norway is examined for corporations on Norway's major stock exchange, the Oslo Børs. The same criteria have been applied, which caused a significant decrease in observations.

Board gender and age diversity are the independent variables of interests. Gender diversity is measured by the yearly percentage of female board directors over the period 2009 to 2015. Age diversity is measured as the standard deviation of age per year for all board directors over the period 2009 to 2015. The dependent variable firm performance is measured over the period 2010 to 2016, but the female directors and the board director's age in the previous year are of influence for the firm value in the next year. I obtained the gender ratios and the standard deviation of age from the Compustat – North America database and the Compustat – Global database for respectively the S&P 500 sample and the Nikkei 225- and Oslo Børs sample. The gender ratio is converted from the ratio male directors divided by total directors into the ratio female directors divided by total directors. In addition, this paper subjoins the exact amount of female board directors and the exact age of board directors. These specific board director data is obtained from BoardEx – North America for the S&P 500 firms, BoardEx – Rest of the World

for the Nikkei 225 firms and BoardEx – Europe for the firms on Oslo Børs. Unfortunately, the exact age of board directors in Japan and Norway was not available on BoardEx.

The endogeneity problem will arise when examining board diversity, which will be further explained in the Methodology section (4). To overcome this endogeneity problem Adams and Ferreira (2009) constructed an instrumental variable. This instrumental variable is correlated with the explanatory variable, the fraction of female board directors, and uncorrelated with the error term. Adams and Ferreira (2009) stated that the fraction of male directors with board connections to female directors influences the appointment of female directors. Hence, this fraction is correlated with the explanatory variable, but there is no direct correlation with the financial firm performance. However, this fraction of male directors with board connection to female directors needs to be manually obtained from annual reports and personal records.²

The dependent variables in this research are Tobin's Q, approximated by the firm's market value divided by its total assets, and Return on Assets (ROA), measured as the firm's net-income divided by its total assets. The data is obtained from Compustat – North America and Compustat - Global for respectively the S&P 500 sample and the Nikkei 225- and Oslo Børs sample. The market value for corporations in Japan and Norway is collected from the DataStream database.

Since, the low amount of measurable observations in the Nikkei 225- and Oslo Børs sample, this paper will focus on the effects of board gender and age diversity for corporations on the S&P 500 index. This significant larger sample will develop a more reliable and significant effect.

² Given the limited time frame available for this paper, I was not able to obtain the data to construct an instrumental variable in the same spirit as Adams and Ferreira (2009).

3.2 Descriptive statistics

The examination of gender and age diversity is divided into three different data samples for three different countries, the S&P 500 (US), the Nikkei 225 (Japan) and the Oslo Børs (Norway). Table 1 presents the descriptive statistics for these three samples: Panel 1: S&P 500, Panel 2: Nikkei 225 and Panel 3: Oslo Børs.

The S&P 500 sample consists of 345 firms with an average firm size, measured in total assets, of almost 70 billion dollars. The market value was unavailable for four firms within the S&P 500 sample. These firms are excluded in the examination when firm value is measured by Tobin's Q. The average percentage of female directors of 17% is a little larger than the average percentage for all OECD countries over the same period (OECD Statistics, 2018 (16.3%)). The maximum female percentage is 48%. Hence, there is no firm in the sample with more female directors than male directors. The average board director is almost 69 years old and the standard deviation of age is only 3.38 years. This suggests that the 'experience factor' is important for appointing new board directors. The average board in the sample consists of approximately 11 directors with 1 or 2 female directors and a 10% nationality mix. The total debt value was unavailable for 50 companies, which caused the debt to asset ratio to be measureable for only 295 enterprises.

The samples for corporations in Japan and Norway are relatively small with respectively 30 and 42 firms, because of a lack of essential board data. Panel 2 and Panel 3 in table 1 present the descriptive statistics for the Nikkei 225 and the Oslo Børs. It directly stands out that the average percentage of female directors is 2% for the Nikkei 225 sample, compared to 39% for the Oslo Børs sample. The percentage in Norway almost represents the gender quota of 40%, implemented in Norway in 2007. Boards in Japan consist of 6 more directors than boards in Norway with a maximum of 31 directors in Japan. The boards of Norwegian corporations are more diverse with a nationality mix of 30% compared to 11% in Japan. The standard deviation of age differs two years between Norway and Japan, respectively 7.65 years and 5.78 years. The financial data, total assets and

Table 1 Descriptive Statistics

This table presents descriptive statistics for the countries and their firms in the sample, containing the United States (Panel 1: S&P 500), Japan (Panel 2: Nikkei 225) and Norway (Panel 3: Oslo Børs). The financial data for panel 1 is obtained from the Compustat-North America database and the Compustat Global database was used for Panel 2 and Panel 3. The board data for Panel 1, Panel 2 and Panel 3 is respectively obtained from BoardEx – North America, BoardEx – Global and BoardEx – Europe.

Panel 1: S&P 500					
Variable	N of firms	Mean	Min	Max	Standard Deviation
ROA (%)	345	5.31	-33.37	25.54	5.99
Tobin's Q	341	1.33	0.05	7.21	1.16
Total Assets (in million \$)	345	69822.30	2367718	1144.72	231788.40
Fraction of females on board	345	0.17	0	0.48	0.08
Number of females on board	345	1.91	0	7	1.20
Age of Directors	345	68.95	60	81	3.38
Number of directors	345	11.03	6	19	1.94
Total Debt (in million \$)	295	10857.36	0.274	312114.30	30322.71
Nationality Mix	345	0.12	0	0.84	0.16
Panel 2: Nikkei 225					
ROA (%)	30	2.72	-22.62	12.01	4.02
Tobin's Q	30	0.59	0.02	1.63	0.44
Total Assets (in million yen)	30	2.76e^7	180312	3.03e^8	6.09e^7
Fraction of females on board	30	0.02	0	0.143	0.04
Number of females on board	30	0.26	0	2	0.47
Standard Deviation of Age	30	5.78	1.9	13.7	2.00
Number of directors	30	12.79	5	31	4.90
Total Debt (in million yen)	30	5430977	716	5.87e^7	1.22e^7
Nationality Mix	30	0.11	0	0.70	0.20
Panel 3: Oslo Børs					
ROA (%)	42	-0.37	-15.22	21.48	2.77
Tobin's Q	42	1.97	0.02	21.04	3.26
Total Assets (in million Norwegian Kron)	42	103804.1	5.815	2653201	382167.80
Fraction of females on board	42	0.39	0.143	0.625	0.09
Number of females on board	42	2.79	1	6	1.06
Standard Deviation of Age	42	7.65	2.5	14.6	2.50
Number of directors	42	7.12	3	14	2.28
Total Debt (in million Norwegian Kron)	41	24127.59	0.98	677074	95529.66
Nationality Mix	42	0.30	0	0.80	0.27

total debt, is measured in the national currency, the Japanese Yen and the Norwegian Kron. One Japanese Yen and one Norwegian Kron correspond respectively to 0.0093 USD and 0.115 USD, according to the live market rate of 30 December 2018.

Table 2 presents a breakdown of female board directors per industry for the S&P 500 sample. This table provides the possibility to examine differences in board gender diversity per industry. One of the questions that arises is if more 'male oriented industries' have less women represented in the boardroom than more 'female oriented industries'. The SIC codes are obtained from the Compustat – North America database and the industry distribution is based on the distribution constructed by Carter et al. (2003). In the overall sample 34.0% and 27.8% of the firms are represented by one or two female directors. Only 2.3% of the firms have four or more female board directors. The mining -, construction -, services - and public administration industries have no firms in the sample with more than four female directors. However, this conclusion is not reliable for the construction and public administration industry, since the overall sample consists of only five and three firms in these industries respectively. Almost 80 percent of the firms in the 'male oriented' mining industry have zero or one female director. On the contrary, the wholesale retail trade industry and the public administration industry have no 'zero women-firms'. As stated above, this conclusion is not reliable for the public administration industry, because only three firms in this industry are represented in the sample. The large amount of female directors in the wholesale retail trade industry is surprising, because the research of Carter et al. (2003) found that almost 80 percent of the firms in this industry had none or only one female director. The manufacturing, transportation & communication and the finance & insurance industries have a well-distributed amount of women in the sample.

The same industry breakdown is not constructed for corporations of the Nikkei 225- and Oslo Børs sample, because of the limited number of observations. As for the construction- and public administration industry in the S&P 500 sample, this limited number of observations causes an unreliable representation of female directors between industries.

Table 2: Breakdown of the firm's female board members per industry

This table shows the industry distribution of the S&P 500 sample divided by the amount of female board members (Carter et al., 2003). The SIC codes distribution and the corresponding industry description is based on the research of Carter et al. (2003). The data concerning the female board members is contained from the BoardEx – North America database. The data concerning the firm's industry is obtained from COMPUSTAT – North America.

Gender and Average age

Female Board Members												
Sic Code	Industry Description	0		1		2		3		4+		Total Firms
		N of firms	% of firms	N of firms	% of firms	N of firms	% of firms	N of firms	% of firms	N of firms	% of firms	
1000 - 1499	Mining	10	34,5%	13	44,8%	4	13,8%	2	6,9%	0	0,0%	29
1500 - 1799	Construction	2	40,0%	1	20,0%	1	20,0%	1	20,0%	0	0,0%	5
2000 - 3999	Manufacturing	33	24,8%	46	34,6%	28	21,1%	21	15,8%	5	3,8%	133
4000 - 4999	Transportation, Communications etc.	11	20,0%	15	27,3%	14	25,5%	13	23,6%	2	3,6%	55
5000 - 5999	Wholesale & Retail Trade	0	0,0%	9	47,4%	7	36,8%	2	10,5%	1	5,3%	19
6000 - 6799	Finance, Insurance and Real estate	19	26,8%	20	28,2%	18	25,4%	10	14,1%	4	5,6%	71
7000 - 8999	Services	4	13,3%	11	36,7%	14	46,7%	1	3,3%	0	0,0%	30
9100 - 9999	Public administration	0	0,0%	1	33,3%	1	33,3%	1	33,3%	0	0,0%	3
Total		79	19,9%	116	34,0%	87	27,8%	51	15,9%	12	2,3%	345

Section 4: Methodology

The effect of board gender and age diversity will be examined with different regression analyses and a difference of means test. The difference of means test compares the firms with no representation of female directors to firms with female directors (Adams and Ferreira, 2009). Carter et al. (2003) excluded the firms with one female director in this statistical test to overcome the so-called ‘tokenism’ of female board directors (Carter et al., 2003). However, this paper is interested in the difference between no female directors and female directors and for this reason assumes the approach of Adams and Ferreira to be more relevant. However, Norwegian corporations in our sample have only boards with one or more female directors. This paper chooses to compare Norwegian corporations with one female director to corporations with more than one female director. The examined variables in the difference of means test are Tobin’s Q, Return on Assets, firm size (total assets), the debt to assets ratio, board size (the number of board directors), the standard deviation of age, total debt, the nationality mix and the average directors’ age for firms on the S&P 500.

The regression analysis regresses two different measures of firm value against gender and age diversity in the boardroom. The regression formulas are as follows:

1. $Tobin's\ Q_{i,t} = \alpha + \beta_1 GenderDiversity_{i,t-1} + \beta_2 AgeDiversity_{i,t-1} + \delta Controls_{i,t-1} + \epsilon_{i,t}$
2. $ROA_{i,t} = \alpha + \beta_1 GenderDiversity_{i,t-1} + \beta_2 AgeDiversity_{i,t-1} + \delta Controls_{i,t-1} + \epsilon_{i,t}$

where the Tobin’s Q and Return on Assets represent firm value. Gender diversity is measured by the fraction of female board directors. In addition, I created the dummy variable ‘Women on Board’ that equals 1 for firm-years with women represented in the boardroom and 0 for firm-years without female representation. Age diversity is measured as the standard deviation of age and additionally the relationship between the average age of board directors and firm performance is investigated.

The term δ Controls contains board-level and financial control variables to control for their effects on firm performance. The control variables are as follows: firm size, measured as the natural logarithm of the firm's total assets; board size, measured as the natural logarithm of the number of board directors; the nationality mix, the percentage of board directors with a different nationality; the average board directors' age; the debt to assets ratio and the industry (SIC code). Yermack (1996) showed a negative relationship between board size and firm financial performance (Tobin's Q). Carter et al. (2003) and Adams and Ferreira (2009) also controlled for CEO duality, the board's stock compensation and board activity (measured by the number of board meetings). Stock compensation improves the monitoring role over the management (Perry, 1999), which increases firm performance. Vafeas (1999) provides evidence on a negative relationship between board meeting frequency and firm performance. Unfortunately within the time frame, it was not possible to obtain these relevant data.

In corporate finance, the renowned problem of endogeneity arises when examining board composition and firm value (Adams & Ferreira, 2009; Carter et al., 2003; Hermalin and Weisback, 2000). This problem arises because of a correlation between the explanatory variable and the error term. This correlation is caused by omitted variables, simultaneity and/or measurement errors (Hermalin and Weisback, 2000). In this case, it is suspected that simultaneity or omitted variables cause the endogeneity problem (Adams & Ferreira, 2009; Carter et al., 2003). Carter et al. (2003) stated that gender diversity can influence firm value, but also firm value can influence the gender diversity. For example, firms with female directors can outperform, but outperforming firms can also appoint more female directors. In addition, the results can be biased because of an unobservable omitted variable in the error term, which is correlated with board gender diversity (Adams & Ferreira, 2009; Carter et al., 2003).

Various studies constructed different solutions to this problem when examining the effect of gender diversity on firm value. The main solution is the appliance of the two-stage least square (2SLS) regression with an instrumental variable. There are two requirements for a successful instrumental variable: 1) the variable is correlated with the endogenous explanatory variable

and 2) the variable is not correlated with the error term. Carter et al. (2003) conducted a two-stage least square (2SLS) regression with instrumental variables, that were almost the same as the control variables in their first ordinary regression, including firm size, board size, average board age etc. Adams and Ferreira (2003) state that endogeneity arises because of unobservable omitted variables that affect both the selection of female board members as the governance choices. *'It is plausible, for example, that some firms are more progressive than others, so they have better governance as well as more female directors.'* (Adams and Ferreira, 2009). Adams and Ferreira (2009) constructed the instrumental variable that measures the fraction of male directors with board connections to female directors. This instrumental variable is more appropriate, since no already included control variables have to be used as instrumental variable. To conduct this 2SLS regression, the fraction of male directors with board connections to female directors needs to be obtained manually. Unfortunately, the time frame of this paper does not allow being able to manage this. This endogeneity problem provides a restriction to this paper, which opens the possibility for further research.

To overcome the endogeneity problem in Norway, the research of Ahern and Dittmar (2012) conducted an event study test. The firm value, measured as leverage, is examined before and after the implementation of the gender quota for listed firms in Norway. This method would be suitable for my analysis on the effect of gender diversity on firm value for firms on the Oslo Børs. However, the research question focuses on the period 2010 to 2016 and the implementation of the gender quota was in 2007. To examine the differences between the United States, Japan and Norway the same period (2010 to 2016) has to be investigated.

Section 5: Results

In this section I present the empirical results for the examination of the relationship between board gender and age diversity and firm financial performance. Paragraph 5.1 shows the results for the difference of means test focused on gender diversity (table 3 and 4). Paragraph 5.2 and 5.3 elaborates on the results for the regression analysis of gender diversity (table 5 and 6) and age diversity (table 7 and 8).

5.1 Comparison of Means for firms with and without gender diverse boards

Table 3 shows the comparison of means for firms on the S&P 500 and the corresponding t-statistic and significance level. The test compared 192 firm-years without female directors to 2223 firm-years with women represented in the boardroom. Firm-years correspond to the examined 7 years (the period 2010-2016) of data for the firms in the sample. Over the period 2010 to 2016 the amount of female directors can differ for the same enterprise.

Table 3: Difference of Means test for the S&P 500

This table presents the results of the difference of means test for firm-years without women in the board compared to the firm-years with female board directors. The financial data is obtained from the Compustat-North America database and the board data is obtained from BoardEx – North America.

<i>S&P 500</i>			
<i>Variable</i>	<i>Mean for firm-years with zero female board directors (192 obs.)</i>	<i>Mean for firm-years with female board directors (2223 obs.)</i>	<i>T-statistic</i>
Tobin's Q	1.62	1.20	4.49***
ROA (%)	6.28	5.23	-1.51
Total Assets (in million \$)	11927.12	74822.69	-3.61***
Debt to Assets Ratio (D/A)	0.26	0.23	2.76***
Number of directors	8.66	11.23	-16.58***
Average age of board directors	70.12	68.85	5.04***
Standard deviation of Age	7.29	6.78	3.39***
Total Debt (in million \$)	3063.20	11248.30	-3.46***
Nationality Mix	0.11	0.13	-0.81

* = Significance at the 10% level

** = Significance at the 5% level

*** = Significance at the 10% level

According to table 3, the mean of Tobin's Q for firm-years without female directors is significantly higher (1.62) than the Tobin's Q mean for firm-years with female directors (1.20), at the 1% significance level. This result suggests that firms without female directors outperform firms with female board directors. This is an interesting result since I expected firm-years with female directors to perform significantly better. Unfortunately it is not possible to compare this result with the comparison of means for the ROA, since this comparison is not significant.

In addition, table 3 shows that firm-years without female board directors have fewer directors in the board, at the 1% significance level. This suggests that firms without female directors have smaller boardrooms. This suggestion is reflected in the comparison of means for the total assets, because not even larger boards but also larger firms are more represented by female directors. The total assets of enterprises without female directors are significantly lower than the total assets for firms with gender diversity in the boardroom. The total debt comparison reflects this suggestion. Firms without female directors have a significantly lower total debt than firms with female directors.

The average age of board directors is significantly higher, 2 years, for firms without women represented in the boardroom, at the 1% significance level. Corporations without female directors are smaller based on the total assets and total debt and have a smaller board that is represented by older directors. In addition, different nationalities are less represented in enterprises without female directors. However, this result is not significant.

Table 4 presents the comparison of means for corporations within the Nikkei 225- (panel 1) and the Oslo Børs sample (panel 2). Unfortunately, these samples are significantly smaller than the sample of the S&P 500, which is reflected in the lack of significant results in this comparison of means. For the comparison of means for Norwegian corporations, I compared enterprises with one female director to enterprises with more than one woman represented in the boardroom. This resulted in a comparison of 19 firm-years with one female director to 275 firm-years with more than one female director. The same significant result as for the S&P 500 occurred,

concerning the Tobin's Q. Corporations with one female director outperform firms with more than one woman in the boardroom, at the 1% significance level. In addition, firms with one female director have a significantly smaller board (4.16 directors) than firms with more than one female director. The standard deviation of age is significantly smaller in firm-years with one female director, while the S&P 500 firm-years without female directors have a significantly higher standard deviation of age than firm-years with more women present.

Table 4: Difference of Means test for the Oslo Bors and Nikkei 225

This table presents the results of the difference of means test for firm-years of the Nikkei 225 sample, where firm-years with no women in the board are compared to the firm-years with female board directors. The same comparison is executed for firm-years of the Oslo Bors sample. However, the firms on the Oslo Bors do not have boards without female directors. In the comparison of the Oslo Bors sample, firm-years with one female director are compared to firm-years with more than one female director.

Panel 1: Nikkei 225			
Variable	Mean for firm-years with zero female board directors (159 obs.)	Mean for firm-years with female board directors (51 obs.)	T-Statistic
Tobin's Q	0.61	0.52	1.11
ROA (%)	3.03	2.22	1.63
Total Assets (in million yen)	2.81e^7	2.59e^7	0.23
Debt to Assets Ratio (D/A)	0.147	0.155	-0.46
Number of directors	13.24	11.39	2.17**
Standard deviation of Age	5.64	6.24	-1.76*
Total Debt (in million \$)	5510207	4651518	0.44
Nationality Mix	0.084	0.19	-3.34***
Panel 2: Oslo Bors			
	Mean for firm-years with one female board directors (19 obs.)	Mean for firm-years with more than one female board directors (275 obs.)	T-statistic
Tobin's Q	4.54	1.79	3.63***
ROA (%)	9.41	-1.04	2.13**
Total Assets (in million Norwegian Krone)	486.79	110942.30	-1.21
Debt to Assets Ratio (D/A)	0.26	0.19	1.72*
Number of directors	4.16	7.33	-6.20***
Standard deviation of Age	5.01	7.83	-4.94***
Total Debt (in million Norwegian Krone)	203.99	23395.63	-1.07
Nationality Mix	0.24	0.31	-0.98

* = Significance at the 10% level

** = Significance at the 5% level

*** = Significance at the 10% level

The firm-years comparison for the Nikkei 225 sample (Table 4: panel 1) is different, since this test compares 159 firm-years without female directors to 51 firm-years with female directors. There is no significant difference between the Tobin's Q for firm-years with female directors to firm-years without. The difference in board size is vice versa compared to the S&P 500- and Oslo Børs comparison. Corporations without female directors have a significantly larger board than corporations with female directors, at the 5% significance level. Strikingly, the difference in the presence of nationality is significant. Firm-years with female directors appoint more different nationalities to the boardroom than firm-years without women. This suggests that gender diverse boards in Japan also diversify the boardroom with different nationalities. These enterprises are more open to a diverse board, which is reflected in more female directors, more nationalities and more age diversity. Namely, the standard deviation of age for boards with female directors is 6.24 against 5.64 for boards without female representation, at the 10% significance level.

5.2 Regression Results of Gender Diversity and Financial Performance

Table 5 presents the regression results of gender diversity and financial firm performance for corporations in the S&P 500 sample, over the period 2010 to 2016. The table is divided in four regressions with the Tobin's Q as measure for financial firm performance and four regressions with the Return on Assets (ROA) as measure for financial firm performance. The first regressions (1) show the independent effect of gender diversity, measured by the fraction of female directors in the boardroom, on Tobin's Q or ROA, with no industrial fixed effects and control variables. The second regressions (2) are controlling for board related variables: standard deviation of age, nationality mix and board size (natural logarithm of the number of directors) and the industrial effects. Additionally, the third regressions (3) control for board-level variables, industrial fixed effects and financial variables (firm size (natural logarithm of total assets) and debt to assets ratio (D/A)). The fourth regressions (4) investigate the effect of gender diversity, measured by the dummy 'women on board', on firm performance, controlled for all board-level, financial and industrial variables. The dummy 'women on board' values 1 when the firm-years have women represented in the boardroom and 0 for firm-years without female representation.

The effect of gender diversity on Tobin's Q for firms of the S&P500

The first regression (1) provides an insignificant positive effect of gender diversity on Tobin's Q, with a highly insignificant F-statistic. The same result occurs in the second regression (2), with no significant effect on firm performance for the board-level variables. The third regression (3) presents a significant positive effect of the fraction of female board directors on Tobin's Q, at the 5% significance level. Meaning that when the fraction of female board directors increases by 1 percent point the Tobin's Q increases by 0.007677. Assuming a fixed amount of total assets, the market value increases when the fraction of women increases. This result is verified in the fourth regression (4) with the dummy variable 'women on board'. At the 10% significance level the presence of women in the boardroom increases the Tobin's Q with 0.1799. Hence, there is a significant positive relationship between women in the boardroom and financial

Table 5: Regression Results of Gender Diversity and Financial Performance (S&P 500)

This table presents the results for the regression of gender diversity and financial performance for the S&P 500 sample. In the first four regressions I examined the effect of gender diversity on Tobin's Q and in the second four regressions the financial firm performance was measured as ROA. The first regressions (1) show the independent effect of gender diversity on firm performance. The second regressions (2) control for all the board-level variables as age, nationality and board size, while the third regressions (3) add the financial control variables. The fourth regressions (4) examine the effect of gender diversity with the dummy "Women on Board", equal to 1 for firm-years with female directors and equal to 0 for firm-years without female directors.

Variable	Tobin's Q				Return On Assets (ROA)			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Constant	1.2558 (0.000)***	1.4375 (0.004)***	3.3693 (0.021)**	3.3343 (0.022)**	0.0623 (0.000)***	0.1336 (0.000)***	-0.1221 (0.286)	-0.1125 (0.304)
The Fraction of Female Board Directors (F/T)	0.2434 (0.495)	0.3883 (0.325)	0.7677 (0.023)**		-0.0537 (0.048)**	-0.1022 (0.012)**	-0.0922 (0.058)*	
Women on Board Dummy				0.1799 (0.084)*				-0.013 (0.264)
Standard Deviation of Age		-0.0335 (0.107)	-0.0368 (0.079)*	-0.0359 (0.084)*		0.0024 (0.303)	0.0020 (0.289)	0.0020 (0.308)
Nationality Mix		0.2702 (0.522)	0.3962 (0.367)	0.3986 (0.368)		-0.0646 (0.120)	-0.0586 (0.251)	-0.0588 (0.255)
Board Size (LN Number of Board Directors)		0.0077 (0.967)	0.0995 (0.501)	0.0389 (0.786)		-0.0299 (0.056)*	-0.0452 (0.025)**	-0.0407 (0.045)**
Firm Size (LN Total Assets)			-0.2081 (0.094)*	-0.1944 (0.114)			0.0368 (0.020)**	0.0345 (0.018)**
Debt to Assets Ratio (D/A)			-0.7586 (0.023)**	-0.7364 (0.029)**			-0.3036 (0.000)***	-0.3072 (0.000)***
Industry/SIC Code Dummies	No	Yes	Yes	Yes	No	Yes	Yes	Yes
N obs.	2235	2235	2235	2235	2415	2415	2415	2415
N firms	341	341	341	341	345	345	345	345
R2	0.0063	0.0116	0.1924	0.1540	0.0002	0.0000	0.0121	0.0079
F-statistic	0.47 (0.4950)	1.01 (0.3998)	2.27 (0.0369) **	0.1638 (0.0784)**	3.92 (0.0476) **	2.57 (0.0377)**	2.53 (0.0207)**	2.88 (0.0018)**

* = Significance at the 10% level

** = Significance at the 5% level

*** = Significance at the 10% level

performance, measured as Tobin's Q. Both regressions show a significant negative effect between the debt to assets ratio and the Tobin's Q. When the amount of debt increases with one million dollar, the Tobin's Q decreases with 0.7586 (3) or 0.7364 (4), assuming a fixed amount of total assets. Moreover, the third regression states that firm size negatively influences firm value (Tobin's Q) with -0.2081, at the 10% significance level. The results of the standard deviation of age will be analyzed in the subsequent paragraph of this section.

The effect of gender diversity on Return on Assets for firms of the S&P500

The first regression (1), presented in table 5, shows a significant negative effect of the fraction of women in the board on ROA of -0.0537, at the 5% level. Meaning that when the fraction of female board directors increases by 1 percent point the ROA decreases by 0.000537. When controlled for board-level- and fixed industrial variables this negative effect increases to -0.1022. Meaning that when the fraction of female board directors increases by 1 percent point the ROA decreases by 0.001022. This same negative effect occurs when financial control variables are added to the regression (3), at the 10% significance level. The ROA decreases by 0.000922 when the fraction of female board directors increases by 1 percent point. This negative effect is relatively small compared to the positive effect on Tobin's Q. Regression 4 does not provide a significant result for the dummy 'Women on Board' on the Return on Assets. Hence, the relationship between gender diversity and the Return on Assets is negative, but small, when gender diversity is measured as the fraction of female directors, and insignificant when gender diversity is measured by the presence of women in the boardroom. The same negative relationship as for the Tobin's Q occurred between the debt to assets ratio and ROA. On the contrary, firm size has a positive effect on ROA, while firm size negatively influences Tobin's Q. Board size has a negative effect on firm performance measured by ROA, at the 5% significance level.

Table 6: Regression Results of Gender Diversity and Financial Performance (Nikkei 225 and Oslo Bors)

This table presents the results for the regressions of gender diversity and financial performance for the Nikkei 225- and Oslo Bors sample. In the first two regressions for each country I examined the effect of gender diversity on Tobin's Q and in the second two regressions for each country the financial firm performance was measured as ROA. The first regressions (1) show the independent effect of gender diversity, measured as the fraction of female directors in the boardroom. The second regressions (2) control for all board-level and financial variables.

Variable	Japan: Nikkei 225				Norway: Oslo Bors			
	Tobin's Q		Return On Assets (ROA)		Tobin's Q		Return On Assets (ROA)	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Constant	0.5558 (0.000)***	2.8471 (0.244)	0.0275 (0.000)***	-0.4771 (0.220)	2.1943 (0.154)	19.6383 (0.000)***	0.0260 (0.634)	0.3447 (0.427)
The Fraction of Female Directors (F/T)	1.2572 (0.037)**	1.2630 (0.056)*	-0.0116 (0.910)	-0.0914 (0.490)	-0.5683 (0.878)	-1.6447 (0.491)	-0.0755 (0.548)	0.0287 (0.848)
Standard Deviation of Age		-0.0125 (0.651)		-0.0085 (0.032)**		-0.1458 (0.206)		0.0047 (0.513)
Nationality Mix		-0.1676 (0.319)		-0.0086 (0.644)		-0.4126 (0.779)		-0.0903 (0.086)*
Board Size (LN Number of Board Directors)		-0.2921 (0.212)		-0.0193 (0.162)		1.0828 (0.290)		-0.2563 (0.011)**
Firm Size (LN Total Assets)		-0.0791 (0.575)		0.0410 (0.103)		-2.0474 (0.002)***		0.0231 (0.667)
Debt to Assets Ratio (D/A)		-1.6559 (0.022)**		-0.2494 (0.003)***		-1.1049 (0.275)		-0.4051 (0.031)**
Industry/SIC Code Dummies	No	Yes	No	Yes	No	Yes	No	Yes
N obs.	210	210	210	210	294	294	294	294
N firms	30	30	30	30	42	42	42	42
R2	0.0000	0.6172	0.0001	0.0051	0.0135	0.1798	0.0550	0.0003
F-statistic	4.37(0.0366)**	1.99 (0.1004)	0.01 (0.9095)	4.39 (0.0028)***	0.02 (0.8779)	4.74 (0.0009)***	0.36(0.5484)	5.81 (0.0002)***

* = Significance at the 10% level

** = Significance at the 5% level

*** = Significance at the 10% level

The effect of gender diversity on Tobin's Q and ROA for firms of the Nikkei 225 and the Oslo Børs

Table 6 presents the regression results of gender diversity and financial performance for the Nikkei 225- and the Oslo Børs sample. In the first two regressions for each country the effect of gender diversity on Tobin's Q is examined and in the second two regressions for each country the financial performance is measured by ROA. The first regressions (1) show the independent effect of gender diversity, measured by the fraction of female directors, on firm performance. The second regressions (2) are controlling for all board-level-, financial- and industrial variables.

For the 30 firms within the Nikkei 225 sample, the first regression provides a significant positive effect of gender diversity on Tobin's Q, at the 5% level. When the fraction of female directors increases by 1 percent point the Tobin's Q increases by 0.012572. The same positive effect occurs when controlled for board-level-, financial- and fixed industrial variables, at the 10% level. The Tobin's Q increases by 0.01263 when the fraction of female directors increases by 1 percent point. This positive effect is larger than the positive effect for the S&P 500 sample (0.007677), which can be caused by the fact that in Japan the average fraction of female directors is significantly low (2%). This suggests that electing female directors adds more value when female directors are scarce, while the positive effect is less present when women are already represented in the boardroom. The effect of gender diversity on ROA is insignificant for firms within the Nikkei 225 sample.

For 42 firms of the Oslo Børs sample, the regression results show a statistical insignificant effect for gender diversity at conventional levels. Unfortunately, based on these results there is nothing to say about the effect of gender diversity on firm performance for Norwegian corporations. The small number of observations in the sample and the gender quota of 40 percent may have caused this insignificant result. All corporations are almost fifty-fifty gender diverse, which diminishes the significance of the effect of more female directors. The result that stands out is the relatively small but significant negative relationship between different nationalities and firm performance, at the 10% level. When the fraction of different nationalities increases by 1 percent point the ROA decreases by 0.000903.

5.3 Regression Results of Age Diversity and Financial Performance

In table 7 the regression results of age diversity and financial performance are presented for enterprises of the S&P 500, over the period 2010 to 2016. The table is divided in four regressions with Tobin's Q as measure for financial firm performance and four regressions with the Return on Assets (ROA) as measure for financial firm performance. The first regressions (1) show the independent effect of age diversity, measured as the standard deviation of age. The second regressions (2) are controlling for board-level-, financial- and industrial variables. The third (3) and fourth (4) regressions examine the effect of age diversity, measured as the average age of board members, where the fourth regressions (4) control for all board-level-, financial- and industrial variables.

The effect of age diversity on Tobin's Q for firms of the S&P500

The second regression shows a statistical significant, negative effect of the standard deviation of age on Tobin's Q of -0.0368, at the 10% level. Meaning that when the standard deviation of age increases by one year the Tobin's Q decreases by 0.0368. This suggests that how smaller the difference in age is between board directors, how better the corporation financially performs. This suggests that directors with the same age work better together. The fourth regression shows a positive relationship between the average board age and Tobin's Q, at the 5% significance level. When the average board directors' age increases by one year the Tobin's Q increases by 0.1081. Hence, the election of older, experienced board directors improves the financial firm performance more than the election of younger, open-minded and creative board directors. These results suggest that the best board consists out of old, experienced directors who do not differ in age. The other financial- and board-level effects on Tobin's Q are extensively described in the previous paragraph.

The effect of age diversity on ROA for firms of the S&P500

Table 7 shows that the results are not statistical significant at conventional levels when examining age diversity on ROA and controlling for all board-level-, financial and industrial

Table 7: Regression Results of Age Diversity on Financial Performance (S&P 500)

This table presents the results for the regressions of age diversity on financial performance for the S&P 500 sample. In the first four regressions I examined the effect of age diversity on Tobin's Q and in the second four regressions the financial firm performance was measured as ROA. The first regressions (1) show the independent effect of age diversity, measured as the standard deviation of age, on firm performance. The second regressions (2) control for all board-level and financial variables. The third regressions (3) show the independent effect of age diversity, measured as the average age of board directors in the firm, on firm performance. The fourth regressions (4) control for all board-level and financial variables.

Variable	Tobin's Q				Return On Assets (ROA)			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Constant	1.4142 (0.000)***	3.3693 (0.021)**	3.0989 (0.027)**	-4.1270 (0.246)	0.0373 (0.000)***	-0.1221 (0.286)	0.1841 (0.005)***	0.1508 (0.587)
The Standard Deviation of Age	-0.0172 (0.133)	-0.0368 (0.079)*			0.0023 (0.092)*	0.0020 (0.289)		
Average Board Directors' Age			-0.0261 (0.199)	0.1081 (0.011)**			-0.0019 (0.047)**	-0.0039 (0.348)
Gender Ratio (F/T)		0.7677 (0.023)**		0.7675 (0.023)**		-0.0922 (0.058)*		-0.0917 (0.058)*
Nationality Mix		0.3962 (0.367)		0.3631 (0.413)		-0.0586 (0.251)		-0.0571 (0.257)
Board Size (LN Number of Board Directors)		0.0995 (0.501)		0.0051 (0.974)		-0.0452 (0.025)**		-0.0401 (0.029)**
Firm Size (LN Total Assets)		-0.2081 (0.094)*		-0.2045 (0.104)		0.0368 (0.020)**		0.0365 (0.020)**
Debt to Assets Ratio (D/A)		-0.7586 (0.023)**		-0.7442 (0.027)**		-0.3036 (0.000)***		-0.3044 (0.000)***
Industry/SIC Code Dummies	No	Yes	No	Yes	No	Yes	No	Yes
N obs.	2235	2235	2235	2235	2415	2415	2415	2415
N firms	341	341	341	341	345	345	345	345
R2	0.0260	0.1924	0.0058	0.0664	0.0101	0.0121	0.0114	0.0092
F-statistic	0.72 (0.3960)	2.27(0.0369)**	1.65 (0.1990)	3.47 (0.0024)***	2.85 (0.0916)*	2.53 (0.0207)**	3.95 (0.0469)**	2.71 (0.0138)**

* = Significance at the 10% level

** = Significance at the 5% level

*** = Significance at the 10% level

variables. However, it must be pointed out that the significant independent effects of age diversity on ROA of regressions (1) and (3), differ from the effects on Tobin's Q. These independent effects suggest that a board with more age diversity and younger directors improves the return on assets. However, these effects disappear in the regressions 2 and 4. As for the Tobin's Q, the elaboration on board-level and financial effects is extensively discussed in the previous paragraph.

The effect of age diversity on Tobin's Q and ROA for firms of the Nikkei 225 and the Oslo Børs

Table 6 presents the regression results of age diversity and financial performance for corporations within the Nikkei 225- and Oslo Børs sample. The first and second regressions for each country examine the effect of age diversity on Tobin's Q and the third and fourth regressions for each country examine the financial performance by ROA. The first regressions (1) show the independent effect of age diversity, measured by the standard deviation of age. The second regressions (2) are controlling for all board-level-, financial- and fixed industrial variables. Unfortunately, the average age of board directors was not available for corporations in Japan and Norway.

Caused by the small samples, the effect of age diversity for firms within the Nikkei 225- and the Oslo Børs sample is not statistically significant at conventional levels. However for the Japanese sample, the standard deviation of age has a significant negative effect of -0.0085 at the 5% level on financial firm performance, measured by ROA. Meaning that the Return on Assets decreases with 0.0085 when the standard deviation increases with one year. This suggests that in Japan the rule, '*the old boys govern best*', applies. For the corporations in Norway, the results are too insignificant to suggest any relationship. As for the S&P 500, the elaboration on board-level- and financial effects is extensively discussed in the previous paragraph.

Table 8: Regression Results of Age Diversity and Financial Performance (Nikkei 225 and Oslo Bors)

This table presents the results for the regressions of age an financial performance for the Nikkei 225- and Oslo Bors sample. In the first two regressions for each country I examined the effect of age diversity on Tobin's Q and in the second two regressions for each country the financial firm performance was measured as ROA. The first regressions (1) show the independent effect of age diversity, measured as the standard deviation of age within the boardroom. The second regressions (2) control for all board-level and financial variables.

Variable	Japan				Norway			
	Tobin's Q		Return On Assets (ROA)		Tobin's Q		Return On Assets (ROA)	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Constant	0.6246 (0.000)***	2.8471 (0.244)	0.0576 (0.000)***	-0.4771 (0.220)	3.1545 (0.011)	19.6383 (0.000)***	0.0389 (0.535)	0.3447 (0.427)
Standard Deviation of Age	-0.0067 (0.794)	-0.0125 (0.651)	-0.0053 (0.066)*	-0.0085 (0.032)**	-0.1548 (0.221)	-0.1458 (0.206)	-0.0334 (0.597)	0.0047 (0.513)
The Fraction of Female Directors (F/T)		1.2630 (0.056)*		-0.0914 (0.490)		-1.6447 (0.491)		0.0287 (0.848)
Nationality Mix		-0.1676 (0.319)		-0.0086 (0.644)		-0.4126 (0.779)		-0.0903 (0.086)*
Board Size (LN Number of Board Directors)		-0.2921 (0.212)		-0.0193 (0.162)		1.0828 (0.290)		-0.2563 (0.011)**
Firm Size (LN Total Assets)		-0.0791 (0.575)		0.0410 (0.103)		-2.0474 (0.002)***		0.0231 (0.667)
Debt to Assets Ratio (D/A)		-1.6559 (0.022)**		-0.2494 (0.003)***		-1.1049 (0.275)		-0.4051 (0.031)**
Industry/SIC Code Dummies	No	Yes	No	Yes	No	Yes	No	Yes
N obs.	210	210	210	210	294	294	294	294
N firms	30	30	30	30	42	42	42	42
R2	0.0002	0.6172	0.0078	0.0051	0.0185	0.1798	0.0005	0.0003
F-statistic	0.07 (0.7943)	1.99 (0.1004)	3.39 (0.0657)*	4.39 (0.0028)***	1.50 (0.2210)	4.74 (0.0009)***	0.38(0.5353)	5.81 (0.0002)***

* = Significance at the 10% level

** = Significance at the 5% level

*** = Significance at the 10% level

Section 6: Conclusion

This paper provides empirical evidence on the worldwide-discussed relationship between board gender and age diversity on firm performance (Tobin's Q and ROA) for enterprises in the United States (S&P 500 index), Norway (Oslo Børs) and Japan (Nikkei 225 index), over the period 2010 to 2016. Recent developed theories and empirical evidence provide different outcomes. This study finds that corporations without female board directors outperform corporations with female directors. On the contrary using panel regressions, the results show a positive effect of gender diversity on Tobin's Q and a small negative effect on ROA. This inconclusive result is similar to the conclusion of various previous studies that found different relationships using different measures of firm performance. The Nikkei 225 sample provides a larger positive effect of gender diversity on Tobin's Q than the S&P 500 sample. Female directors contribute to additional value in Japan, which should be an important factor in the development of Japan's new corporate governance system. The results for Norwegian corporations are not statistically significant at conventional levels. The Nikkei 225- and Oslo Børs sample were too small, to be able to provide statistical significant evidence on the effect of gender diversity.

Age diversity (standard deviation of age) has a significant negative effect on Tobin's Q and a statistical insignificant effect on ROA. In addition, boards of listed firms with older, experienced directors outperform firms with younger, open-minded and creative directors. Older directors have more accumulated experiences, which positively influences their ability to handle operations and decisions. For Nikkei 225 corporations this same conclusion applies. The results for Norwegian corporations are not statistically significant at conventional levels.

In corporate finance, the renowned problem of endogeneity arises when examining board composition and firm value. This problem is one of the major critical points in my examination, since I was not able to solve this problem within the time frame. For further research, it is recommended to tackle this problem with a 2SLS regression and the instrumental variable constructed by Adams and Ferreira (2009). In addition, it is recommended to create larger data samples for examining Japanese and Norwegian corporations, with more board-level controlling variables. For Norwegian corporations, further research can focus on firm performance before and after the implementation of the gender quota in 2007.

Section 7: Literature

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