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BI Norwegian Business School  
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**Master Thesis**

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**Looking through the Glass Ceiling  
Women and Power: Leadership in  
Norwegian Firms**

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## **Abstract**

This paper examines two important factors that describe female leadership in Norwegian firms. First, the main determinants of having a female CEO, and, second, the impact a female CEO has on firm performance. In other words, the main question the paper raises is if women-led companies are distinguishable in any detectable and relevant way. I analyze the influence of women in the executive suite across different samples of firms (LTD, and PLC) and divided in two time periods (prior Norwegian gender quota 2000-2004, and post Norwegian quota 2005-2009).

Results indicate that after the quota, the number of women in CEO positions had considerably increased which suggests that the reform had promoted women not only on the board level, but also on the CEO level. Moreover, the findings show that after the quota, women CEOs had become more dominant in certain industry sectors (such as financial and transportation sectors), obtaining higher salaries than men CEOs.

Nevertheless, the present paper argues that having a woman CEO has a neutral or negative effect on the firm. There is no relevant evidence that there is a significant relationship between firm performance and women CEO's characteristics. If previous researches such as Adler (2001) and Deszo & Ross (2008) show that female participation in the board of the company has a positive effect on firm performance, the present paper shows that not the same positive effect can be acclaimed when having a woman CEO.

## I. Introduction

The objective of this paper is to analyze the particular source of diversity in corporate governance and top management, namely, that attributable to the participation of women. The issue of gender diversity has been discussed both in the academic literature and in the popular press. Among numerous aspects connected to the issue, recent studies have investigated the so-called “glass ceiling effect<sup>1</sup>” that refers to obstacles women have to face in their way of reaching the highest levels of power in top management.

The resilience of the glass ceiling can be accounted for in many ways. Whether the concept is highlighted as the “semi-hard glass ceiling” (Agrawal and Knoeber 2001) or the “ultimate glass ceiling” (Arfken et al. 2004), women feel that as further as they climb on the higher levels of management, the more intense they sense a sort of male brotherhood from which they are excluded. At the executive level, the glass ceiling apparently persists.

Therefore, it is important to measure women’s participation in executive suite in financial terms. It is a challenge to try and commensurate the impact that women have both on corporate policies and on corporate finance. Not only is performance measured in various ways, but women’s contribution to firm performance is also quantified by numerous factors (experience, background, motivation, and others). Some papers measure firm performance by normal stock-market returns (Adams and Ferreira 2004), ROI (return on investment), or CAR (cumulative abnormal returns (Nygaard 2011)). The performance measures I used in the paper are ROA (Return on Assets), and Profit-to-sales-ratio.

Most companies are founded by an individual who is likely to be both the owner and the manager. The manager and the CEO remain in charge of their businesses as they grow, being responsible for their direction and their management (Cadbury 2002).

Executives can affect firm outcomes as they can consistently influence key decisions in their firms. Therefore, I believe it is important to analyze the connection between firm performance and CEO’s characteristics and examine whether there are strong relationships among the factors.

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<sup>1</sup> The pioneering book in this area was Morrison et al.’s *Breaking the Glass Ceiling*. The book brought the term “glass ceiling” into the lexicon in 1987.

Furthermore, the paper examines the extent to which women have vanquished the glass ceiling by empirically analysing if there has been an increase in women's representation in CEO positions, especially after the Norwegian gender quota was mandated in 2005. Therefore, it is important to discuss policies currently implemented in some countries and organizations to foster the advancement of women in business. Norway is one of the countries that has the most participation of women in top management.

Nevertheless, the large proportion of women on the firm's board of directors might be due to the quota mandated in December 2005 rather than women's efforts to break the glass ceiling by their own forces. In such a situation, when women are being promoted just because the company has to comply with the law, then women's strengths may go unrecognized and silence may lead to the obsolete belief that women bring nothing new to the table. Conversely, some directors may become what sociologists call the "Queen Bee": they take advantage of their token status posing as the single representative in their collectivity as they excessively criticize their potential women peers (Hemingway and White 2009).

The aim of the present paper is to extrapolate previous researches both on gender studies, and on the impact female members from the board of directors have on firm performance to a more specific aspect of female leadership. Namely, the research narrows down to female representation at the highest level of the firm, the CEO level.

This paper contributes to the economic literature on gender and top management by attempting to find the main firm characteristics that determine the gender of the CEO, and which factors make a firm more likely to have a female CEO rather than a male CEO. Moreover, the research is expanded to the examination of the well-known chicken-and-egg problem – do women change their working environment after reaching the highest level in corporate promotion, or do women reach the top of the pyramid because they work in an environment that is already favourable to them? In other words, is firm performance dependant on the CEO gender or is the CEO gender dependent on firm characteristics?

Since the mid-1980s, advocates for women have worked hard to convince the business world that women are as capable as men in high executive positions. Therefore, their inclusion in the executive suite contributes to the goodwill of the company (Adler 2001). Adler's study brings evidence that 215 Fortune 500 firms (from 1980 to 1998) show a strong correlation between promoting women into the executive suite and high profitability. Under three measurements of performance (profits as a

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Looking through the Glass Ceiling. Women and Power: Leadership in Norwegian Firms percentage of revenues, profits as a percentage of assets, and profits as a percentage of stockholder's equity), Adler's study proved that firms that had women in the executive suite had better results than the other firms. However, another related study from 1999, shows that there had been no progress with respect to women as CEOs from 1987 to 1996, and there was no evidence that such progress would likely be forthcoming in the future (Daily 1999, 96-97).

I will investigate whether there has been a progress in this regard by examining all Norwegian firms (both PLC and LTD) over the past decade. A specific aspect that I will take into account is the Norwegian gender quota obliging all PLC companies to have 40% females on the board of directors. The government mandated the quota in 2005. All PLCs registered after 1<sup>st</sup> January 2006 had to comply with the quota immediately. As for the other existing firms, they were given an interval of two years to meet the requirements of the law.

Therefore, I will examine if the quota had an impact not only on board composition, but also on the changes in the CEO positions. In other words, are there significantly more women CEOs after the quota was implemented?

The present study examines one of the most debated diversity issues, not only in terms of board diversity, but also in terms of female participation in the highest levels of management. These aspects are of imperious importance for policy makers. In recent years, there has been more and more pressure from both society and investors to assign women to director positions in corporations. This increasing pressure has led to equality laws in some countries, including Norway, which is of focus in this paper. Daily and Dalton (2003) consider that increasing female participation in higher levels of management is a business imperative. One of the reasons is that in a complex business environment, firms must make use of all available resources to compete effectively and women represent half of the workforce. Therefore, it is not efficient to loose the expertise, skills, knowledge, and background of females, which could contribute to the goodwill of the company.

The paper is organized as follows: *section 1* reviews the literature on corporate governance, board composition, and female representation in top management positions; *section 2* presents the data and the methodology; *section 3* analyzes the main determinants of CEO gender across different samples of firms and different time periods; *section 4* looks at whether female-led companies perform better than male-led companies; *section 5* summarizes the results and concludes; *section 6* presents the limitations of the study.

## II. Literature Review

Motto: *What the world needs today is not more competition but woman's native genius for sympathetic co-operation.* (Meyer 1953, p. 397)

### Overview of Corporate Governance Literature

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, 737). This refers to the *agency problem* often known as the separation of ownership and control or the separation of management and finance. According to the definition given on the Oslo Stock Exchange (Oslo Børs) official website, corporate governance addresses the triangular interaction between a company's shareholders, board of directors, and management. In a somewhat wider context, corporate governance also embraces the relationship between a company and parties other than shareholders, such as employees, creditors, the local community, and other parties with whom the company has a connection.<sup>2</sup>

In Shleifer and Vishny's paper (1997), *A Survey of Corporate Governance*, the authors are dealing with the separation of financing and management as they are trying to analyze how this dissociation is handled with both in theory and in practice. Various methods and suggestions are given so as investors recuperate the money from the managers. Whether incentive contracts are offered to the managers<sup>3</sup>, legal protection to the investors and even considering the concentration of ownership<sup>4</sup> as a way of leveraging up legal protection, the managers of the companies should serve the interests of all shareholders and not only theirs.

When dealing with concentration of ownership, it is debatable which part should own more (the state, the institutional, the personal, the industrial or the international owners) in order to emulate countries with good corporate governance systems such as those suggested by Shleifer and Vishny (1997) – United States, Germany, or Japan. Obviously, the type of governance system will strongly depend on which cultural and

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<sup>2</sup> In one word, *stakeholders* of the company.

<sup>3</sup> The forms of incentive contracts are: share ownership, stock options, and threat of dismissal if income is low (Berle and Means 1932 cited in Shleifer and Vishny 1997).

<sup>4</sup> The forms of concentration are: large shareholders, takeovers, and large investors.



legal framework the companies employ. For instance, most of the studies on large ownership structure focus on the U.S and UK firms. The findings of Short and Keasey (1998) confirm that national culture and governance systems have a major influence on the inception point at which managerial entrenchment occurs. Thus, a wider examination on the relationship between firm value and managerial ownership across different countries might bring new insights.

In the attempt of discovering which represents the best fit of management ownership so as to maximize the value of a firm, numerous researches have been made in this field. One of the most representative is *Management, Ownership and Market Valuation: An Empirical Analysis* (Mork et al. 1986). The paper uses a sample of 456 of the Fortune 500 U.S firms and investigates the relationship between management ownership and market valuation of the firm measured by Tobin's Q. The results show a positive relationship between ownership and Q in the 0% to 5% board ownership range, a negative and less pronounced relation in the 5% to 25% range and a further positive relation beyond 25%. In a related and more up to date study, Bhabra et al. (2003) examines the curvilinear relationship between director's equity ownership and firm performance in the Singaporean economy. Firm value is also measured by Tobin's Q, and the findings indicate that Q is positively related to director ownership in the 0% to 20.34% range, negatively related in the 20.34% to 52.73% range, and again positively related when directors' ownership exceeds 52.73%. These inflection points are higher than the ones in Mork, Shleifer, and Vishny (1986) of U.S firms. In addition to the 1986 study, the research in Singaporean firms analyzes this relationship among three sub-samples of firms: *founder*, *government linked corporations*, and *corporate*.

In other connected research, Demsetz and Lehn (1985) find a simple linear relation between profit rate (as an alternate measure of firm performance) and ownership by large shareholders, in contrast to Mork et al. (1986), who focus on ownership by management only. However, when estimating the relationship between the profit rate and board stake, Mork et al. (1986) get consistent results with the previous study from 1985. More refined results are obtained in later studies which capture a rather nonmonotonic relationship between profits and board ownership.

### Board Composition and the Norwegian Gender Quota

It is often questioned what is the role exerted by the boards and to what extent does their role matter within a corporation. By performing a linear regression between financial performance and governance attribute (e.g., measured by board size) gives an apparent negative relation which could easily lead to the conclusion that a firm would do better if it diminished the size of the board. However, as the survey by Adams et al. (2010) shows, this is not the case as for a given firm there is a nonmonotonic relation between the attribute and financial performance.

In the Adams et al. (2010) survey on the role of board of directors in corporate governance, possible answers range from boards' being simply legal necessities, something akin to the wearing of wings in English courts, to their playing an active part in the overall management and control of the corporation. Other possible roles might be: setting the strategic direction of the company, the corporate policies, the overall direction, mission and vision (Demb and Neubauer 1992 cited by Adams et al. 2010). Another important role ascribed to directors is control of the process by which top executives are hired, promoted, assessed, and, sometimes, even fired.

In my paper, I analyze the observable category of characteristics with focus upon gender. Gender is one of the most discussed diversity issue not only within corporations, but also in politics. Along the years there have been various quota systems aimed to raising representation of women both in government structures<sup>5</sup>, and also on boards. One example is the coalition of the Norwegian government in 2002 who asked companies to comply with a new quota that all public limited companies should make their boards be comprised of 40% female<sup>6</sup> members. The gender equality rule does thereby not apply to private limited liability companies. The stated reason for not including the private companies is the typical nature of Norwegian private companies. Their shares are less dispersed compared with public companies (as only public companies can offer shares to the public), and Norwegian private companies are

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<sup>5</sup> Gender quotas exist for political parties in countries such as France and Sweden.

<sup>6</sup> A weaker imitation of the law passed by the Norwegian government is the Spanish government's Gender Equality Act (*Ley de Igualdad*) in March 2007. The law requires that 40% of candidates on political party ballots should be female, and it encourages greater employment of women by giving companies with greater ratio of female to male employees preferential treatment when bidding for government contracts. It also recommends, but does not require, firms negotiating for public contracts to have at least 40 % of the least represented gender on their boards by 2015 (Miguez and Martin).

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Looking through the Glass Ceiling. Women and Power: Leadership in Norwegian Firms typically family-controlled with the shareholders also being the members of the board (Reiersen and Sjøfjell 2008).

The quota was mandated on 9<sup>th</sup> December 2005 and was only addressed to public limited companies (PLC). The deadline for meeting the new regulation was 2008 and the sanction for non-compliance was firm liquidation (Nygaard 2011). Therefore, according to the Norwegian Business Register, by 2008 all PLC firms were in accordance with the law. However, some firms succeeded in evading the law by converting from PLC to LTD corporate form. Results from the abovementioned paper suggest that, indeed, the conversion rate is associated with the quota. Nevertheless, for the non-listed PLC firms, results show that there is a strong negative correlation between the conversion decision and the share of female directors in both 2006 and 2007. This is consistent with the fact that the quota only had an impact after it was mandated in December 2005 (Nygaard 2011).

A similar study examines the differences in firm performance measured by profit among both listed and non-listed Norwegian firms. Matsa and Miller (2011) proved that the impact of the quota is negative: profits declined after 2006 by 2.7 % of assets among listed firms relative to the change in profits in unlisted firms during the same time period.

Using a sample of 200 large U.S firms, Shrader et al. (1997) did not find any significant relationship between the percentage of women in the upper management and firm performance. In 2009, Adams and Ferreira studied a sample of firms from 1996-2003 and found a negative relationship between gender diversity and both ROA and Tobin's Q. In another study of 250 listed companies from 200-2006, Hussein and Kiwia (2009) found no relationship between female board representation and Tobin's Q.

However, Adler's (2001) results are different from previous ones. He found that there is a strong correlation between women-friendliness and firm profitability. The sample in his study comprised of 25 Fortune 500 firms and showed a strong participation of women in executive slots. In Canadian firms, Francoeur, Labelle, and Sinclair-Desgagne (2007) found a positive correlation between female officers and financial performance, but no relationship between women directors and performance.

Adams and Ferreira's results from the 2009 paper suggest that mandating gender quotas for directors can reduce firm value for well-governed firms. This result could

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Looking through the Glass Ceiling. Women and Power: Leadership in Norwegian Firms occur because token<sup>7</sup> members are often marginalized as representing the “women’s” or the “minority’s” point of view, as if it were a monolithic position (Rhode 2010, 18).

According to Martin’s survey (2007) on women power on higher levels of management from France, often, women regard quotas as rather pernicious for them. Imposing women by force could be, in a way, looking down on them. A specific quota for women could be interpreted as an underestimation of the women’s capability to move beyond the glass ceiling through merit, competence, and courage (Martin 2007).

Another important paper on women representation on boards is Adams and Funk’s study from 2009. Their findings show that women who made it past the glass ceiling have something particular. Unlike women in general, women directors seem to be more prone to risk. Adam and Funk (2009) surveyed CEOs of publicly traded Swedish firms and showed that female and male directors differ systematically in their core values and risk attitudes. Even though, in general, women are more risk averse than men, the results from the survey show that female directors are more inclined to take risks than men are.

In the case that women directors are, indeed, more risk loving than men directors, then one would expect a firm with more women on board to perform better. Performance is a broad term and includes not only profitability, but also risk. Markowitz marked these aspects when he first developed the Portfolio Selection Theory. Therefore, an investor will take more risk because he/she assumes to obtain more profitability and vice versa. Firms with less risky investments will have less profitability.

Further research in a wide number of countries would facilitate a comparative study of the impact of institutional and cultural differences of diversity factors both on the CEO and on the board of directors. As far as gender is concerned, according to Catalyst<sup>8</sup> 2012 news report, the Swedish corporate boards have 27.3 % female members; Finland has 24.5 %, Canada 10.3 %, and Denmark 13.9 %. By contrast, women occupy fewer than 10% of corporate seats in China (8.5 %), Mexico (6.8 %), and the Arab countries.

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<sup>7</sup> Tokenism is a formal or superficial compliance with a law, requirement, convention, especially in the hiring of members of a minority group.

<sup>8</sup> Catalyst is the leading research and advisory organization in North America which fosters the advancement of women in business.

### The CEO's Characteristics and his Role in the Company

Even though it would be at least challenging to analyze the structure of the board and correlate it with firm performance and with other efficiency indicators, the present paper is describing the relationship of the CEO with the board and the way the CEO's attributes influence the firm's performance.

Boards and CEOs' attributes have been a subject of interest in a wide range of domains: including accounting, management, law, sociology, and psychology. From the financial point of view, a deeper insight towards the board of the companies as well as a more detailed view upon its role and its relationship with the CEO of the company may offer new approaches of the agency problem (in the way that the CEOs' incentives could be misaligned with those of the shareholders').

According to Hermalin and Weisbach's survey from 2010 on board of directors and CEOs, a CEO that has a good performance can win on two sides: he might bargain for more compensation and he might also bargain on the degree of the board's independence because it is assumed he would rather prefer to remain CEO than be fired.

An interesting aspect worth dwelling upon is observing the evolution of the CEO's salary in parallel with board independence and monitoring by the board. An increase in the CEO's salary signals that the board is more willing to budge on the issue of independence (willingness to monitor) than salary; hence, there is movement on independence (Adams et al. 2010). A CEO who performs well faces a less independent board, whereas a CEO who performs poorly is susceptible to being fired or replaced. As a conclusion, measures of CEO bargaining power, tenure, and the CEO's share are negatively correlated with board independence.

Adams's (2010) results are in accordance with Ryan and Wiggins's (2004) findings that show that a CEO's pay becomes less linked to equity performance as his control over the board increases (proxied by his tenure and proportion of insiders). These results are similar to the ones obtained by Babchuk, Cremers, and Peyer (2010) who found that higher CPS<sup>9</sup> is associated with lower firm value, lower accountability, profitability, and lower stock market returns accompanying the filling of proxy statements for periods where CPS increases.

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<sup>9</sup> CPS (CEO Pay Slice) is the fraction of the aggregate compensation of the firm's top-five executive team captured by the CEO (Adams, Almeida and Ferreira 2005).

Nevertheless, in the organizational literature, there is some controversy whether top executives matter. It is debatable whether the CEO exercises power over firm profitability. Malmendier and Tate (2005) and Bertrand and Schoar (2003) cited by Adams, Almeida and Ferreira (2005, 1405) found some characteristics of top executives that are related to firm outcomes. These characteristics, often being the source of diversity, are of two categories: observable ones, which are readily detectable attributes of directors, and less visible ones, such as background of directors (Miliken and Martins 196 cited by Kang et al. 2007). On one hand, the observable diversity category includes race ethnic background, nationality, gender, and age. On the other hand, the less observable diversity category comprises educational, functional and occupational backgrounds, industry experience, and organizational ownership.

#### Women Power at the CEO Level

Barnard (2006, 315-316) names the women who get to the top or near the top of their respective corporate pyramids the “Alpha Women”, and those who are CEOs, the “Elite”. Barnard’s survey on women who break the glass ceiling gives a different view on the circumstances under which women enter the executive sector.

Women reach the top management especially when risk of failure is extremely high. This is consistent with Ryan and Haslam’s “edge-of-the-cliff” theory that occurs when women become the heads of troubled companies. Therefore, Ryan and Haslam hypothesised a particular scenario: “Rather than the appointment of women leaders precipitating a drop in company performance, it is equally plausible that a company’s poor performance could be a trigger for the appointment of women to the board”. A good example in this sense is Anne Mulcahy who was promoted to CEO of Xerox Corp. in August 2001. According to *Business Week* (2004), the time Anne was promoted, the company was “in terrible shape” and “it looked like a lost cause”. What is remarkable about the story is that the company returned to profitability at the end of 2001.

However, Anne Mulcahy is not the only woman CEO who accomplished a corporate resurrection that seemed less likely at that moment in time. Mary Sammons - CEO of Rite Aid Corp., and Pat Russo – CEO of Lucent Technologies Inc. achieved a successful business turnaround when the companies were in precarious conditions.

Even though there has been evidence showing that women participation in the boardroom is positively correlated with firm performance (Adler 2001; and Deszo & Ross 2008), findings from this paper suggest that having a female CEO is not

systematically related to performance. This result implies that there might be something particular about the CEO position, which interferes with the effectiveness of female managers. Niederle and Vesterlund (2007) offer a possible explanation for the inability or unwillingness of women to achieve at least as good results as CEOs as they do when having board positions. For example, women have to face a series of milestones in their way beyond the glass ceiling. These obstacles could be represented by women's aversion to competitive environments or men's reluctance in cooperating with women.

Further evidence sustains the negative or neutral effect of women CEOs on firm performance. The paper of Wolfers (2006) indicates that having a female CEO has no effect on firm performance. However, the author notes that his finding of a "zero gender effect" could leave space for interpretation. It could either mean that female CEO's perform similar to men, or that the statistical power of the test is weak. There is also evidence that the stock market reacts unfavourably to the hiring of a female CEO (Lee and James 2007).

It is widely known that CEOs are in their majority male, and according to Deszo and Ross (2008), *ceteris paribus*, men tend to be more favourably evaluated in roles occupied mainly by men. Eagly and Johnson (1990) motivate that women have less incentives to deviate from "masculine" behaviour when occupying such roles. Thus, a firm with a female CEO may have a poorer performance.

All in all, the literature on senior management and its effects is wide as evidence is found at least since Barnard (1938). Economists have also taken a recent interest in the topic (e.g., Rhode 2010; Cremers and Peyer 2010). However, academic work on the relationship between female participation in top management and firm performance is relatively sparse. Most of the scientific papers focused on finding a relationship between board composition and firm performance (Adler 2001, Adams and Ferreira 2003, Matsa and Miller 2010) and very few on the connection between the CEO and firm performance.

In my paper, I will investigate whether the number of female directors is associated with having a woman CEO over two time periods (prior the Norwegian gender quota and post quota) for all Norwegian firms. In other words, I will examine if female power at the CEO level became stronger or not after the quota.

Moreover, I will extend the previous studies on the Norwegian quota and its effects on firm performance towards a different level of management: the CEO level. I will attempt to answer the following questions: are women making their firms perform better or have better performing firms been promoting women to senior positions? Are

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only the better performing firms using their female human capital at their best? There  
are many metrics to answer these questions, but I will focus on finding a possible  
association between the gender of the CEO and financial performance measured by  
ROA and Profit-to-sales ratio for all Norwegian firms.



## II. Data and Methodology

### II.1. CCGR Database

The data used in the study was obtained from the database created by CCGR (*Centre for Corporate Governance Research*) at BI Norwegian Business School. According to the CCGR website, the centre's objective is to improve the insight into how the governance of firms influences the welfare of its stakeholders. CCGR pays special attention to the private industry in general, and to non-listed firms and family firms in particular.

CCGR focuses on empirical research and primarily studies Norwegian firms. CCGR database contains data that are difficult to obtain in other countries (such as unusually detailed ownership data for listed firms, and high-quality accounting data for non-listed firms) or data that reflects institutional environments that are unique internationally (such as mandatory representation of employees and females on the board of directors).

As of 2012, the CCGR database consists of six tables and has 16 years of accounting data on corporate governance from 1994 to 2010, and 9 years of data on corporate governance from 2000 to 2009.

My study comprises all Norwegian firms, both PLC and LTD over a period of nine years, from 2000 to 2009. *Allmennaksjeselskap* (literally "all men stock company"), or ASA, is the Norwegian term for a public limited company. "ASA" or "asa" is added to the company name of all Norwegian companies registered as *Allmennaksjeselskap*. ASA is an organizational form for large companies with numerous shareholders, liquid stock, and with minimum capital requirements that are ten times larger than the requirement for AS firms. ASA firms may or may not list shares on a public stock exchange, while an AS firm cannot list their shares on a public exchange.

AS form of organization is destined for small companies with few shareholders and less liquid stock. An important difference between the two forms of organization is that only PLC (ASA) firms are subject to the Norwegian quota (Nygaard 2011). Moreover, the ASA differentiates from the *Aksjeselskap* or AS in that it has rules regulating its ownership. There cannot be any rules limiting the company's ownership to

certain interests and an ASA must offer a public tender to purchase stock, either new stock or from existing owners if the company is converted from an AS (Matsa and Miller 2011). Norwegian companies listed on the Stock Exchange must be ASAs. Norwegian banks are also ASAs, but they are exempt from certain regulation, including ownership regulation.

In my research, I assume that all companies are independent. Therefore, I considered relevant to include in my analysis the corporate governance structure of subsidiaries, and parent companies as well.

## **II.2. Samples**

I filtered the data choosing an interval of nine years from 2000 to 2009 and I ruled out all the small firms. I panelled the data into three subsamples: listed PLC firms on Oslo Stock Exchange (Oslo Børs) or Oslo Axess, non-listed PLC, and all LTD firms.

According to the Oslo Stock Exchange official website, listing on Oslo Stock Exchange represents a full stock exchange listing that complies with all EU requirements, while listing on Oslo Axess gives companies access to an authorized and fully regulated marketplace. Listed companies are subject to all the obligations of stock exchange listing, regardless of the marketplace on which they are listed. Norwegian public limited companies and equivalent foreign companies can apply for their shares to be listed on Oslo Stock Exchange or on Oslo Axess.

Oslo Stock Exchange is the most probable choice for larger companies that have an established track record and a wide distribution of shareholders. The Oslo Stock Exchange marketplace does not accept companies that are in a pre-commercial phase. On the other hand, Oslo Axess is more appropriate for companies that have less than three years' since their establishment, but seek for benefits associated with listing on a regulated marketplace<sup>10</sup>. Therefore, it can be concluded that Oslo Axess has more relaxed requirements than Oslo Stock Exchange.

I corrected for LTD (AS) firms that were registered as listed in the CCGR data set as I considered these registrations as measurement errors. If a company can sell stocks on the exchange, it is by definition publicly traded and, therefore, not a private company.

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<sup>10</sup> [http://www.oslobors.no/ob\\_eng/Oslo-Boers/Listing/Shares-equity-certificates-and-rights-to-shares/The-difference-between-Oslo-Boers-and-Oslo-Axess](http://www.oslobors.no/ob_eng/Oslo-Boers/Listing/Shares-equity-certificates-and-rights-to-shares/The-difference-between-Oslo-Boers-and-Oslo-Axess)

### II. 3. Descriptive Statistics

In this section of the paper, I briefly present the framework of the Norwegian quota and the descriptives for the data.

#### The Norwegian Quota

Policymakers in Europe have started to foster women's enhancement in business leadership by adopting gender quotas for corporate boards of directors. Among the countries that took into consideration adopting such measures are Spain, France, Holland. According to the article "Getting Women into Boardroom, by Law" published in 2010 in *The New York Times* newspaper, Spain and the Netherlands have passed gender laws, similar to the Norwegian quota, with a 2015 deadline for compliance. The French Senate will debate a bill phasing in a female quota by 2016, after the National Assembly's approval. Belgium, Britain, Germany and Sweden are also considering similar legislations.

The only mandatory gender quota in effect was mandated in Norway in 2005. The law required that all boards of directors for all publicly traded firms should have a 40% proportion of female members. The sanction for non-compliance was liquidation of the firm. Therefore, all PLCs registered after January 2006 were required to meet the law immediately, whereas all the other PLCs had to comply with the law by 1<sup>st</sup> January 2008 (Nygaard 2011).

The firms that found the change of the board as a burden and too difficult to comply with in the required time interval could evade the law by converting into the LTD corporate form. As can be seen from *graph 1* and *table 1*, the number of PLC firms decreased to approximately one half from 578 in 2000 to 307 in 2009. If a non-listed PLC could easily adopt the form of a LTD, a listed PLC would first need to delist from Oslo Stock Exchange or Oslo Axess. There is a steeper decrease in the number of non-listed PLCs in comparison with the listed PLCs. As can be seen from *graph 1*, by the end of 2009, the number of both the listed and non-listed PLCs becomes almost equal (149 listed PLCs in 2009, and 158 non-listed PLCs in the same year, respectively). On the other hand, according to *graph 2* and *table 2*, the number of LTD firms rose 1.47 times more from 2000 to 2009. The considerable raise in the number of LTD firms could be due to the fact that a lot of PLCs converted to LTD in order to

evade the law or simply because of the proper economic environment to start new businesses.

Nevertheless, the most sudden increase in the number of LTDs can be observed during the interval of 2005 - 2006. I believe that one of the most important reasons for the sudden increase was the conversion decision from PLC to LTD in 2005 and 2006. As Nygaard noted in his paper (2011), the conversion decision corresponds with the legislative process of the quota as the law had a significant impact after it was mandated in 2005.

If at the beginning of 2000 only 4.37% of the board was represented by women, by 2009 all PLC firms had 40% female representatives on the board of directors. According to the legislative process of the Norwegian quota, in April 2008, all PLCs were in compliance, and no firm was sanctioned with liquidation for failing to comply with the law<sup>11</sup>.

However, the year after the deadline for meeting the law had passed (2008), in 2009, the average ratio of women directors slightly decreased from the required 40% to 38.62%<sup>12</sup>. The inconsistency in the evolution of the representation of women in the executive suite could be explained by the forced changes imposed by the state within a certain deadline, rather than changes coming from the boards' own initiative of promoting and encouraging women in top positions. It is possible that after the danger of liquidation had passed, some firms could have returned to approximately the same board composition they had before the quota. This could have happened by temporarily appointing female family members to the board in order to meet the law.

According to *table 1*, the average number of directors for PLC companies maintained a relatively constant size over the sample period. This is of particular interest as it implies that firms preferred to supersede the male directors with female directors rather than increase the board size in order to comply with the law. In their study that only included the listed firms on Oslo Stock Exchange from 2001 to 2009, Ahern and Dittmar (2011) made the same observation about the relatively constant size of the board over the time interval.

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<sup>11</sup> For a brief description of mean number of female members on the board of directors across different types of firms (PLC listed, PLC non-listed, and LTD) see *graphs 3-8* from Appendix.

<sup>12</sup> See *graph 7* and *table 1* from Appendix

### CEO Age and CEO Gender

Tables 1 and 2 show that female CEOs are slightly younger than male CEOs for both PLC and LTD firms over the sample period.

These findings could find support in Ahren and Dittmar's paper from 2011 on female board representation. They argue that since a lot of board members are present or past CEOs, the new female directors are likely to be less experienced than the male directors and this could explain the age gap between women and male CEOs. In an interview for *The New York Times* newspaper from 2010, Elin Myrmel-Johansen, a 36 year old executive vice president at Storebrand, the Norwegian financial services group, says: "We don't need everybody to be the same age, from the same schools, reading the same magazines. Often younger people are better able to spot new market trends."

For the PLC firms, *graph 9* illustrates that over the years, the age gap between male and female CEOs seems to have decreased as a male CEO is younger and closer to that of the female CEO. Moreover, *graph 9* also shows that during the last decade the mean age at which a woman could be promoted as CEO was around 53, while in 2009 the mean age for a female CEO decreased to 50. This shows that a female could become CEO at a younger age than in the last nine years. In addition, *graphs 10* and *11* show how the total number of female CEOs had increased over the sample period. The presence of women in CEO positions had increased from 4.6% in 2000 to 7.3% in 2009. Even though the increase was only 2.7% in a nine year interval, it shows that women had made their way towards top management positions.

The increase of the total number of female CEOs (see *graph 10*) as well as the number of female directors among the PLC (see *graph 7*) firms could be a prime indicator of the stated purpose of the gender quota, that of *balanced participation for democracy and equality*. According to the Human Development Report (2009), Norway ranks the country number 2 in the *United Nations Gender-Related Development Index of 2007*.

Even though the number of female CEOs had increased over the past years, men still seem to dominate the top positions. *Graph 12* shows the distribution of the number of CEOs across different panels of firms. It can easily be observed that the percentage of male CEOs heavily outnumbers the percentage of female CEOs during the whole sample period (see *graph 13*). Interestingly, results show that the proportion of female CEOs of non-listed PLCs (5.9%) is higher than that of listed PLCs (3%). As *graph 11*

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Looking through the Glass Ceiling. Women and Power: Leadership in Norwegian Firms shows, there had been a continuous increase in the number of women promoted in CEO positions for the non-listed PLCs beginning with 2006 (from 5.6% to 11.1% percentage of women CEOs with respect to the total number of CEOs registered in the respective year). I believe this result is of major importance as it shows the general tendency of firms in promoting more and more women to the highest positions in a company. This could be interpreted as a further attempt by women to break the so called glass ceiling.

#### “Side-effects” of the Norwegian Quota

Whether the quota had a true impact on the increase of the number of female CEOs or the increase of female CEOs during the last years is independent of the law, remains under further investigation. However, my view is that the scope of the reform, namely, *equality between sexes for a fairer society*, can be interpreted and observed not only at the board level, but also at the CEO level.

Moreover, other effects regarding the evolution of women promotion on higher management levels can also be observed for the firms that were not subject to the quota. *Graph 11* indicates that the proportion of female CEOs increased over the last years for the LTD firms as well. On one hand, this increase could be due to the general economic tendency of increasing equality among sexes (so called “side-effects” of the Norwegian quota). On the other hand, the increase can either be due to the fact that a lot of PLC firms converted into LTD firms in 2005 (so the mean number of female CEOs for LTD firms increased with the conversion phenomenon) or simply because of the prosperous environment for founding new LTD firms.

#### Women CEO’s Salary

Another relevant aspect worth mentioning is the pay or salary of the female CEOs prior and post quota.

For the prior quota sample, *graph 14* shows that for most age groups, women CEOs are paid under the mean annual salary (1.1895 mil NOK). However, for the 55-60 age group, female CEOs are paid more than the average and even more than men, exceeding 1.5 mil NOK per year. The highest salary for female CEOs was attained around the age of 57 with a value of app. 3 mil NOK per year.

For the post quota sample, *graph 15* shows that for most age groups, women CEOs are paid under the mean annual salary (2.0621 mil NOK). However, for the 45-50

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Looking through the Glass Ceiling. Women and Power: Leadership in Norwegian Firms and 55-60 age groups, female CEOs are paid more than the average and even more than men exceeding 4.5 mil NOK per year for the 45-50 age group. *Graph 15* shows how women CEOs gained more and more dominance, outnumbering the male CEOs in two age groups compared with the prior-quota period when women CEOs outnumbered male CEOs only in the 55-60 age group.

It is also interesting to see how the maximum attainable salary for a woman CEO raised five times in the post-quota period in comparison with the highest salary during the prior-quota period. Moreover, it can also be shown that not only did the salary substantially increase, but the average age of a female CEO susceptible to receiving a high salary had decreased to below 50 years old. This indicates that, nowadays, a female CEO can receive more money at a younger age than in the past.

### Women CEOs across Industry Sectors

A lot of researchers have sought to find various associations between industry sectors and characteristics of the corporate governance systems of the firm. For example, Kang et al. (2007) in their study on diversity and independence of Australian boards found that industry type is significantly associated with the independence of directors and age range, but not with gender diversity. However, Hyland and Marcellino (2002) found a significant relationship between industry and the percentage of female directors on board using a sample of top 100 public companies in a suburban region of the USA.

According to the Official Statistics of Norway, from 2008 Norway uses a revised industrial classification, SIC2007 (Standard Industrial Classification). The classification corresponds to EU's revised industrial classification, NACE rev.2. Since 1994 the Standard Industrial Classification has been prepared on the basis of EU's international industrial standard NACE rev.1 (Nomenclature générale des activités économiques dans les Communautés Européenes). This standard was updated in 2002 (NACE rev.1.1.). The standard has a five level hierarchical structure: section, division, group, class, and subclass.

In my research, I used the 17 industry sections for 2000-2007 (NACE rev 1), and the 21 industry sections for 2008-2009 (NACE rev 2).

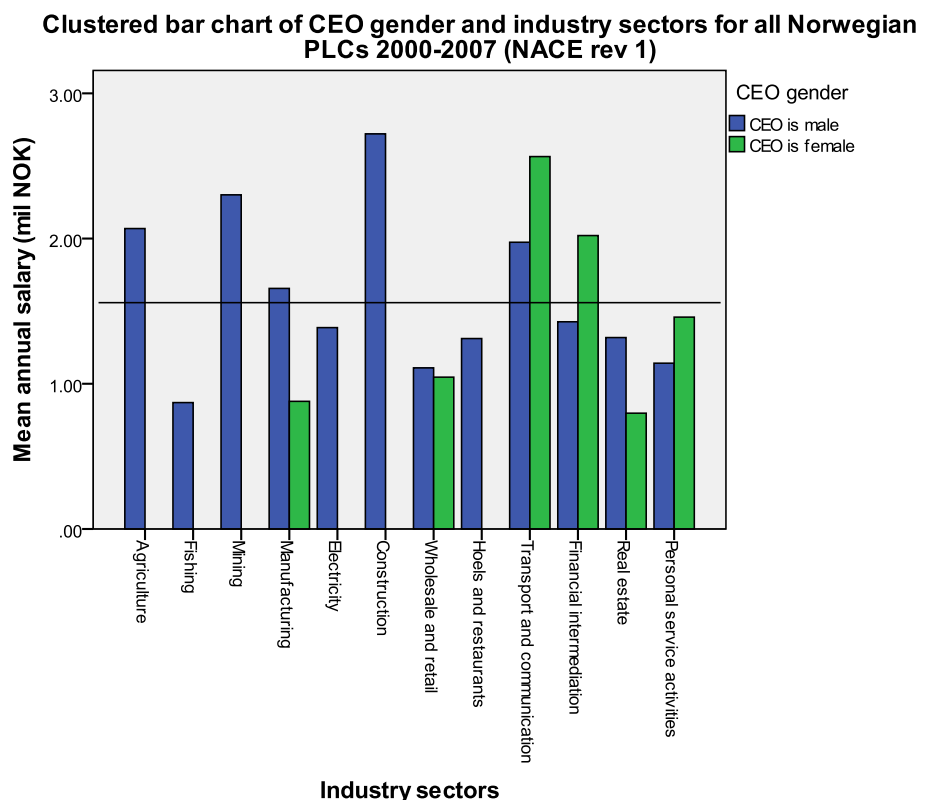
*Table 4* shows the distribution of the CEOs by gender for all Norwegian firms across 17 industry sectors according to the NACE rev 1 classification standards.

The pie chart (*graph 16*) shows that the industry sector in which there are the most numerous female CEOs among both PLC and LTD Norwegian firms are: private households with employed persons (37.5%); other community, social and personal service activities (32.8%); and health and social work (29.6%). On the other side, the sectors with the least numerous female CEOs are: construction (2.3%); fishing (4.1%); and mining and quarrying (6%).

As far as the firms that were subject to the Norwegian quota are concerned, *table 5* shows the distribution of the CEOs by gender for all PLC firms across industry sectors for the 2000-2007 time interval<sup>13</sup>.

The following graph (*graph 17*) shows the clustered bar chart of CEO gender and industry sectors for all Norwegian PLCs 2000-2007 (NACE rev 1). The X axis represents the most relevant industry sectors for the time period 2000-2007. The Y axis represents the mean annual CEO salary expressed in mil NOK. The Y reference line is the average salary line (1.558 mil NOK per year). The chart shows that most of the industry sectors are dominated by male CEOs who are also better paid than the female CEOs. However, for the transport and communication sector, as well as for the financial intermediation sector, the female CEOs dominate the men CEOs as they are better paid and more numerous at the same time. It is obvious that for these particular industry sectors female CEOs are paid over the average.

**Graph 17.**  
Clustered bar chart of CEO gender and industry sectors for all Norwegian PLC firms 2000-2007 (NACE rev1)



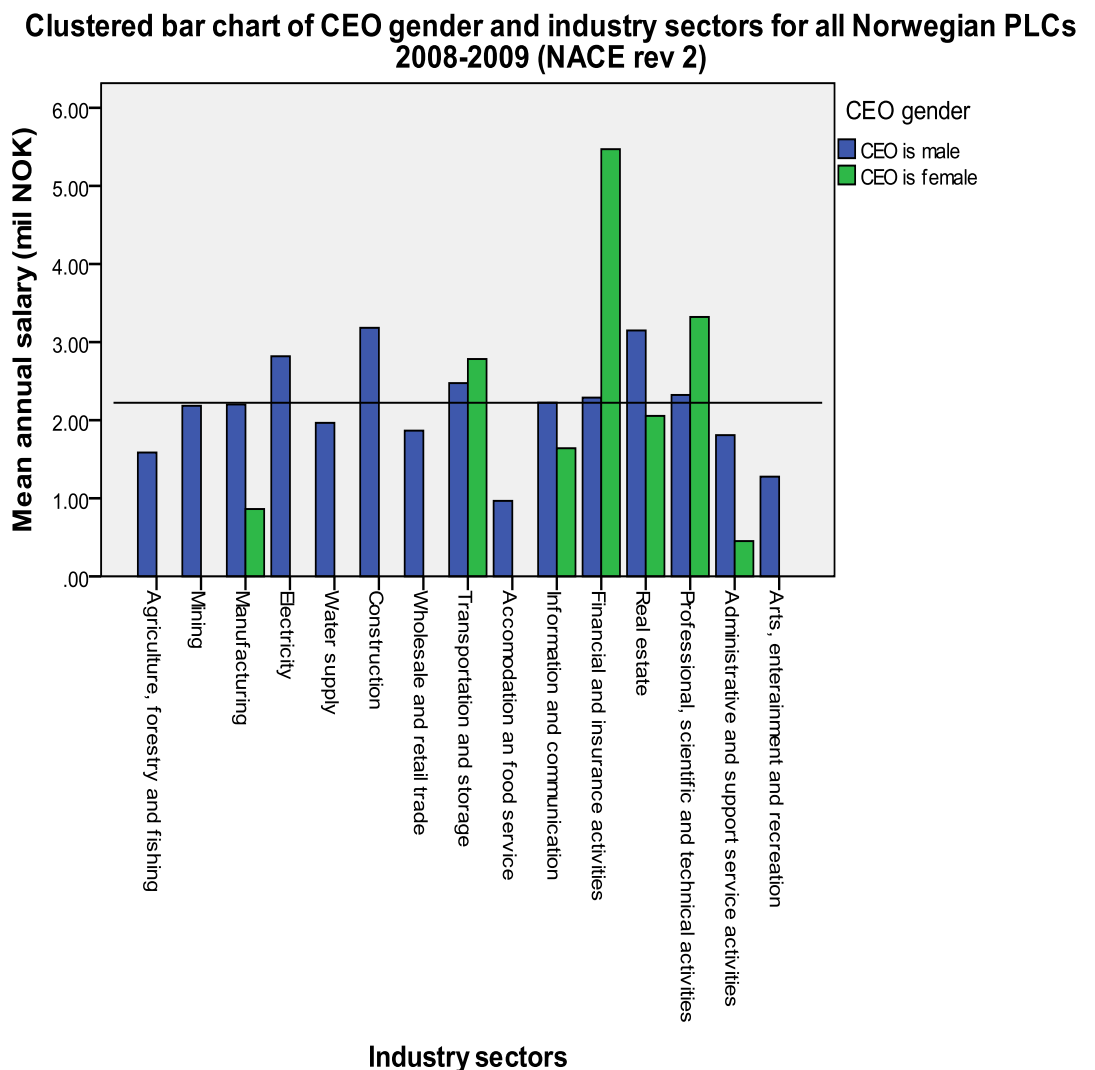
<sup>13</sup> For 2008-2009 time interval, see *tables 6 and 7* from Appendix



There is no clear pattern in female representation across industry sectors at the CEO level during the sample period 2000-2007. *Graph 18* indicates that the greatest increase in female CEO representation can be seen in the other community, social and personal service activities sector, as well as in the wholesale and retail trade in 2005 and 2006, respectively.

As far as the second period is concerned, 2008-2009, the clustered bar chart below (*graph 19*) shows that in most of the sectors, male CEOs are better paid than female CEOs with the exception of three industry sectors. These sectors are: transportation and storage; financial and insurance activities; and professional, scientific and support service activities. Not only women CEOs are better paid than men in these sectors, but they are also paid above the mean (2.2229 mil NOK per year).

Graph 19. Clustered bar chart of CEO gender and industry sections for all Norwegian PLC firms during 2008-2009 time period



#### II.4. Objectives and Regression Models

It is of interest to test whether the quota also had an impact on the CEO's gender and not just the on the composition of the board. Taking into consideration that one of the main attributes of directors is to monitor and advice the CEO, a change in the board composition could also be reflected upon the decision of a possible replacement of the CEO. Is the likelihood of hiring a female CEO higher after the quota than before the quota was mandated? Did the changes in the board of directors have an effect on the CEO as well?

On the other hand, there seems to be room for CEO's personal preferences to influence the selection of directors in Norwegian PLCs, at least prior to the quota (Nygaard 2011). How do the CEO characteristics influence firm performance?

To test for the hypotheses, I used a cross-sectional data set containing all Norwegian firms from 2000 to 2009. I structured the data in a longitudinal manner or in a stacked cross section to perform binary logit, and OLS regressions<sup>14</sup>.

In order to find the factors which determine the CEO gender, or more specifically, to find the characteristics of the firms that are more likely to have a female CEO than a male CEO, I conduct a binomial logit model<sup>15</sup>. The dependent variable is the CEO gender, the independent variable is the ratio of female directors, and the control variables are: firm age, firm size (proxied by natural logarithm of sales), board size, and ROA. The control variables are in accordance with the ones used in previous similar papers (Nygaard 2011 and Ahern 2011).

To test for significance, I use the maximum likelihood (ML) test. The ML test is consistent and asymptotically efficient (unbiased and minimum variance for large samples). With large samples, ML has the added advantage of producing normally distributed coefficient estimates, allowing for the use of typical hypothesis testing techniques. Therefore, the null hypothesis is that all population coefficients except the constant are zero (Studenmund 2006).

I assume that the models are nested, so I perform regressions in block, progressively adding independent variables to the model.

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<sup>14</sup> See *tables 8 and 9* for descriptive statistics

<sup>15</sup> The binomial logit is an estimation technique for equation with dummy dependent variables that avoids the unboundness problem of the linear probability model by using a variant of the cumulative logistic function (Studenmund 2006).

$$\text{CEO gender} = \beta * \text{ratio of female directors} + \Sigma \text{ control variables} + \varepsilon$$

To test the relationship between firm performance and CEO characteristics, I ran cross-sectional OLS regressions. ROA (Return on Assets) is set as the dependent variable and CEO characteristics (gender, salary, age) are set as independent variables using a set of control variables (firm size, firm age, board size, gender diversity). I reduced the sample size to only the firms that survived during the whole time period (2000-2009)<sup>16</sup>.

$$\text{ROA} = \beta_0 * \text{CEO gender} + \beta_1 * \text{CEO salary} + \beta_2 * \text{CEO age} + \Sigma \text{ control variables} \\ (\ln(\text{sales}), \text{firm age}, \text{board size}, \text{gender diversity}) + \varepsilon$$

Using ROA as a measure of firm performance is consistent with previous similar researches (Nygaard 2011, and Adams and Ferreira 2005). In his research on the Norwegian gender quota, Nygaard (2011) finds that the change in ROA mostly depends on the information index; for low information asymmetry firms,  $\Delta\text{ROA}$  is positive; whereas for high information asymmetry firms,  $\Delta\text{ROA}$  is negative.

In their study on CEOs and their impact on corporate performance, Adams and Ferreira (2005) use a sample of publicly traded firms in the 1998 Fortune 500 from 1992 to 1999. They find that the most significant effect on firm performance is due to the CEO's position and title as founder or only insider on the board.

To test for robustness of the OLS regression, I perform another set of regressions, using *Profit-to-sales ratio* as the measurement for firm performance. *Profit-to-sales ratio* shows how many cents of profit are earned on each euro of sales (Sutton 2004, 51). The ratio can be calculated using various measures of profit (in this particular case, I used the net profit) and it provides insight into a firm's cost structure.

$$\text{Profit-to-sales ratio} = \beta_0 * \text{CEO gender} + \beta_1 * \text{CEO salary} + \beta_2 * \text{CEO age} + \Sigma \text{ control} \\ \text{variables} (\ln(\text{sales}), \text{firm age}, \text{board size}, \text{gender diversity}) + \varepsilon$$

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<sup>16</sup> For each firm I calculated the difference in  $\Delta\text{ROA} = \text{ROA}_{2000} - \text{ROA}_{2009}$ . Therefore, I deleted the firms that had missing value for  $\Delta\text{ROA}$  and kept in the analysis only the firms which maintained their existence throughout the whole sample. Using this procedure, I managed to keep a constant sample of firms over the years and, thus, making the results more accurate.

Gender diversity is measured by the ratio of female directors on the board. Matsa and Miller's study from 2011 on the impact of the Norwegian gender quota on profits shows that after the quota, the ratio of operating profits to assets among affected firms decreased by about 4 percentage points, relative to firms that were unaffected by the law. Therefore, it is expected that in my paper, I will also find negative coefficients for gender diversity.

### III. Determinants of CEO Gender

#### III. 1. Hypothesis 1

*There is a link between the Norwegian gender quota and female representation at the CEO level.*

I used a binomial logit model dividing the sample in two periods (prior quota 2000-2004, and post quota 2005-2009) for all firms.

Both for the prior quota sample (2000-2004) and for the post quota sample (2005-2009), I am modeling on four sub samples (listed PLCs, non-listed PLCs, all PLCs, and all LTDs). Only cases where all dependent and explanatory variables are complete are included in the analysis. The categorical variable for gender has reference category of female<sup>17</sup>.

#### III.2. Cross-Section Analysis

##### Results for the Prior Quota Sample for all PLC Firms

Results from *table 10 - panel C* show that when adding all the explanatory variables to the model reduces the -2 log likelihood by 36.125 (Model Chi-square) with 5 degrees of freedom. The -2 log likelihood is a measure of how well the model explains variations in the outcome of interest, the CEO gender. The -2 log likelihood (sometimes called, deviance) has a chi squared distribution. The p value for the result of adding all explanatory variables to the model is .001. Hence, it can be concluded that the model is statistically significant at the 1% level (all variables explain variation in the CEO gender) and the null hypothesis is rejected.

Therefore, results from *table 1 - panel C* show that the estimated model becomes:

$$\text{Logit(CEO gender)} = -.646 + 4.543*\text{ratio of female directors} + .008*\text{firm age} \\ -.096*\text{firm size} - .385*\text{board size} + .000*\text{ROA}$$

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<sup>17</sup> 1 for female and 0 for male

However, in this model only the coefficients for ratio of female directors and board size are statistically significant at 1% level as their p-value is lower than .01. The model which includes all variables explains between 3% and 12.1% of the variation in CEO gender for all PLC firms in the prior quota period (as expressed by the Cox and Snell  $R^2$ , and by Nagelkerke  $R^2$ ).

The odds ratio for female directors is 93.975, which means that for each increase in the ratio of female directors<sup>18</sup>, the company is 93.975 times more likely to have a female as a CEO having allowed for the control variables in the model. This number is very high as it indicates a strong connection between women on the board and their preference towards having a female CEO. Moreover, the high value could be justified by the fact that the increase in the *ratio* of female directors is the variable taken into consideration, and not the increase in the *number* of female directors. In addition, by performing the same regression and substituting the ratio of female directors with the number of female directors, the odds ratio becomes 2.176 (as shown in *table 10''*). This number shows that with each additional female director on the board, the company is 2.176 times more likely to have a woman CEO. Implicitly, when substituting for ratio of male directors on board and for the number of male directors, the coefficients are negative. The negative coefficient of the number of male directors could be interpreted as the men's resistance of allowing a female to take the CEO position of the company.

Nevertheless, results from *table 10 – panel C* show that the coefficient for board size is negative and the odds ratio is .681, which suggests that with every increase in the board of directors, the CEO of the firm is .681 times less likely to be a female. Even though this result somehow contradicts the previous finding (that with every increase in the number of female directors, the company is more than two times likely to have a woman CEO), it shows that an additional member on the board would most probably be a male. As documented by Farrell and Hersch (2001), the probability of adding a woman to a board in a given year is inversely related to the number of women directors already on the board.

Oakley (2000) finds that men show a form of resistance to working with women. It seems that male CEOs overestimated the progress being made to designate female CEOs. Thus, men may feel reluctant in allowing more female power in the upper echelons of corporations.

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<sup>18</sup> The ratio of female directors is the number of female directors divided by the board size.

Results for the Post Quota Sample for all PLC Firms

Results from *table 11* – panel C show that performing the same regression described previously for the post quota period, the new model reduces the -2 log likelihood by 47.562 with 5 degrees of freedom. The p value for the result of adding all explanatory variables to the model is .001. Hence, it can be concluded that the model is statistically significant (all variables explain variation in the CEO gender) at the 1% level, and thus, the null hypothesis is rejected.

Therefore, the results from *table 11 - panel C* show that the estimated model for the post quota period is:

$$\text{Logit(CEO gender)} = -1.625 + 4.551 * \text{ratio of female directors} + .017 * \text{firm age} \\ - .1 * \text{firm size} - .318 * \text{board size} + .01 * \text{ROA}$$

In this model the coefficients for ratio of female directors, firm age, and board size are all statistically significant at the 1% level as their p-value is lower than .01. The model which includes all variables explains between 4.6 and 14.1% of the variation in CEO gender for all PLC firms in the post quota period (as expressed by the Cox and Snell R<sup>2</sup>, and by Nagelkerke R<sup>2</sup>).

The odds ratio (relative odds) for female directors is 94.713, which is higher than the one from the prior quota sample (93.975). This suggests that after the quota, women in the board can exert more influence at the CEO level. Therefore, it becomes more probable that a firm will have a female CEO than before the quota. Performing the same regression and substituting the *ratio* of female directors with the *number* of female directors, the odds ratio becomes 3.349 (statistically significant at 1% level), which once again is higher than the one from the prior quota period (2.176). This result shows that after the reform, women had gained more power and control on the higher levels of management.

Nevertheless, the coefficient for board size is negative and the odds ratio is .728, which suggests that with every increase in the board of directors, the CEO of the firm is .728 times less likely to be a female. Interestingly, the odds ratio for board size is higher than the one from the prior quota sample (.681). The results from *table 11* show that after all firms had met the law, it became even less probable that bringing an additional member on the board would still be a woman (fact demonstrated by the slight decrease

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Looking through the Glass Ceiling. Women and Power: Leadership in Norwegian Firms in the number of female directors after 2006<sup>19</sup>). Therefore, the probability of the company to have a female CEO decreases with the size of the board.

The coefficient for company age is positive and statistically significant at the 1% level. The odds ratio is 1.017, which means that for each year increase in company age, the firm is 1.017 times more likely to have a female CEO. This result could suggest that older firms are more prone to having a female CEO.

### Overall Results

An important observation is that all the coefficients for the ratio of female directors and for the number of female directors are positive and statistically significant at 1% level for all samples. This shows that not only does the number of female directors on the board constitute a good predictor for the CEO gender, but it also indicates that more women on the board of directors means more chances that the designated CEO will be a woman. Conversely, more men on the board of directors indicate less probability that the CEO of the firm will be a woman.

It is interesting to observe how the odds ratio for female representation on board became higher for all the PLC firms after the reform. This means that the increase in the number of female CEOs after 2005 cannot be interpreted as a random effect, but as a phenomenon that could be attributed to the quota.

However, not the same can be said for the LTD companies, which were not subject to the quota. As indicated by *tables 10''* and *11'' panel D*, the odds ratio for the number of female directors decreased from 10.16 to 10.02 after the quota. It seems that after the quota, even though the proportion of women directors increased, it is more difficult for a woman from a LTD company to occupy a CEO position than for a woman from a PLC company.

Unlike the PLC group (both prior and post quota), the LTD group has a positive coefficient for board size indicating that an additional member to the board makes the firm more probable to having a woman in the position of the CEO. This result could mean that the PLC firms would rather have a male as an additional member of the board, whereas the LTD firms would prefer giving a seat on the board to a woman.

Another noticeable difference between the LTD firms and the PLC firms is that for the PLC firms - the older the firm, the more probable the CEO would be a woman,

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<sup>19</sup> See *table 1* from Appendix



whereas for LTD firms – the older the company, the more likely a man would take the position of the CEO.

As far as firm size is concerned (proxied by natural logarithm of sales) for the post quota period, the coefficients are negative for the post quota sample (except for the non-listed PLCs). This suggests that the larger the firm, the less probable a woman will take the position of a CEO.

## IV. Female CEOs and Firm Performance

This section assesses the impact of CEOs on firm outcomes. In the organizational literature, the topic on the importance of top executives is quite debatable.

Researchers like Finkelstein and Hambrick (1996) claim that managers do not matter. They found that CEO effects have little additional explanatory power for firm performance. Conversely, other authors claim that CEOs are important for the firm's outcomes (Weiner and Mahoney 1981). Do companies seek for CEOs for their characteristics? If so, which are the characteristics related to the firm outcomes?

As measurement for firm performance, I used return on assets (ROA) which is in accordance with similar related studies (Nygaaed 2011, Ahern 2011). The research of Adams et. al (2005) on the CEO's ability to influence decisions that will affect firm decisions also uses ROA as the appropriate measure for firm performance.

Another measurement of performance that I also considered in my research is profit-to-sales ratio. This indicator was also used by Adler (2001) in his study on the influence that women in top management positions have on firm profitability.

### IV.1. Hypothesis 2

*There is a relation between firm performance and the CEO's characteristics.*

#### Results for the Prior Quota Sample

Results from *table 12 – panel C* show that there is a negative relation between firm performance expressed in terms of returns on assets and having a woman in the position of the CEO. Holding all other factors constant, having a female CEO reduces ROA by .067 for all PLC firms. Among the PLC group of firms, the listed ones seem to be more negatively affected by having a woman in the position of the CEO (CEO gender has a coefficient of -.168 for the listed PLC firms, and a coefficient of -.06 for non-listed firms<sup>20</sup>). In addition, results from *table 14* show a negative correlation between women CEOs and firm performance.

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<sup>20</sup> See *table 12* panels A and B from Appendix

Table 14. Correlation of the CEO gender with two different measures of profitability for the prior-quota sample (2000-2004)

Prior quota sample 2000 - 2004									
Correlation of CEO gender with:	A. Listed PLC firms		B. Non-listed PLC firms		C. All PLC firms		D. All LTD firms		Sig.
	Value	Sig.	Value	Sig.	Value	Sig.	Value	Sig.	
1. ROA	-.140*	.054	-.027	.296	-.039	.185	-.004**	.035	
2. Profit-to-sales-ratio	.016	.428	-.033	.257	-.002	.482	-.002	.218	

Notes: Sig. is the p-value (significance level) for the one tailed test.

\* statistically significant at 10% level

\*\* statistically significant at the 5% level

ROA (return on assets) shows the profit the company generates in a period on the total assets employed by it (Sutton 2004). ROA = Operating profit/Average total assets.

In this table only the values of the correlation of the CEO gender with ROA for listed PLC and all LTD firms are significant. It shows a negative relation between ROA and a female CEO.

As far as the CEO's salary is concerned, results from *table 12 – panel C* show that for all PLC firms an increase in the CEO's salary with one unit is beneficial for the overall performance, increasing the ROA by .002 holding all the other factors constant. However, not the same holds for the LTD firms. An increase in the CEO's salary, decreases the ROA by .002 units.

Findings from *table 12* also show that the PLC group of firms do not perform so well when the CEO of the company is older. According to The New York Times article on women in the boardrooms (2010), the sharp increase in women as directors significantly reduced the average amount of senior executive-level experience on the boards at 130 of the biggest Norwegian companies. On the other hand, results show that the LTD group of firms perform better when the CEO of the company is older or has more experience. This could suggest that an older CEO with more experience would be preferred over a younger CEO for the LTD firms.

As expected, results from *table 12* indicate that firm performance is negatively correlated with board size (the larger the board, the worse the firm performs). However, this does not necessarily imply that small boards are associated with higher market valuation. The results would give a negative bias on the OLS estimate for board size caused by omitting variables from the estimation equation (Nygaard 2012).

Even though the F tests are statistically significant at the 1% level for the PLC and the LTD firms' samples, the values for R square are quite low showing that the

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chosen model explains 7.7% of the variation of firm performance for the PLC firms and  
only .5% for the LTD firms.

As far as women representation on the board is concerned, many papers focused on the relation between female directors and firm performance, especially in the context of the gender quotas currently discussed in some European countries. However, the findings differ from paper to paper suggesting there is no universal law underlying the relation between women directors and firm performance. If the results from the researches on the U.S market (Adler 2001, Adams and Ferreira 2004, Dezso and Ross 2008) show a positive relationship between women in the executive suite and firm performance, previous research on the Norwegian quota (Matsa and Miller 2011) finds a negative relationship between female representation on the board and firm's profits.

Results from *table 12* show that before the quota was mandated, there is a positive relation between the ratio of female directors (gender diversity) and ROA for all samples. However, before 2005, female representation on the board was below 16%. Therefore, the positive relation between the ratio of female directors and firm performance found for the prior quota sample does not tell much about the influence of women directors on performance. These results may serve in terms of comparison with the post quota sample.

#### Results for the Post Quota Sample

Results from *table 13* show that for the post quota sample there is also a negative relation between having a woman CEO and firm performance (expressed in terms of ROA) for all firm samples.

For the PLC sample, a woman in the position of the CEO reduces firm performance by .04 percentage points expressed in terms of ROA. The correlation table (*table 15*) also indicates a negative relation between female CEOs and firm performance. These results are in line with the ones obtained by Dezso and Ross (2008). They performed a study on a sample of U.S firms (1992-2006) and found that women in CEO positions have a neutral or negative effect on firm performance. Even though their research controlled for firm and industry effects, these effects are robust to the inclusion of lagged values of the performance measures. However, the inclusion of lagged values provided some indicative evidence of causality between having a woman CEO and firm performance.

Table 15. Correlation of the CEO gender with two different measures of profitability for the post-quota period (2005-2009)

Post quota sample 2005 - 2009								
Correlation of CEO gender with:	A. Listed PLC firms		B. Non-listed PLC firms		C. All PLC firms		D. All LTD firms	
	Value	Sig.	Value	Sig.	Value	Sig.	Value	Sig.
1. ROA	-.044	.326	-.039	.298	-.035	.275	-.011***	.000
2. Profit-to-sales-ratio	.617***	.000	.026	.360	.334***	.000	-.002	.250

Notes: Sig. is the p-value (significance level) for the one tailed test.

\*\*\* statistically significant at the 1% level

ROA (return on assets) shows the profit the company generates in a period on the total assets employed by it (Sutton 2004). ROA = Operating profit/Average total assets. The categorical variable for gender has reference category of female (1 for female and 0 for male).

In this table the significant values are: correlation of CEO gender with profit-to-sales ratio for the listed PLCs (showing a positive relation between the profitability of the firm and a female CEO), the correlation of the CEO gender with profit-to-sales ratio for all PLC firms (indicating a positive relation between profitability and a female CEO), and the value of the correlation of the CEO gender with ROA for all LTD firms (showing a negative relation between ROA and a female CEO).

Results from *table 13- panels C and D* indicate negative coefficients for CEO salary for all LTD firms and for all PLC firms. Therefore, a one unit increase in CEO's pay decreases ROA by .009 percentage points for all PLC firms and by .004 for all LTD firms.

Unlike the prior quota sample, for the post quota sample the relation between ratio of female members on the board and firm performance is negative for all PLC firms.

The findings from *table 13* are in accordance with the results from previous similar researches. For example, Matsa and Miller (2011) find that the ratio of operating profits to assets decreased after the quota was introduced and the strongest effects were observed among firms that were required to add the most women in order to comply with the law. According to *The New York Times* article on women in the boardrooms (2010), the sudden increase in Norwegian female directors "has done little – yet- to improve either the professional caliber of the boards or to enhance corporate performance." On the other hand, for the firms that were not subject to the law, the results from *table 13* show that the LTD firms did not encounter a negative effect on performance by increasing the ratio of female directors on board keeping all other variables constant.

The coefficients for board size are statistically significant for all post quota samples and have a negative sign. As in the prior quota sample, this shows that by adding new members to the board will not contribute to the goodwill of the firm.

Without deeper analysis, it could wrongly be concluded that the firms would perform better if it diminished the size of its board. However, the problem of drawing such a conclusion is not to take into consideration why a large board might have been chosen in the first place (Hermalin and Weisbach 2010). According to Hermalin and Weisbach's survey (2010) on board of directors in corporate governance, for a given firm there is a nonmonotonic relation between the attribute of governance (in this case, board size) and financial performance (in this case, ROA). When studying the nature of the relation between firm performance and governance attributes, it is very important to confront the issue of heterogeneity in the solutions adopted by the firms for their governance problems<sup>21</sup>.

One important difference between the prior-quota sample and the post quota sample is that the value for R square increased for the PLC firms from only 7.7% (in the prior quota sample) to 14.1% (in the post quota sample). This means that after the quota was mandated, CEO's characteristics became more relevant in explaining the variation in firm performance.

The value for F test (6.737) is statistically significant at the 1% level and it shows the strong explanatory power of the chosen model.

#### **IV.2. Robustness Checks**

The robustness of the results obtained in the section above will be examined below. Most of the researches on the relation between firm performance and directorship use various measures for performance: Tobin's Q (Ahern and Dittmar 2011), profit-to-sales ratio (Adler 2001), ROA (Adams and Ferreira 2004, Nygaard 2011). Robustness checks are useful because the researcher examines how certain "core" regression coefficient estimates behave when the regression specification is modified by adding or removing regressors (White and Lu 2010).

I run similar regressions for all firms as in the section above, but instead of using ROA as the measure for performance, I will use Profit-to-sales ratio as the appropriate measure for firm profitability.

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<sup>21</sup> A more complex empirical study would control for such heterogeneity by adding in other controls, for example, firm fixed effects.

For the prior quota, *table 12* shows that there is a negative relation between a female CEO and firm profitability for all types of firms. These results support the findings from the section where I use ROA as the measure for performance. Even though not statistically significant, results from *table 14* also show negative correlations between a having a woman CEO and profit-to-sales ratio both for all PLC firms and for LTD firms.

As far as the post quota sample is concerned, results from *table 13* show a different relation between female CEOs and firm performance. Unlike the use of ROA, it seems that the use of profit-to-sales ratio as the measure for firm performance gives positive results for PLC firms that have a woman CEO. Naming a woman CEO will raise the profit-to-sales ratio by .313 keeping constant all other factors. The positive correlation (.334 significant at the 1% level) for the PLC group of firms from *table 15* shows that firms perform better when having a female CEO.

The misaligned result with the previous one when ROA was used could be due to some countervailing factors that make the performance of women led companies difficult to gauge. Therefore, it is unclear whether firms that have women CEOs perform better than the other companies. More specifically, there is no concrete answer to the question if after the quota the companies that have women CEOs have better financial results than the men led companies. Either further investigation must be made or it is too soon to observe the effects women CEOs have on their companies.

## **V. Summary and Conclusions**

The purpose of this study was to examine the effects of the Norwegian gender quota beyond its area of application, namely, women in CEO positions. I investigated whether there have been some noticeable changes at the CEO level after the quota and whether these changes affected firm performance. This research is especially timely given that gender diversity both at the board level and at the CEO level are significant corporate issues for the modern firm.

The descriptive part of the paper follows the evolution of female promotion in higher management positions along the time interval 2000-2009. Results show that after the Norwegian gender quota, more women became engaged in CEO positions, and, thus, enhancing female power in the business world. In addition, the paper presents the main industry sectors in which women are more likely to take CEO positions. Financial intermediation, transport and communication are the industry sectors for PLC firms where women CEOs outnumber the male CEOs.

The findings from this paper come to support Reiersen's and Sjøfjell's report (2008) on boardrooms in Norway showing that the quota had a positive effect on gender equality beyond its area of application. Not only did the quota make more space for women in the boardroom, but it also had positive indirect effects on the women willing to take even higher positions and win a seat at the executive table. Results from the post quota sample show a general tendency of diminishment of the gender gap at the CEO level, allowing for greater gender equality in the upper echelons of Norwegian firms.

Furthermore, I tested the main predictors of agency problem concerning the effect on firms' profitability of increased female representation in top management. Even though previous researches (Adler 2001, Adams and Ferreira 2009) demonstrated that more women representation on the U.S boards brings more value to the firm, the main findings in this research reveal mixed results. In the case of using ROA as the appropriate measure for firm performance, the correlations between female CEOs and financial performance are negative for all firm samples.

Possible explanations for the negative relation between having a woman CEO and firm performance could be that women are unsuited to take leadership positions or they face too many obstacles in their way to the top management and, thus, lose their motivation to perform better. According to Ross and Deszo's paper (2008) on women



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Looking through the Glass Ceiling. Women and Power: Leadership in Norwegian Firms representation in top management, the main milestones women have to overcome in order to break the glass ceiling are: resistance among men to working with women, lack of managerial experience, and difficulties in developing managerial talent. I believe these obstacles determine women to develop a sentiment of aversion towards working in highly competitive environments and towards taking too many responsibilities.

On the other hand, when using the profit-to-sales ratio, the coefficient for CEO gender is statistically significant and positive for the PLC firms in the post quota sample. The contradictory results obtained when using different measures for firm performance could probably be due to the fact that it is too soon to gauge women's influence on the firm. The effects of women CEOs on performance will probably become more visible in the next few years.

The results from this paper have implications for policies being discussed or implemented not only in Norway, but in other countries as well. Furthermore, the study could also address to organisations that foster the advancement of women in business.

Overall, there are reasons to believe that the gender quota has led to some changes in the way women are perceived and promoted in top management positions. When recruiting a director or a CEO, instead of limiting the search to only one-half of the candidates, the search can be expanded to qualified women as well. I believe that the Norwegian quota represents one of the most courageous moves to demolish one of the most durable barriers to gender equality. At the same time, there has been made place for more competent businesspersons, and, thus, the business environment became more competitive. According to *The New York Times* article on women in the boardrooms (2010), when the Norwegian government first made its case for the quota, the number of women on boards had been growing by less than 1 percent a year for a decade. In an interview in 2010 for the same publication, Arne Hole, the general director of the Equality Ministry in Norway, said that it would have taken 200 years to reach 40 percent of female representation on the board.

However, it is too soon to say that women have become just as eligible for top directorship positions as men are. As Farrell and Hersch (2001) noted in their paper on gender in the corporate boards, it is still unclear whether the corporate glass ceiling is half-empty or half full. In their way to reaching the highest top corporate positions, women still have to face a lot of difficulties and impediments which keeps the glass ceiling in its place. *Looking through the Glass Ceiling* is a metaphor meant to conceal the fact that it would take more than a gender quota for women to break the glass and consider themselves equal to men.

## VI. Limitations

When estimating firm performance as a function of CEO characteristics, the biggest impediment is endogeneity, which could lead to spurious results. According to Nyggard's article (2012) on endogeneity of board structures, the most common forms of endogeneity are the omitted variables (such as organizational ability, the CEO status – founder or the sole insider of the board), and simultaneity (do poorly performing firms hire female CEOs or do the female CEOs negatively influence the performance of the firm?). A more complex study on female representation at the CEO level and its influence on firm performance would have dealt with endogeneity issues by implementing empirical methods such as fixed effects panel estimation or instrumental variables. In order to test the hypotheses about the population regression, one must make the necessary assumptions for testing hypotheses (e.g., normality, independence). A more rigorous robustness check would have verified for violations of the assumptions by using the residuals (the difference between the observed and predicted values).

It is important to stress that the interpretation of results does not depend on the centralization power of the CEO, nor on the managers' less visible characteristics, which comprise of educational, functional and occupational background, industry experience, and organisational membership. Even though these particular characteristics are not of main interest in this study, there is evidence (Deszo and Ross 2008) that firms with women in CEO positions have on average worse performances than firms led by men. These negative results may occur because women fail to nurture as CEOs or because positive results are unnoticeable due of countervailing factors. A deeper insight into women's style of leadership and into their inner characteristics that make them different from men would probably give more answers to how women led companies function.

Over the years, researchers have tried to identify and essentialize women's unique management skills. However, it is still not known enough about the Alpha or Elite women (Barnard 2006): how they strived in their way of reaching the top, how they faced difficulties and how they kept their determination in the face of failure, the role of their family and peer support, the impact of money, of values, of chance, and timing. Whether women are truly effective as CEOs over the long run, and, if so, under what circumstances are questions that must await future research.

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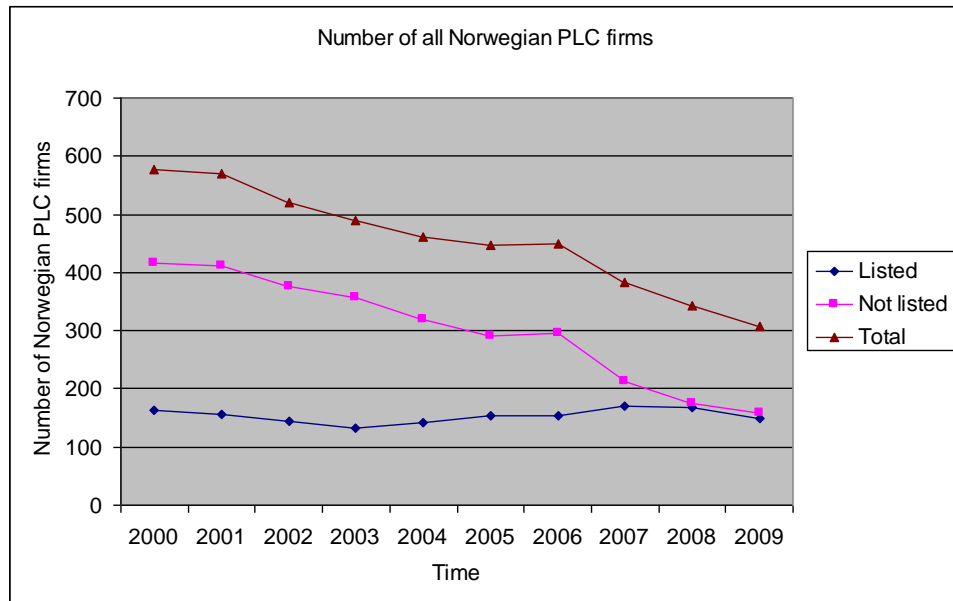
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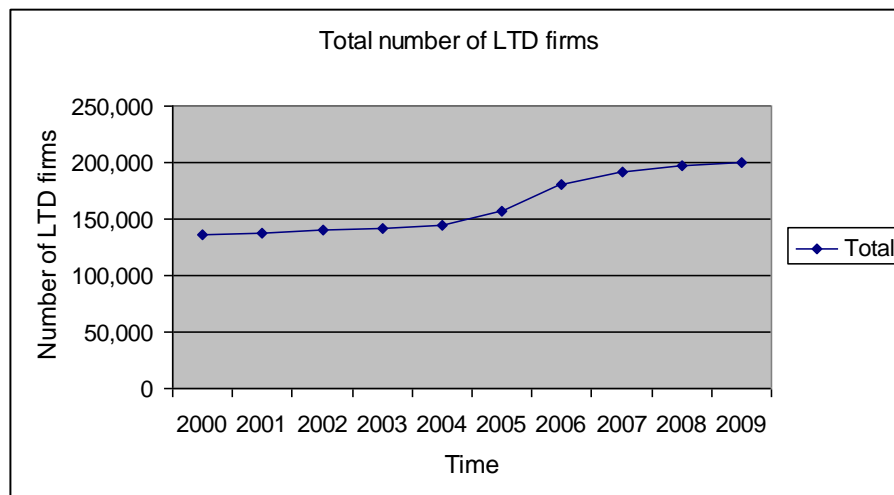
## Appendix

Graph 1. Number of Norwegian PLC firms, by year



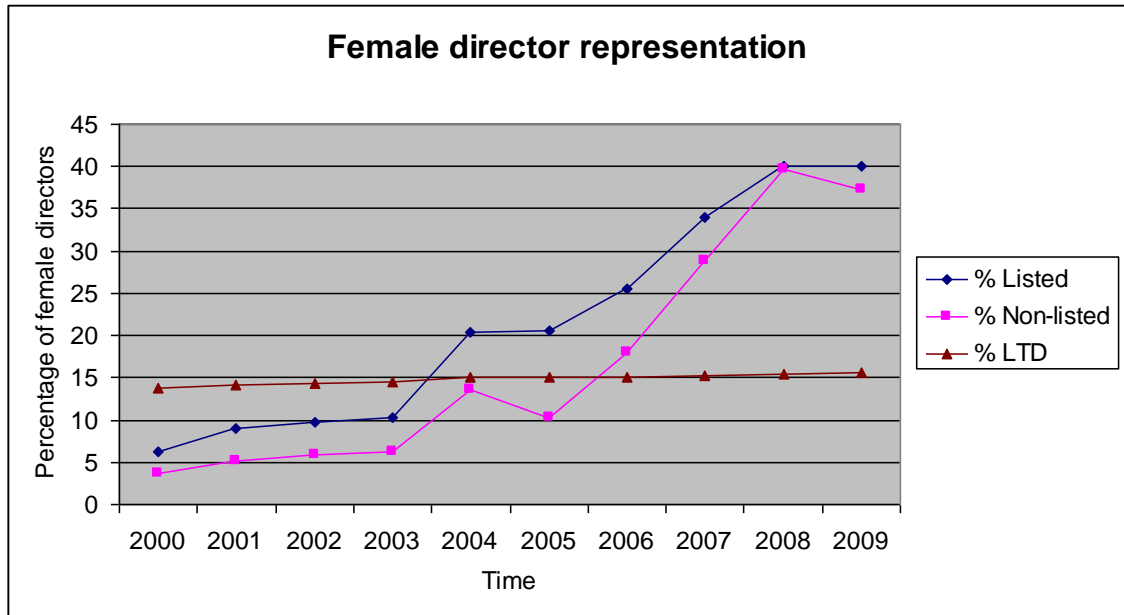
*Notes:* The X axis presents the time expressed in years, while the Y axis represents the average number of Norwegian PLC firms. The graph shows the evolution of the number of Norwegian PLC firms throughout the time interval 2000-2009. The number of firms varies in every year, as firms may die, merge or change their corporate form.

Graph 2. Total number of Norwegian LTD firms, 2000-2009



*Notes:* The graph shows the evolution of the number on LTD firms over the time interval 2000-2009. A sudden increase in the number of LTD firms can be observed from 2005 onwards, the year in which the Norwegian quota was mandated.

Graph 3. Female director representation across different types of firms



*Notes:* The X axis represents the time, and the Y axis represents the average percentage of female representation in the board of directors. It can be observed that in 2008 all the firms that were subject to the Norwegian quota met the law (they made their board of directors being consisted by women in a percentage of 40%). However, it is of interest to notice that after the deadline for meeting the quota had passed, the ratio of female directors slightly decreased in 2009 to approximately 38% for the PLC companies.



Table 1. Director characteristics, all Norwegian PLCs, 2000-2009

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Average age of CEOs, separately by gender										
Men	55.7	55.4	55.3	54.7	54.4	53.2	52.3	51.3	51.2	50.7
Women	52.8	52.1	51.2	51.8	52	50.7	49.7	50.4	50.4	50
Is CEO a board member, separately by gender										
Men	.29	.29	.29	.32	.26	.28	.24	.15	.17	.16
Women	.28	.27	.31	.44	.36	.30	.30	.30	.17	.32
Average ratio of firms with a female CEO, and with a male CEO, respectively										
Male CEO	95.4	95.1	95.1	96.4	96.7	94.7	95.5	94.7	93.2	92.7
Female CEO	4.6	4.9	4.9	3.6	3.3	5.3	4.5	5.3	6.8	7.3
Average number of directors, separately by gender										
Men	4.97	4.72	4.79	4.8	4.33	4.38	3.98	3.59	3.23	3.26
Women	.28	.38	.44	.46	.93	.86	1.15	1.70	2.17	2.10
Average ratio of directors, separately by gender										
Men	95.63	93.87	93.01	92.66	84.39	86.21	79.41	68.86	60.12	61.38
Women	4.37	6.13	6.99	7.34	15.61	13.79	20.59	31.14	39.88	38.62
Average CEO ownership, separately by gender										
Men	19.95	22.11	22.53	20.10	19.23	31.43	23.63	37.21	33.03	26.24
Women	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Average CEO salary (annual mil NOK), separately by gender										
Men	1.089	1.224	1.321	1.301	1.520	1.508	1.829	2.239	2.293	2.256
Women	0.900	1.172	1.129	1.258	1.247	1.301	1.054	3.142	3.457	3.138
Number of PLC firms										
Listed	162	157	145	132	141	154	154	171	168	149
Not listed	416	412	376	357	319	292	296	213	175	158
Total	578	569	521	489	460	446	450	384	343	307

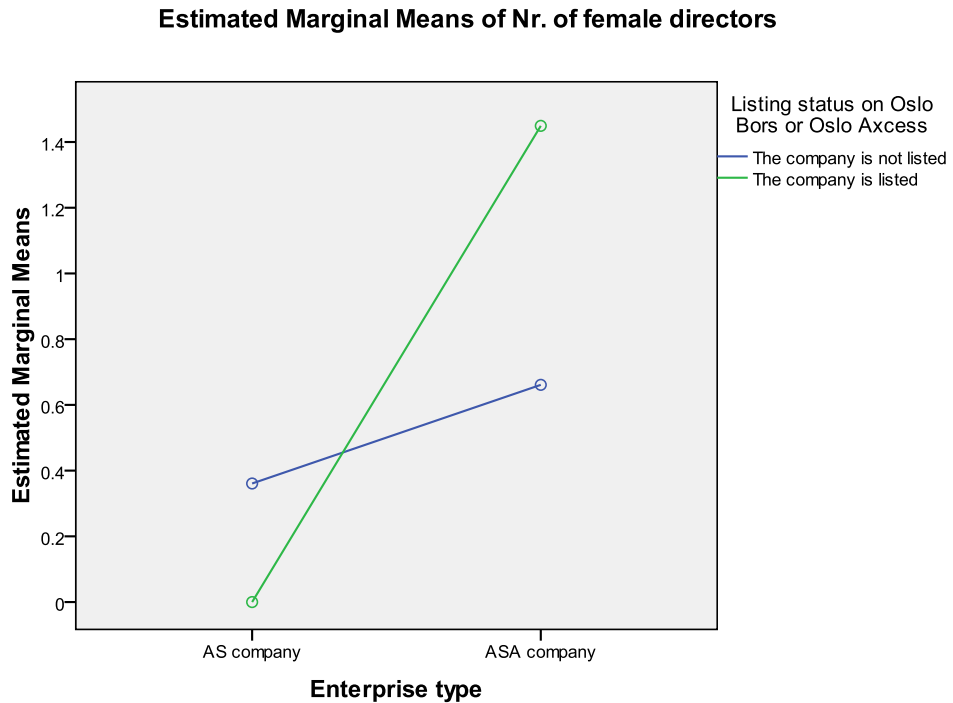
Notes: The table reports cross-sectional mean values for director characteristics based on all PLC firms registered in Norway for each year from 2000 to 2009, separately by gender. *Is CEO a board member* is a variable which takes the value of 1 if the CEO is a board member and 0 otherwise. The average ratio of gender diversity counts for the proportion of firms that have a female CEO, and the proportion of PLC firms that have a male CEO. The average number of directors reports the average board size for each firm, separately by gender. The average ratio of directors represents the percentage of female and men directors with respect to the total size of the board. *Average CEO ownership* is represented in percentage points and shows the amount of the CEO's stake in the firm. N/A stands for *Not Available*.

Tabel 2. Director characteristics, all Norwegian LTDs, 2000-2009

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Average age of CEOs, separately by gender										
Men	59.1	58.4	57.5	56.7	56	55.1	54.3	53.5	52.8	52.2
Women	56.5	55.7	54.8	53.9	53.1	52	51.3	50.5	49.9	49.2
Is CEO a board member, separately by gender										
Men	.80	.81	.80	.80	.82	.78	.80	.80	.81	.81
Women	.69	.70	.70	.68	.71	.68	.69	.69	.70	.69
Average ratio of firms with a female CEO, and with a male CEO, respectively										
Male CEO	87.6	87.5	87.3	86.9	86.6	86.4	86.3	86.2	86.1	85.8
Female CEO	12.4	12.5	12.7	13.1	13.4	13.6	13.7	13.8	13.9	14.2
Average number of directors, separately by gender										
Men	1.973	1.9352	1.9637	1.9616	1.908	1.911	1.818	1.802	1.7875	1.776
Women	.34	.34	.35	.36	.38	.37	.36	.36	.37	.37
Average ratio of directors, separately by gender										
Men	86.18	85.89	85.70	85.56	84.86	84.98	84.90	84.79	84.60	84.46
Women	13.82	14.11	14.30	14.44	15.14	15.02	15.10	15.21	15.40	15.54
Average CEO ownership, separately by gender										
Men	63.89	64.008	63.992	64.27	64.66	67.72	69.81	72.11	72.7	73.12
Women	60.6	60.9	60.86	61.169	61.39	63.40	64.53	66.79	67.22	67.64
Average CEO salary (annual mil NOK), separately by gender										
Men	0.339	0.359	0.375	0.385	0.398	0.422	0.456	0.493	0.535	0.543
Women	0.237	0.254	0.266	0.282	0.294	0.305	0.328	0.352	0.381	0.397
Number of LTD firms										
Total	135,562	138,176	140,625	141,502	143,966	157,264	180,259	191,627	197,648	199,889

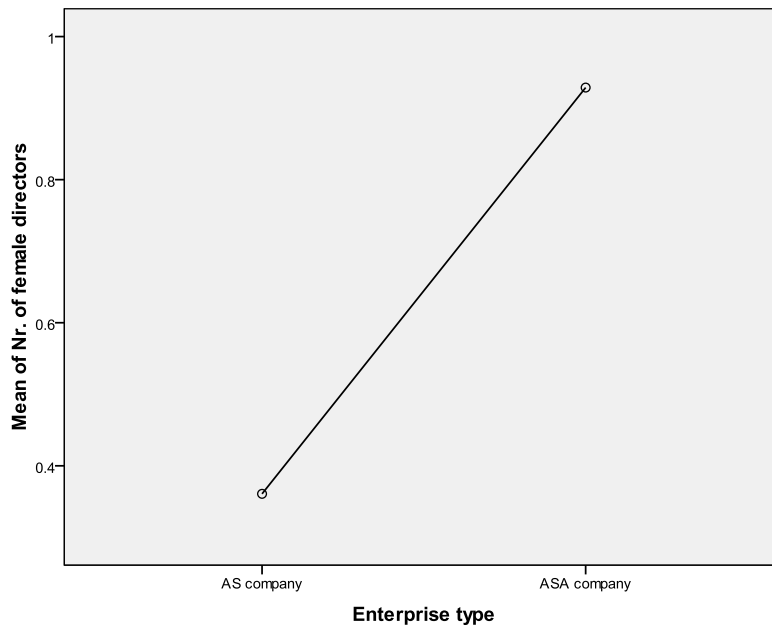
*Notes:* The table reports cross-sectional mean values for director characteristics based on all LTD firms registered in Norway for each year from 2000 to 2009, separately by gender. *Is CEO a board member* is a variable which takes the value of 1 if the CEO is a board member and 0 otherwise. The average ratio of gender diversity counts for the proportion of LTD firms that have a female CEO, and the proportion of firms that have a male CEO. The average number of directors reports the average board size for each firm, separately by gender. The average ratio of directors represents the percentage of female and men directors with respect to the total size of the board. *Average CEO ownership* is represented in percentage points and shows the amount of the CEO's stake in the firm.

Graph 4. Estimated marginal means of the number of female directors across different groups of firms



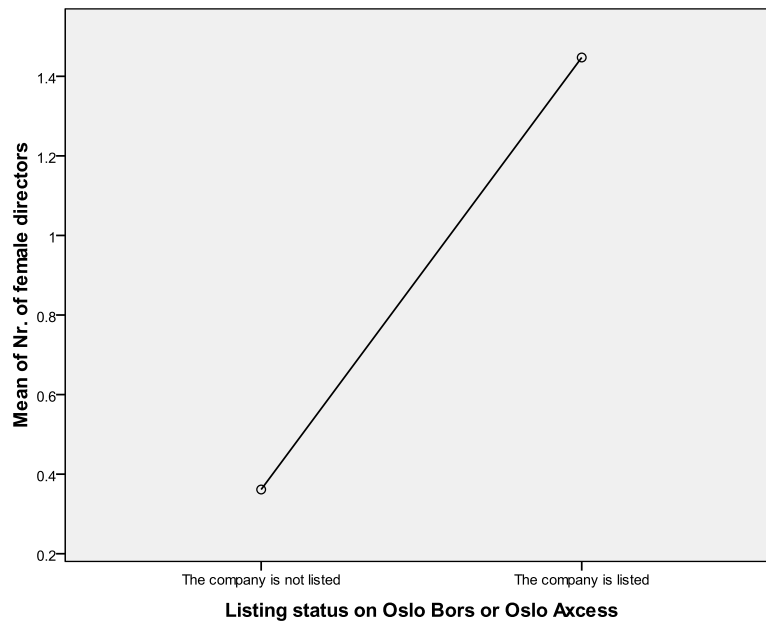
*Notes:* The types of the companies are represented on the X-axis (AS (LTD) on the left and ASA (PLC) on the right) and the listing status groups are represented by different lines (blue line-the company is not listed, and green line-the company is listed). The graph shows that among the ASA group, the listed firms have, on average, more women on the board of directors. In contrast, the non-listed firms among the ASA group have, on average, fewer women on the board of directors. This can be observed by looking at the difference between the two lines. The steep green line goes from zero (no listed AS companies) to approximately 1.4 estimated marginal mean for female directors for ASA companies). The blue line is less steep as the non-listed companies had been less affected by the Norwegian quota. The presence of a significant interaction is reflected in the graph above since the lines of the chart are clearly not parallel. However, further testing is needed to know if this difference is significant.

Graph 5. Average number of female directors across AS and ASA firms



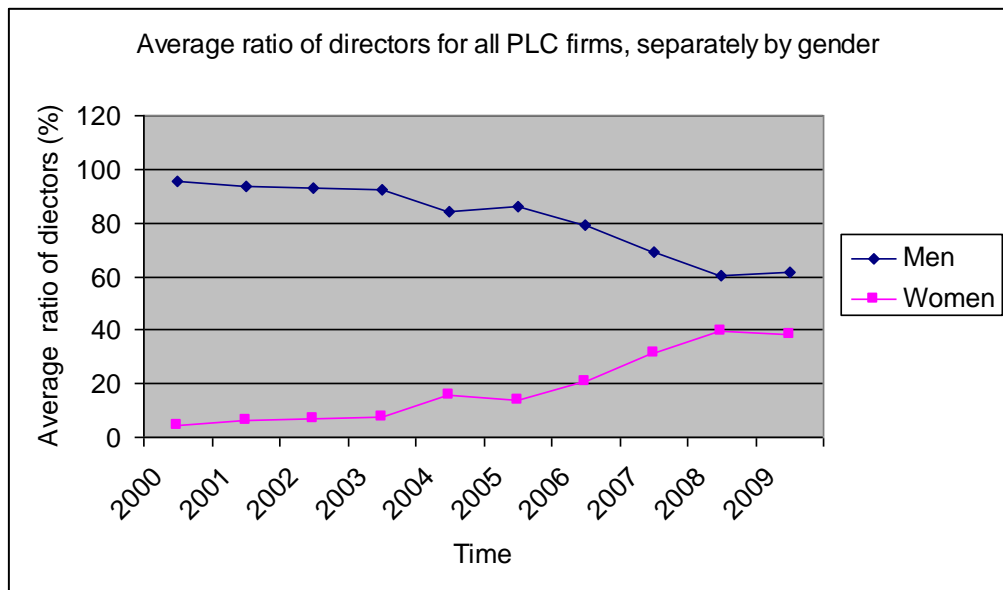
*Notes:* The graph is a result of one-way ANOVA testing analysis for the difference in means. The value for F ( $<0.05$ ) is significant and shows that the difference in mean of female directors is significant within these particular groups of firms (ASA and AS). The graph also shows that the average number of female directors is higher in the ASA group than in the AS group.

Graph 6. Average number of female directors across listed and non-listed firms



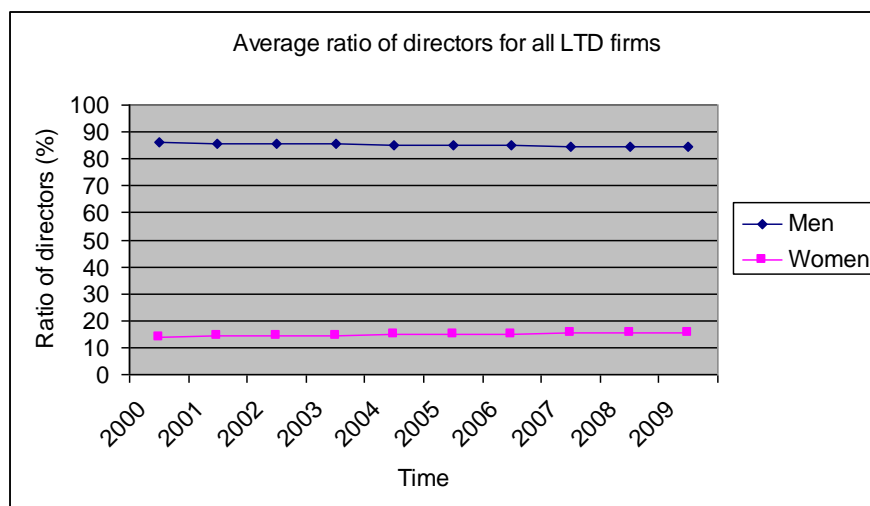
*Notes:* The difference in mean of female directors is significant within the listing status group. The graph also shows that the number of female directors is higher when the company is listed.

Graph 7. Average ratio of directors for all PLC firms, separately by gender



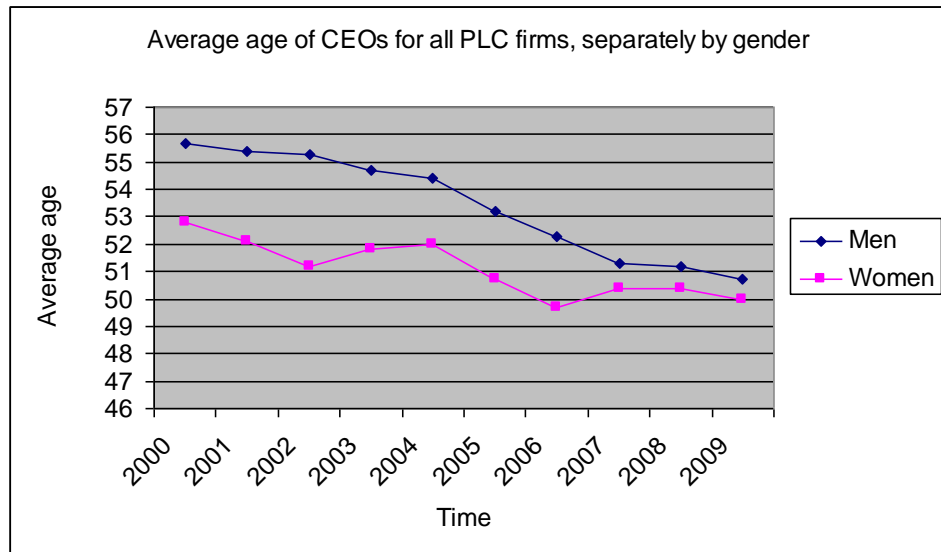
Notes: The X axis presents the time expressed in years, while the Y axis represents the average ratio of directors, separately by gender (for example, the ratio of female directors is calculated as the ratio between female directors and the total number of directors on the board). The graph shows the time series of the transformation in the composition of Norwegian board of directors for all PLC firms. The distance between the two lines on the graph is decreasing, showing the desired trend of bringing equality among sexes on the board level.

Graph 8. Average ratio of directors for all LTD firms, separately by gender



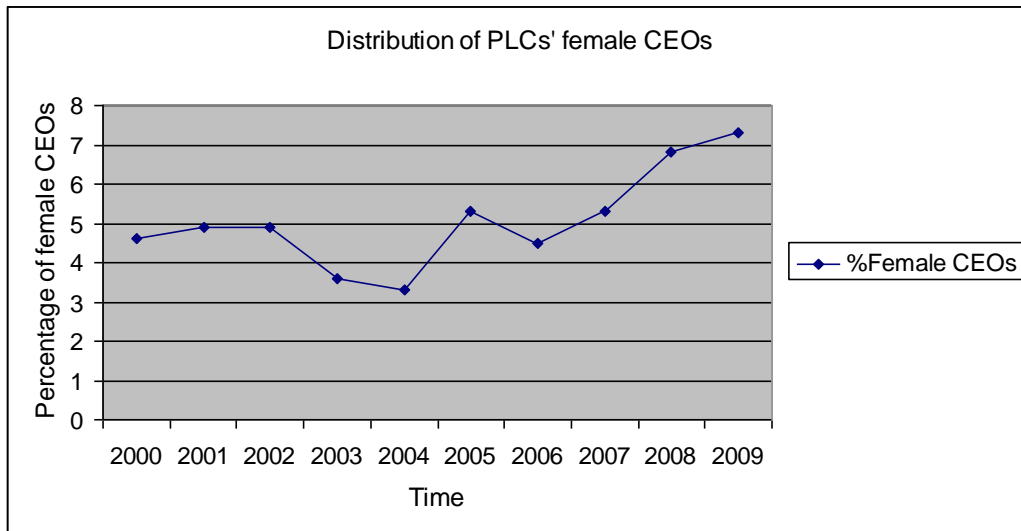
Notes: The graph shows the distribution of the directors by gender in the time interval of 2000 – 2009 for all LTD firms. The average ratio of directors is calculated separately for each gender by dividing the number of male directors by the total number of directors, and the number of female directors by the total number of directors on the board. Unlike the PLC group of firms, the LTD group has less women representation on the board of directors. For the LTD group, women are not represented on the board in a proportion more than 15.54% (2009). Unlike the graph from the PLC group, for the LTD group the two lines, representing the two sexes maintain a relatively constant distance from each other along the whole time interval.

Graph 9. Average age of CEOs for all PLC firms, separately by gender



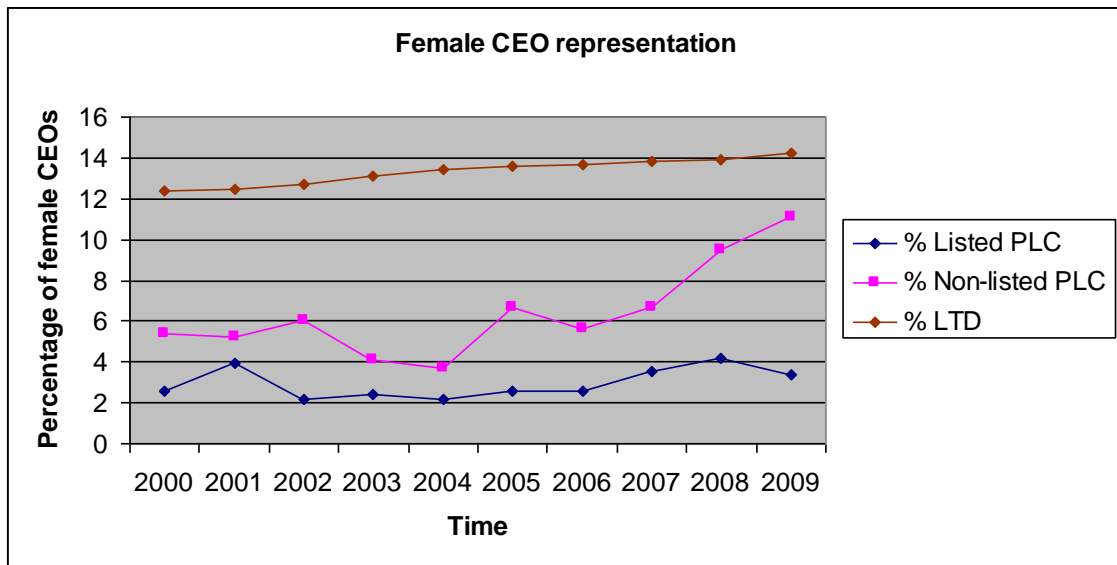
Notes: The X axis represents the timeline and the Y axis represents the mean age of CEOs, separately by gender. The graph shows a convergence between the mean age of a male CEO and the mean age of a female CEO (both of which could be promoted as CEOs at the mean age of 50).

Graph 10. Distribution of PLCs' female CEOs



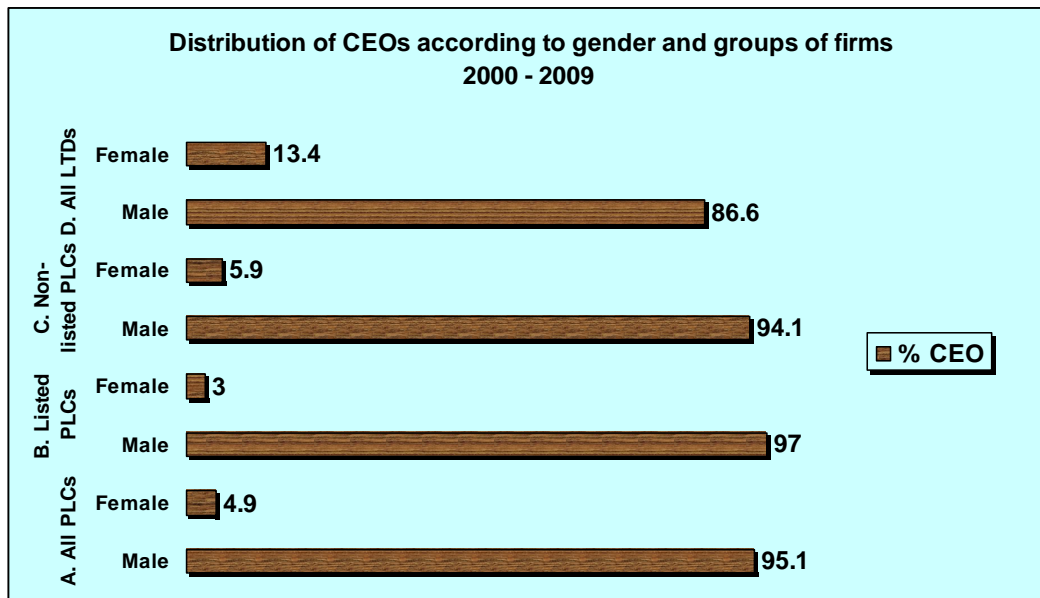
Note: Percentage of female CEOs represents the proportion of women CEOs expressed in percentage points with regard to the total number of CEOs registered in the respective year for all PLC Norwegian firms. It can be observed that from 2006 onwards, female representation on CEO level had been increasing reaching a top of 7.3% representation in 2009.

Graph 11. Female CEO representation across different types of firms



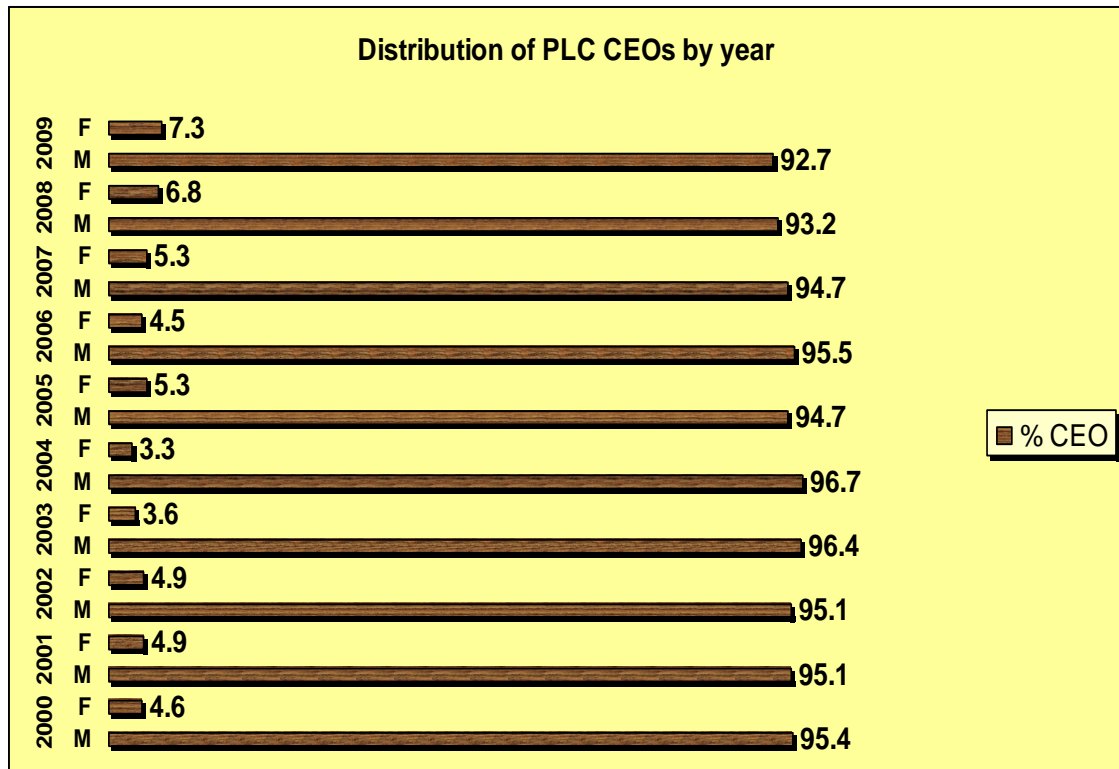
Notes: The percentage of female CEOs represents the proportion of women CEOs expressed in percentage points with regard to the total number of CEOs registered in the respective year for the respective category of firm (PLC listed and non-listed, and LTD). For example, in 2000 there were registered only 4 female CEOs for the listed PLCs, representing 2.6% of the total CEOs registered in 2000 (97.4% of the CEOs being represented by men). Observation: the missing values are not taken into consideration.

Graph 12. Distribution of CEOs according to gender and groups of firms



Notes: The percentage of female CEOs represents the proportion of women CEOs expressed in percentage points with regard to the total number of CEOs registered in the respective panel during the whole sample period. The highest representation of female CEOs can be observed in the LTD group (13.4%) and also in the non-listed PLCs (5.9%) group, while in the other two groups (listed PLCs and all PLCs) female representation on the CEO level is less than 5%.

Graph 13. Distribution of CEOs by gender for all the Norwegian PLCs by year



Notes: The percentage of female CEOs represents the proportion of women CEOs expressed in percentage points with regard to the total number of CEOs registered in the respective year.

Table 3. Correlations between the CEO gender with various variables for all PLC firms

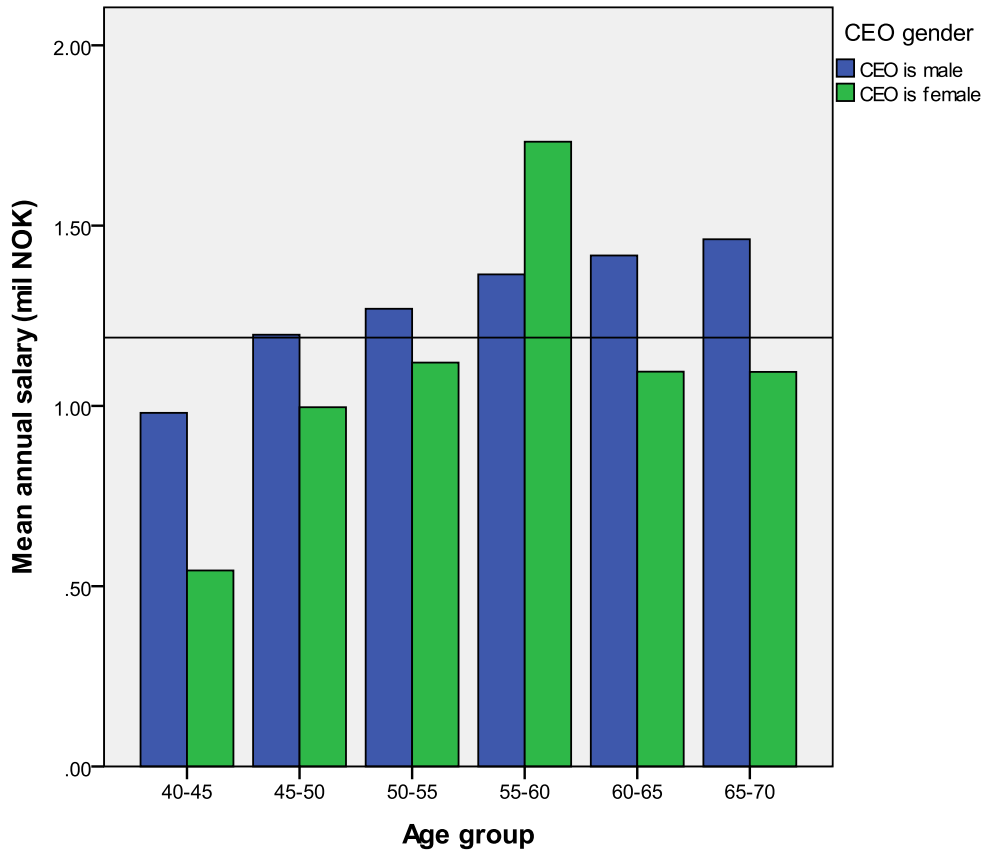
Year	Correlation of CEO gender with:					
	1. Nr. of female directors		2. Nr. of personal female owners		3. Aggregated fraction held by female owners	
	Value	Sig.	Value	Sig.	Value	Sig.
2005	.124**	.026	-.033	.305	-.027	.339
2006	.109**	.044	-.018	.394	-.017	.399
2007	-.03	.335	-.023	.377	-.021	.384
2008	.018	.408	-.026	.366	-.023	.38
2009	-.08	.156	-.027	.37	-.024	.384

\*\* statistically significant at  $p < .05$ , two-tailed



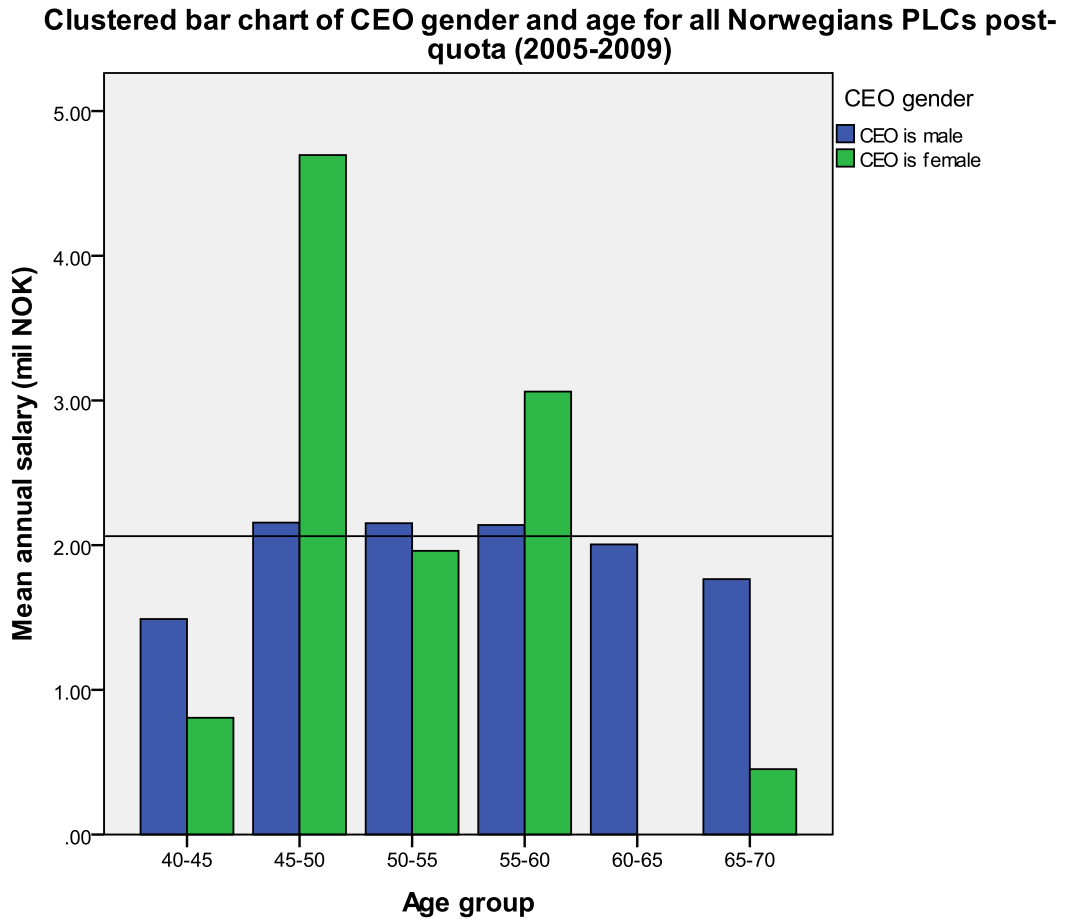
Graph 14. Clustered bar chart of CEO gender and CEO age for all Norwegian PLCs prior-quota (2000-2004)

**Clustered bar chart of CEO gender and age for all Norwegian PLCs prior-quota (2000-2004)**



*Notes:* The Y axis shows the annual salary expressed in mil NOK and the X axis represents age groups for CEOs for all PLC firms during the prior-quota period (2000-2004). The Y axis reference line represents the average salary reference line (1.1895 mil NOK).

Graph 15. Clustered bar chart of CEO gender and CEO age for all Norwegian PLCs post quota (2005-2009)



*Notes:* The Y axis shows the annual salary expressed in mil NOK and the X axis represents age groups for CEOs for all PLC firms during the post-quota period (2005-2009). The Y axis reference line represents the average annual salary reference line (2.0621 mil NOK) which had approximately doubled in comparison with the average annual salary for the prior-quota period.

Table 4. Distribution of CEO by gender (%) according to industry sectors for all Norwegian firms (2000-2007) NACE rev 1

Industry sector	2000	2001	2002	2003	2004	2005	2006	2007
<b>A. Agriculture, hunting and forestry</b>								
Male	91.1	92.2	92.4	92.9	92.4	91.1	90.5	90.3
Female	8.9	7.8	7.6	7.1	7.6	8.9	9.5	9.7
<b>B. Fishing</b>								
Male	94.9	94.4	94.4	93.4	93.2	93.4	93.3	94
Female	5.1	5.6	5.6	6.6	6.8	6.6	6.7	6
<b>C. Mining and quarrying</b>								
Male	92.5	93.3	92.4	95.1	93.9	95	95.3	94.5
Female	7.5	6.7	7.6	4.9	6.1	5	4.7	5.5
<b>D. Manufacturing</b>								
Male	92.1	91.9	91.8	91.9	91.8	91.5	91.1	90.8
Female	7.9	8.1	8.2	8.1	8.2	8.5	8.9	9.2
<b>E. Electricity, gas and water supply</b>								
Male	96.9	97.3	95.9	95.6	95.9	95.3	95	92.5
Female	3.1	2.7	4.1	4.4	4.1	4.7	5	4.8
<b>F. Construction</b>								
Male	97.8	97.6	97.7	97.8	97.8	97.7	97.7	97.5
Female	2.2	2.4	2.3	2.2	2.2	2.3	2.3	2.5
<b>G. Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods</b>								
Male	83.2	82.7	82.9	81.8	81.5	80.5	80	79.7
Female	16.8	17.3	17.1	18.2	18.5	19.5	20	20.3
<b>H. Hotels and restaurants</b>								
Male	76.6	76.6	76.3	74.7	75	74.6	73.4	73
Female	23.4	23.4	23.7	5.3	25	25.4	26.6	27
<b>I. Transport, storage and communication</b>								
Male	92.9	92.4	92.1	92	91.7	91.3	90.8	90.8
Female	7.1	7.6	7.9	8	8.3	8.8	9.2	9.2
<b>J. Financial intermediation</b>								
Male	93.6	91.6	91.7	90.7	89.6	89.4	88.4	88.5
Female	6.4	8.4	8.3	9.3	10.4	10.6	11.6	11.5
<b>K. Real estate, renting and business activities</b>								
Male	89.1	88.9	88.9	88.7	88.4	88.4	88.4	88.6
Female	10.9	11.1	11.1	11.3	11.6	11.6	11.6	11.4
<b>L. Public administration and defense; compulsory social security</b>								
Male	100	100	100	100	100	100	100	50
Female	0	0	0	0	0	0	0	50
<b>M. Education</b>								
Male	83.2	83	81.3	82.7	81.9	79.8	80.5	78.4
Female	16.8	17	18.7	17.3	18.1	20.2	19.5	21.6

Table 4 continued

Industry sector	2000	2001	2002	2003	2004	2005	2006	2007
<b>N. Health and social work</b>								
Male	74.9	74.5	74.4	71.1	70.4	67.6	66.1	64
Female	25.1	25.5	25.6	28.9	29.6	32.4	33.9	36
<b>O. Other community, social and personal service activities</b>								
Male	69.6	68.8	69.2	67.6	67	66.3	64.9	64.4
Female	30.4	31.2	30.8	32.4	33	33.7	35.1	35.6
<b>P. Private households with employed persons</b>								
Male	0	0	0	100	100	100	100	100
Female	100	100	100	0	0	0	0	0
<b>Q. Extra-territorial organizations and bodies</b>								
Male	100	100	100	N/A	N/A	N/A	N/A	N/A
Female	0	0	0	N/A	N/A	N/A	N/A	N/A

Table 5. Distribution of CEO by gender (%) according to industry sectors for all PLC firms (2000-2007)

Industry sector	2000	2001	2002	2003	2004	2005	2006	2007
<b>A. Agriculture, hunting and forestry</b>								
Male	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Female	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>B. Fishing</b>								
Male	100	100	100	100	100	100	100	87.5
Female	0	0	0	0	0	0	0	12.5
<b>C. Mining and quarrying</b>								
Male	100	100	100	100	100	93.8	100	100
Female	0	0	0	0	0	6.3	0	0
<b>D. Manufacturing</b>								
Male	94	95.3	94.6	95.5	96.8	95.5	94.8	96.7
Female	6	4.7	5.4	4.5	3.2	4.5	5.2	3.3
<b>E. Electricity, gas and water supply</b>								
Male	100	100	100	100	100	100	100	100
Female	0	0	0	0	0	0	0	0
<b>F. Construction</b>								
Male	100	100	100	100	100	100	100	100
Female	0	0	0	0	0	0	0	0
<b>G. Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods</b>								
Male	92.7	90.3	92.9	100	95.2	95.7	86.7	94.4
Female	7.3	9.7	7.1	0	4.8	4.3	13.3	5.6
<b>H. Hotels and restaurants</b>								
Male	100	100	100	100	100	N/A	N/A	100
Female	0	0	0	0	0	N/A	N/A	0

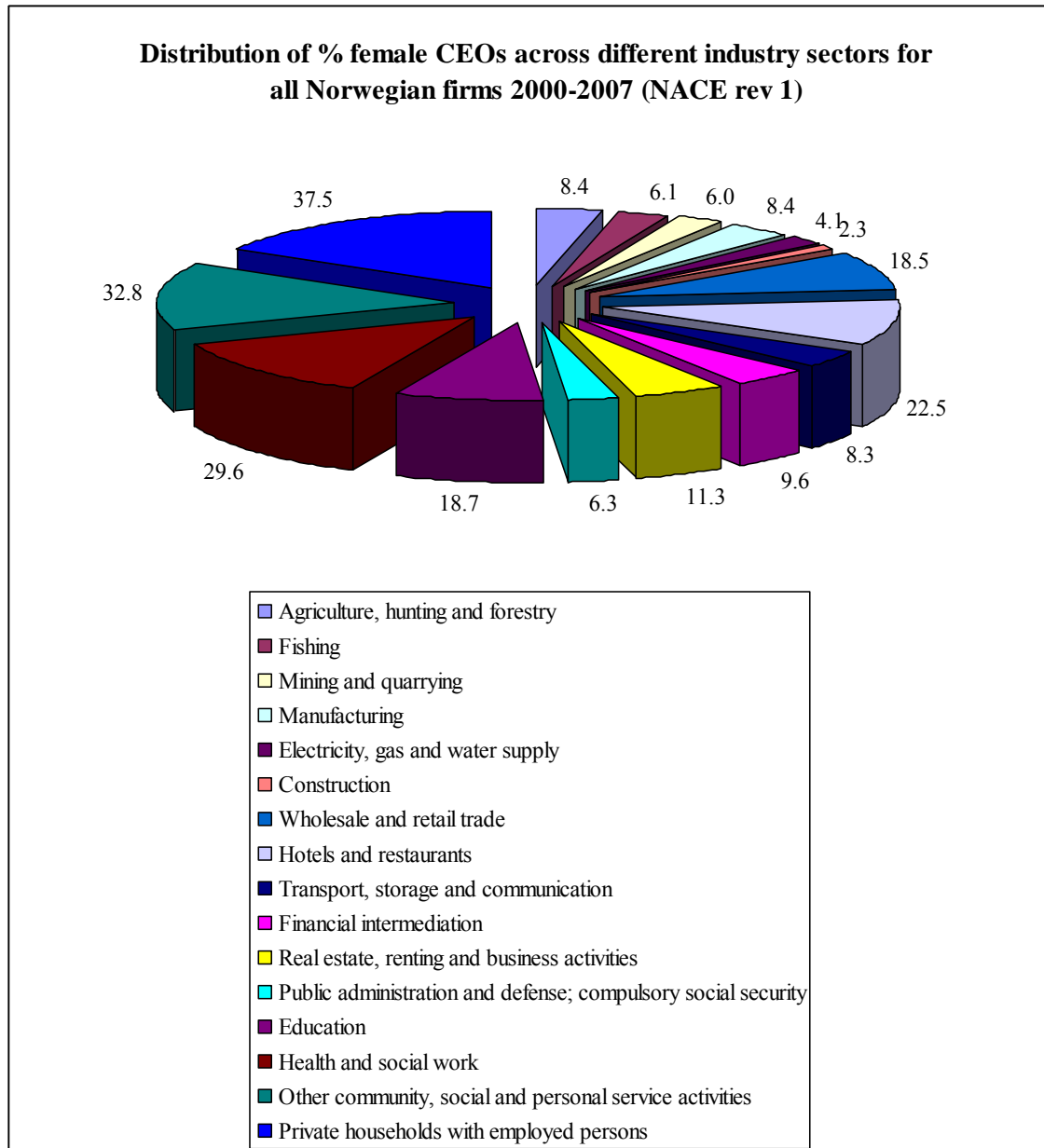
Table 5 continued

Industry sector	2000	2001	2002	2003	2004	2005	2006	2007
<b>I. Transport, storage and communication</b>								
Male	90.2	88.2	92.6	92.3	94.4	93.8	92.6	89.7
Female	9.8	11.8	7.4	7.7	5.6	6.3	7.4	10.3
<b>J. Financial intermediation</b>								
Male	97.9	97.7	97.3	97.2	97	96	93.4	91.9
Female	2.1	2.3	2.7	2.8	3	4	6.6	8.1
<b>K. Real estate, renting and business activities</b>								
Male	96.2	95.4	95.7	95.4	96.1	93.9	95.9	95.7
Female	3.8	4.6	4.3	4.6	3.9	6.1	4.1	4.3
<b>L. Public administration and defense; compulsory social security</b>								
Male	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Female	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>M. Education</b>								
Male	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Female	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>N. Health and social work</b>								
Male	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Female	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>O. Other community, social and personal service activities</b>								
Male	94.7	94.4	93.3	100	100	83.3	100	100
Female	5.3	5.6	6.7	0	0	16.7	0	0
<b>P. Private households with employed persons</b>								
Male	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Female	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>Q. Extra-territorial organizations and bodies</b>								
Male	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Female	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes: The distribution of firms among various sections was based on NACE rev 1 classification as in the table below.

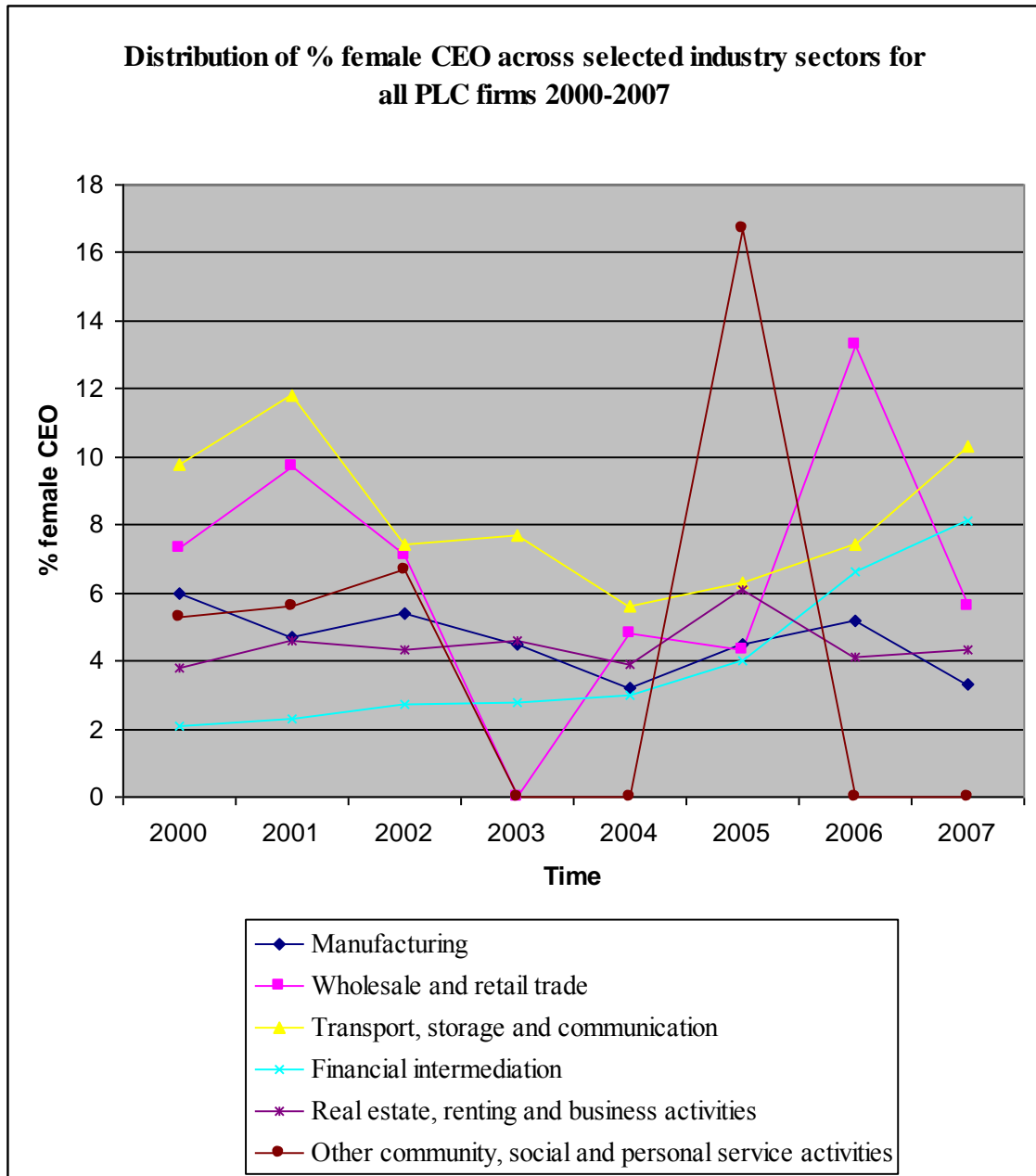
Section	NACE rev 1 industry sections	Divisions
<b>A</b>	Agriculture, hunting and forestry	01-02
<b>B</b>	Fishing	05
<b>C</b>	Mining and quarrying	10-14
<b>D</b>	Manufacturing	15-37
<b>E</b>	Electricity, gas and water supply	40-41
<b>F</b>	Construction	45
<b>G</b>	Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods	50-52
<b>H</b>	Hotels and restaurants	55
<b>I</b>	Transport, storage and communication	60-64
<b>J</b>	Financial intermediation	65-67
<b>K</b>	Real estate, renting and business activities	70-74
<b>L</b>	Public administration and defense; compulsory social security	75
<b>M</b>	Education	80
<b>N</b>	Health and social work	85
<b>O</b>	Other community, social and personal service activities	90-93
<b>P</b>	Private households with employed persons	95
<b>Q</b>	Extra-territorial organizations and bodies	99

Graph 16. Distribution of % female CEOs across different industry sectors for all Norwegian firms 2000-2007 (NACE rev 1)



Notes: The values in the pie chart are approximate. The pie chart over the 2000-2007 time period was determined as an average of the percentage of female CEOs in each industry sector for each year.

Graph 18. Distribution of female CEOs across selected industry sectors for all PLC firms by year



Notes: The X axis represents the timeline and the Y axis represents women representation on CEO level for all Norwegian PLC firms for selected industry sectors.

Table 6. Distribution of CEO by gender (%) according to industry sectors for all Norwegian firms (2008-2009) NACE rev 2

Industry	2008	2009	Industry	2008	2009
<b>A. Agriculture, forestry and fishing</b>			<b>K. Financial and insurance activities</b>		
Male	90.3	92	Male	88.3	88.2
Female	9.7	8	Female	11.7	11.8
<b>B. Mining and quarrying</b>			<b>L. Real estate activities</b>		
Male	93.9	95.4	Male	N/A	89.1
Female	6.1	4.6	Female	N/A	10.9
<b>C. Manufacturing</b>			<b>M. Professional, scientific and technical activities</b>		
Male	90.3	91	Male	88.6	84.3
Female	9.7	9	Female	11.4	15.7
<b>D. Electricity, gas, steam and air conditioning supply</b>			<b>N. Administrative and support service activities</b>		
Male	95.4	94.6	Male	76.9	84.1
Female	4.6	5.4	Female	23.1	15.9
<b>E. Water supply; sewerage, waste management and remediation activities</b>			<b>O. Public administration and defense; compulsory social security</b>		
Male	88.1	94.7	Male	N/A	50
Female	11.9	5.3	Female	N/A	50
<b>F. Construction</b>			<b>P. Education</b>		
Male	97.8	96.7	Male	62.6	75.1
Female	2.2	3.3	Female	37.4	24.9
<b>G. Wholesale and retail trade; repair of motor vehicles and motorcycles</b>			<b>Q. Human health and social work activities</b>		
Male	97.5	79.3	Male	88.2	63
Female	2.5	20.7	Female	11.8	37
<b>H. Transportation and storage</b>			<b>R. Arts, entertainment and recreation</b>		
Male	79.8	93.6	Male	63.6	76.4
Female	20.2	6.4	Female	36.4	23.6
<b>I. Accommodation and food service activities</b>			<b>S. Other service activities</b>		
Male	72.1	71.9	Male	100	40
Female	27.9	28.1	Female	0	60
<b>J. Information and communication</b>			<b>T. Activities of households as employees</b>		
Male	90.4	90.6	Male	N/A	100
Female	9.6	9.4	Female	N/A	0
			<b>U. Activities of extraterritorial organizations and bodies</b>		
			Male	N/A	N/A
			Female	N/A	N/A



Table 7. Distribution of CEO by gender (%) according to industry sectors for all PLC firms (2008-2009) NACE rev 2

Industry	2008	2009	Industry	2008	2009
<b>A. Agriculture, forestry and fishing</b>			<b>K. Financial and insurance activities</b>		
Male	N/A	N/A	Male	90.5	92.3
Female	N/A	N/A	Female	9.5	7.7
<b>B. Mining and quarrying</b>			<b>L. Real estate activities</b>		
Male	88.9	95.5	Male	N/A	72.7
Female	11.1	4.5	Female	N/A	27.3
<b>C. Manufacturing</b>			<b>M. Professional, scientific and technical activities</b>		
Male	97.3	96	Male	90.3	96.6
Female	2.7	4	Female	9.7	3.4
<b>D. Electricity, gas, steam and air conditioning supply</b>			<b>N. Administrative and support service activities</b>		
Male	88.9	100	Male	N/A	81.8
Female	11.1	0	Female	N/A	18.2
<b>E. Water supply; sewerage, waste management and remediation activities</b>			<b>O. Public administration and defense; compulsory social security</b>		
Male	100	N/A	Male	N/A	N/A
Female	0	N/A	Female	N/A	N/A
<b>F. Construction</b>			<b>P. Education</b>		
Male	N/A	75	Male	N/A	N/A
Female	N/A	25	Female	N/A	N/A
<b>G. Wholesale and retail trade; repair of motor vehicles and motorcycles</b>			<b>Q. Human health and social work activities</b>		
Male	100	100	Male	N/A	N/A
Female	0	0	Female	N/A	N/A
<b>H. Transportation and storage</b>			<b>R. Arts, entertainment and recreation</b>		
Male	93.3	82.6	Male	100	100
Female	6.7	17.4	Female	0	0
<b>I. Accommodation and food service activities</b>			<b>S. Other service activities</b>		
Male	100	N/A	Male	N/A	N/A
Female	0	N/A	Female	N/A	N/A
<b>J. Information and communication</b>			<b>T. Activities of households as employees</b>		
Male	87.5	87	Male	N/A	N/A
Female	12.5	13	Female	N/A	N/A
			<b>U. Activities of extraterritorial organizations and bodies</b>		
			Male	N/A	N/A
			Female	N/A	N/A

Notes: The distribution of firms among different industry sections was based on the NACE rev 2 classifications according to the following table.

<b>Section</b>	<b>NACE rev 2 industry sections</b>	<b>Divisions</b>
<b>A</b>	Agriculture, forestry and fishing	01 – 03
<b>B</b>	Mining and quarrying	05 – 09
<b>C</b>	Manufacturing	10 – 33
<b>D</b>	Electricity, gas, steam and air conditioning supply	35
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Table 8. Summary statistics, PLC firms 2000-2009

	Observations	Mean	Std. Dev.
<b>Panel A. Listed PLCs</b>			
Nr. of female CEOs	45		
Nr. of male CEOs	1450		
Nr. of female directors	1526	1.45	1.211
Ratio of female directors	1526	.2199	.17335
Aggregated fraction held by female owners	1477	.0687	1.26509
Board size	1526	6.32	1.803
Company age	1450	28.42	35.255
Nr. of female owners	1477	.01	.119
<b>Panel B. Non-listed PLCs</b>			
Nr. of female CEOs	168		
Nr. of male CEOs	2662		
Nr. of female directors	2964	.66	.933
Ratio of female directors	2964	.1326	.17477
Aggregated fraction held by female owners	2752	.5952	5.39553
Board size	2964	4.69	1.732
Company age	2819	12.05	20.764
Nr. of female owners	2752	.04	.238

*Notes:* The table reports summary statistics for all PLCs over the time interval 2000-2009, separately for listed and non-listed PLCs. Ratio of female directors represents the number of female directors divided by the total number of directors. Aggregated fraction held by female owners shows the total stake owned by women owners expressed in percentage points. Firm age is the current year minus the foundation year.

Table 9. Summary statistics, LTD firms 2000-2009

	Observations	Mean	Std. Dev.
Nr. of female CEOs	173198		
Nr. of male CEOs	1117937		
Nr. of female directors	1599177	.36	.660
Ratio of female directors	1599177	.1489	.27931
Aggregated fraction held by female owners	1512429	11.2561	25.95524
Board size	1599177	2.23	1.378
Company age	1546677	10.57	12.542
Nr. of female owners	1512480	.28	.624

*Notes:* The table reports summary statistics for all LTDs over the time interval 2000-2009, separately for listed and non-listed PLCs. Ratio of female directors represents the number of female directors divided by the total number of directors. Aggregated fraction held by female owners shows the total stake owned by women owners expressed in percentage points. Firm age is the current year minus the foundation year.

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Table 10. Binomial logit model for the prior quota period (2000 - 2004)

A. Listed PLCs				B. Non-listed PLCs			
<b>Dependent variable: CEO gender</b>				<b>Dependent variable: CEO gender</b>			
Observations	358			Observations	848		
Cox and Snell R <sup>2</sup>	.053			Cox and Snell R <sup>2</sup>	.032		
Nagelkerke R <sup>2</sup>	.569		<u>Sig.</u>	Nagelkerke R <sup>2</sup>	.11		<u>Sig.</u>
Model Chi-square	19.327***		.002	Model Chi-square	27.57***		.000
	<u>Coefficient</u>	<u>p-value</u>	<u>Exp(B)</u>		<u>Coefficient</u>	<u>p-value</u>	<u>Exp(B)</u>
<b>Independent variable</b>				<b>Independent variable</b>			
Ratio of female directors	16.785**	.044	1.949E7	Ratio of female directors	4.7507***	.000	115.600
<b>Control variables</b>				<b>Control variables</b>			
Firm age	.081*	.064	1.085	Firm age	.004	.717	1.004
Firm size	1.304	.240	3.682	Firm size	-.119	.142	.888
Board size	-4.643*	.083	.010	Board size	-.193	.123	.825
ROA	-.039*	.086	.962	ROA	.000	.545	.999
<b>Intercept</b>	-13.327	.348	.000	<b>Intercept</b>	-.886	.479	.412

Table 10'. Binomial logit model for the prior quota period (2000 - 2004) – Coefficient for number of female directors

A. Listed PLCs				B. Non-listed PLCs			
	<u>Coefficient</u>	<u>p-value</u>	<u>Exp(B)</u>		<u>Coefficient</u>	<u>p-value</u>	<u>Exp(B)</u>
Nr of female directors	3.273**	.043	26.381	Nr of female directors	.870***	.000	2.386

Notes: Table 10' shows the results for the coefficient of the number of female directors by running the following regression: CEO gender =  $\beta$ \*number of female directors +  $\Sigma$  control variables +  $\epsilon$ .

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*Notes:* Observations represent the number of cases included in the analysis. Some cases are deleted from the analysis where information is missing. Only cases where all dependent and explanatory variables are complete are included in the analysis.

The Cox and Snell  $R^2$  is  $R^2 = 1 - [L(0)/L(B)]^{2/N}$  where  $L(0)$  is the likelihood for the model with only a constant,  $L(B)$  is the likelihood for the model under consideration, and  $N$  is the sample size. This measure for logistic regression cannot achieve a maximum value of 1. Nagelkerke (1991) proposed a modification of the Cox and Snell  $R^2$  so that the value of 1 could be achieved. The Nagelkerke  $R^2$  is:  $R^2 = R^2 / R_{MAX}^2$  where  $R_{MAX}^2 = 1 - [L(0)]^{2/N}$ . Nagelkerke  $R^2$  tells how much of the variation in the outcome variable is explained by the logistic regression model. (Observation: The values of logistic summary measures are typically much smaller than the ones from a linear regression model).

Model chi-square is the difference between -2LL for the model with only a constant and -2LL for the current model. The model chi-square tests the null hypothesis that all coefficients except the constant are zero. This is comparable to the overall F test for regression (Norusis 2008).

Exp(B) gives the relative odds or odds ratio for a particular explanatory variable, given the other explanatory variables in the model.

p-value represents the significance level

\* statistically significant at the 10% level ( $p < 0.1$ )

\*\* statistically significant at the 5% level ( $p < 0.05$ )

\*\*\* statistically significant at the 1% level ( $p < 0.01$ )

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Table 10. Binomial logit model for the prior quota period (2000 - 2004) continued

C. All PLCs				D. All LTDs		
<b>Dependent variable: CEO gender</b>				<b>Dependent variable: CEO gender</b>		
Observations	1206			Observations	360288	
Cox and Snell R <sup>2</sup>	.03			Cox and Snell R <sup>2</sup>	.228	
Nagelkerke R <sup>2</sup>	.121	<u>Sig.</u>		Nagelkerke R <sup>2</sup>	.415	<u>Sig.</u>
Model Chi-square	36.125***	.000		Model Chi-square	93071.193***	.000
	<u>Coefficient</u>	<u>p-value</u>	<u>Exp(B)</u>		<u>Coefficient</u>	<u>p-value</u>
						<u>Exp(B)</u>
<b>Independent variable</b>				<b>Independent variable</b>		
Ratio of female directors	4.543***	.000	93.975	Ratio of female directors	4.812***	.000
<b>Control variables</b>				<b>Control variables</b>		
Firm age	.008	.289	1.008	Firm age	-.011***	.000
Firm size	-.096	.201	.908	Firm size	-.048***	.000
Board size	-.385***	.001	.681	Board size	.023***	.000
ROA	.000	.428	.999	ROA	.000***	.000
<b>Intercept</b>	-.646	.588	.524	<b>Intercept</b>	-2.368***	.000

Table 10''. Binomial logit model for the prior quota period (2000 - 2004) – Coefficient for number of female directors

C. All PLCs			D. All LTDs				
	<u>Coefficient</u>	<u>p-value</u>	<u>Exp(B)</u>		<u>Coefficient</u>	<u>p-value</u>	<u>Exp(B)</u>
Nr of female directors	.777***	.000	2.176	Nr of female directors	2.318***	.000	10.160

Notes: Table 10'' shows the results for the coefficient of the number of female directors by running the following regression: CEO gender =  $\beta$ \*number of female directors +  $\Sigma$  control variables +  $\epsilon$ .

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Table 11. Binomial logit model for the post quota period (2005 - 2009)

A. Listed PLCs				B. Non-listed PLCs		
<b>Dependent variable: CEO gender</b>				<b>Dependent variable: CEO gender</b>		
Observations	482			Observations	524	
Cox and Snell R <sup>2</sup>	.09			Cox and Snell R <sup>2</sup>	.039	
Nagelkerke R <sup>2</sup>	.388		<u>Sig.</u>	Nagelkerke R <sup>2</sup>	.098	<u>Sig.</u>
Model Chi-square	45.243***		.000	Model Chi-square	20.599***	.01
	<u>Coefficient</u>	<u>p-value</u>	<u>Exp(B)</u>		<u>Coefficient</u>	<u>p-value</u>
						<u>Exp(B)</u>
<b>Independent variable</b>				<b>Independent variable</b>		
Ratio of female directors	12.344***	.001	229532.092	Ratio of female directors	4.156***	.000
<b>Control variables</b>				<b>Control variables</b>		
Firm age	.032***	.000	1.033	Firm age	-.005	.691
Firm size	-.269**	.012	.764	Firm size	.024	.784
Board size	-.078	.675	.925	Board size	-.111	.369
ROA	.015	.591	1.015	ROA	.005	.393
<b>Intercept</b>	-5.078**	.027	.006	<b>Intercept</b>	-3.750**	.012

Table 11'. Binomial logit model for the post quota period (2005 - 2009) – Coefficient for number of female directors

A. Listed PLCs				B. Non-listed PLCs		
	<u>Coefficient</u>	<u>p-value</u>	<u>Exp(B)</u>		<u>Coefficient</u>	<u>p-value</u>
Nr of female directors	2.354***	.001	10.523	Nr of female directors	1.114***	.000
						<u>Exp(B)</u>
						3.047

Notes: Table 11' shows the results for the coefficient of the number of female directors by running the following regression: CEO gender =  $\beta$ \*number of female directors +  $\Sigma$  control variables +  $\epsilon$



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Table 11. Binomial logit model for the post quota period (2005 - 2009) continued

C. All PLCs				D. All LTDs		
<b>Dependent variable: CEO gender</b>				<b>Dependent variable: CEO gender</b>		
Observations	1006			Observations	479710	
Cox and Snell R <sup>2</sup>	.046			Cox and Snell R <sup>2</sup>	.246	
Nagelkerke R <sup>2</sup>	.141	<u>Sig.</u>		Nagelkerke R <sup>2</sup>	.429	<u>Sig.</u>
Model Chi-square	47.562***	.000		Model Chi-square	135757.028***	.000
	<u>Coefficient</u>	<u>p-value</u>	<u>Exp(B)</u>		<u>Coefficient</u>	<u>p-value</u>
						<u>Exp(B)</u>
<b>Independent variable</b>				<b>Independent variable</b>		
Ratio of female directors	4.551***	.000	94.713	Ratio of female directors	4.757***	.000
<b>Control variables</b>				<b>Control variables</b>		
Firm age	.017***	.000	1.017	Firm age	-.012***	.000
Firm size	-.100	.102	.905	Firm size	-.040***	.000
Board size	-.318***	.002	.728	Board size	.002	.626
ROA	.010*	.093	1.010	ROA	.000***	.000
<b>Intercept</b>	-1.625	.118	.197	<b>Intercept</b>	-2.309***	.000

Table 11''. Binomial logit model for the post quota period (2005 - 2009) – Coefficient for number of female directors

C. All PLCs			D. All LTDs				
	<u>Coefficient</u>	<u>p-value</u>	<u>Exp(B)</u>		<u>Coefficient</u>	<u>p-value</u>	<u>Exp(B)</u>
Nr of female directors	1.209***	.000	3.349	Nr of female directors	2.305***	.000	10.020

Notes: Table 11'' shows the results for the coefficient of the number of female directors by running the following regression: CEO gender =  $\beta$ \*number of female directors +  $\Sigma$  control variables +  $\epsilon$ .

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Table 12. OLS regressions prior quota (2000 - 2004)

Dependant variables		A. Listed PLC firms				B. Non-listed PLC firms			
		R <sup>2</sup>	Durbin-Watson	Observations	F test	R <sup>2</sup>	Durbin-Watson	Observations	F test
Return on Assets		.086		132		.094		384	
		1.991		1.666		1.602		5.569***	
				Sig. .123				Sig. .000	
		<b>Independent variables</b>	<u>Standardized</u>	<u>p-value</u>		<b>Independent variables</b>	<u>Standardized</u>	<u>p-value</u>	
		CEO gender	-.168*	.069		CEO gender	-.060	.244	
		CEO salary	-.068	.496		CEO salary	-.019	.708	
		CEO age	.229**	.019		CEO age	-.043	.403	
		<b>Control variables</b>				<b>Control variables</b>			
		Firm size	.168*	.093		Firm size	.287***	.000	
		Firm age	.081	.389		Firm age	-.005	.918	
	Board size	-.129	.211		Board size	-.117**	.026		
	Gender diversity	.056	.546		Gender diversity	.113**	.031		
Profit-to-sales ratio		.181		132		.102		384	
		1.296		3.911***		2.009		6.12***	
				Sig. .001				Sig. .000	
		<b>Independent variables</b>	<u>Standardized</u>	<u>p-value</u>		<b>Independent variables</b>	<u>Standardized</u>	<u>p-value</u>	
		CEO gender	-.067	.439		CEO gender	-.003	.950	
		CEO salary	-.295***	.002		CEO salary	-.101**	.050	
		CEO age	-.159*	.084		CEO age	-.052	.319	
		<b>Control variables</b>				<b>Control variables</b>			
		Firm size	.220**	.021		Firm size	.337***	.000	
		Firm age	.249***	.006		Firm age	.001	.980	
	Board size	.047	.633		Board size	-.056	.286		
	Gender diversity	-.036	.688		Gender diversity	-.126**	.016		

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## Looking through the Glass Ceiling. Women and Power: Leadership in Norwegian Firms

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*Notes:* The  $R^2$  represents the Multiple Squared Correlation and shows how much of the variability in ROA and Profit-to-sales ratio is explained by all independent variables.  $R^2$  is obtained by dividing the regression sum of squares by the total sum of squares. *Profit-to-sales ratio* shows how many cents of profit are earned on each euro of sales (Sutton 2004, 51).

The Durbin Watson statistic tests whether adjacent residuals are correlated. The possible values of the statistic range from 0 to 4. If the residuals are not correlated with each other, the statistic is close to 2. Values less than 2 indicate positive correlation of the residuals, and values greater than 2 indicate negative correlation. *Observations* represent the number of firms that survived along the whole sample.

The unstandardized coefficients provide information needed to write the regression equation in raw score units, whereas the standardized coefficients provide information needed to express the regression equation in standard score units, or Z-score units. Standardized coefficients are the coefficients obtained if both the dependent variable and each of the independent variables have a mean of zero and a standard deviation of 1. Therefore, the standardized coefficients are useful for comparing the coefficients in the model. The CEO gender is a dummy intercept variable that takes a value of 1 if the CEO is a female and a value of 0 if the CEO is a male. The standardized coefficient for CEO gender indicates the additional increase or decrease in ROA and profit-to-sales ratio that can be attributed to having a female CEO.

The overall F test is used for testing the null hypothesis that the population value for R is 0. The observed significance level for the F statistic tells how often it is expected to observe a sample value for multiple R of its respective value or larger when the true population value is zero. If the observed significance level is less than .0005, the null hypothesis is rejected. The test that multiple R is zero is equivalent to testing that the population values of all the regression coefficients in the equation except the constant are zero. Even if the null hypothesis that the population value for multiple R is 0 is rejected, that does not mean that all of the variables in the equation have regression coefficients that are significantly different from 0. To test whether a particular coefficient is 0, I performed t-tests for each coefficient. The observed significance level for testing the null hypothesis that in the population the value of the coefficient is 0 is .05. For p-values lower than .05, the null hypothesis is rejected, and for values above .05, the null hypothesis is accepted.

Gender diversity is represented by the ratio of women on the board of directors.

- \* statistically significant at the 10% level
- \*\* statistically significant at the 5% level
- \*\*\* statistically significant at the 1% level

Looking through the Glass Ceiling. Women and Power: Leadership in Norwegian Firms

Table 12. OLS regressions prior quota (2000 - 2004) continued

Dependant variables		C. All PLC firms				D. All LTD firms			
		R <sup>2</sup>		Observations		R <sup>2</sup>		Observations	
<b>Return on Assets</b>	R <sup>2</sup>	.077		516		.005		170809	
	Durbin-Watson	1.591		6.017***		1.898		125.418***	
				Sig.	.000			Sig.	.000
	<b>Independent variables</b>		<u>Standardized</u>	<u>p-value</u>		<b>Independent variables</b>	<u>Standardized</u>	<u>p-value</u>	
	CEO gender		-.067	.130		CEO gender	-.006*	.061	
	CEO salary		.002	.973		CEO salary	-.002	.546	
	CEO age		-.004	.934		CEO age	.012***	.000	
	<b>Control variables</b>					<b>Control variables</b>			
	Firm size		.249***	.000		Firm size	.073***	.000	
	Firm age		.020	.672		Firm age	-.003	.280	
	Board size		-.114**	.016		Board size	-.052***	.000	
	Gender diversity		.111**	.015		Gender diversity	.017***	.000	
<b>Profit-to-sales ratio</b>	R <sup>2</sup>	.112		516		.001		171026	
	Durbin-Watson	1.349		9.188***		1.846		20.792***	
				Sig.	.000			Sig.	.000
	<b>Independent variables</b>		<u>Standardized</u>	<u>p-value</u>		<b>Independent variables</b>	<u>Standardized</u>	<u>p-value</u>	
	CEO gender		-.016	.708		CEO gender	-.005	.122	
	CEO salary		-.246***	.000		CEO salary	.014***	.000	
	CEO age		-.127***	.004		CEO age	-.001	.746	
	<b>Control variables</b>					<b>Control variables</b>			
	Firm size		.235***	.000		Firm size	-.035***	.000	
	Firm age		.146***	.002		Firm age	.007***	.008	
	Board size		-.003	.952		Board size	.011***	.000	
	Gender diversity		-.073	.101		Gender diversity	.001	.860	

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Table 13. OLS regressions post quota (2005 - 2009)

Dependant variables		A. Listed PLC firms				B. Non-listed PLC firms			
<b>Return on Assets</b>	R <sup>2</sup>	.164	Observations	107	R <sup>2</sup>	.172	Observations	188	
	Durbin-Watson	1.58	F test	2.774**	Durbin-Watson	1.557	F test	5.34***	
			Sig	.011			Sig	.000	
	<b>Independent variables</b>		<u>Standardized</u>	<u>p-value</u>	<b>Independent variables</b>		<u>Standardized</u>	<u>p-value</u>	
<b>Profit-to-sales ratio</b>	R <sup>2</sup>	.486	Observations	107	R <sup>2</sup>	.19	Observations	191	
	Durbin-Watson	1.043	F test	13.364***	Durbin-Watson	2.064	F test	6.138***	
			Sig	.000			Sig	.000	
	<b>Independent variables</b>		<u>Standardized</u>	<u>p-value</u>	<b>Independent variables</b>		<u>Standardized</u>	<u>p-value</u>	

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Table 13. OLS regressions post quota (2005 - 2009) continued

<b>Dependant variables</b>		<b>C. All PLC firms</b>				<b>D. All LTD firms</b>			
<b>Return on Assets</b>	R <sup>2</sup>	.141	Observations	295	R <sup>2</sup>	.004	Observations	181413	
	Durbin-Watson	1.525	F test	6.737***	Durbin-Watson	1.884	F test	115.509***	
			Sig	.000			Sig	.000	
	<b>Independent variables</b>		<u>Standardized</u>	<u>p-value</u>	<b>Independent variables</b>		<u>Standardized</u>	<u>p-value</u>	
	CEO gender		-.040	.495	CEO gender		-.004	.132	
	CEO salary		-.009	.876	CEO salary		-.004	.114	
	CEO age		.084	.163	CEO age		.018***	.000	
	<b>Control variables</b>				<b>Control variables</b>				
	Firm size		.320***	.000	Firm size		.069***	.000	
	Firm age		.080	.193	Firm age		-.028***	.000	
	Board size		-.267***	.000	Board size		-.041***	.000	
	Gender diversity		-.100*	.081	Gender diversity		.003	.357	
<b>Profit-to-sales ratio</b>	R <sup>2</sup>	.188	Observations	298	R <sup>2</sup>	.001	Observations	208311	
	Durbin-Watson	1.034	F test	9.588***	Durbin-Watson	1.931	F test	29.168***	
			Sig	.000			Sig	.000	
	<b>Independent variables</b>		<u>Standardized</u>	<u>p-value</u>	<b>Independent variables</b>		<u>Standardized</u>	<u>p-value</u>	
	CEO gender		.313***	.000	CEO gender		-.003	.247	
	CEO salary		.134**	.021	CEO salary		.015***	.000	
	CEO age		.057	.326	CEO age		-.006**	.017	
	<b>Control variables</b>				<b>Control variables</b>				
	Firm size		-.151***	.009	Firm size		-.044***	.000	
	Firm age		.188***	.002	Firm age		.004	.102	
	Board size		-.007	.903	Board size		.015***	.000	
	Gender diversity		-.029	.605	Gender diversity		-.004	.124	

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BI Norwegian Business School  
MSc Financial Economics

## **Preliminary Thesis Report**

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# **Looking through the Glass Ceiling Women in the Executive Suite**

(Revised)  
Date of submission:  
16.01.2012

Supervisor:  
Knut Nygaard

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## **Abstract**

This paper examines whether there is a relationship between the CEO gender of Norwegian firms and firm performance. In other words, the main question the paper raises is if women-led companies are distinguishable in any detectable and relevant way. I examine the influence of women in the executive suite across different samples of firms: AS, ASA and listed ones.

Results show that there is no significant improvement of firm performance in Norwegian firms. Nevertheless, the findings also show that the aggregated fraction held by female owners is positively correlated with the gender of the CEO, leading to more female power in Norwegian firms. There is no relevant evidence that there is a significant relationship between firm performance and CEO's characteristics. If female participation in the board of the company has a positive effect on firm performance, results show that having a woman CEO has a neutral or negative effect.

## I. Introduction

The objective of this paper is to analyze the particular source of diversity in corporate governance and top management, namely that attributable to the participation of women. The issue of gender diversity has been discussed both in the academic literature and in the popular press. Among numerous aspects connected to the issue, recent studies have investigated the so-called “glass ceiling effect<sup>1</sup>” that refers to obstacles women have to face in their way of reaching the highest levels of power in top management.

The resilience of the glass ceiling can be accounted for in many ways. Whether the concept is highlighted as the “semi-hard glass ceiling” (Agrawal and Knoeber 2001) or the “ultimate glass ceiling” (Arfken et al., 2004), women feel that as further as they climb on the higher levels of management the more intense they sense a sort of male brotherhood from which they are excluded. At the executive level, the glass ceiling apparently persists.

Therefore, it is important to measure women’s participation in executive suite in financial terms. It is a challenge to try and commensurate the impact that women have both on corporate policies and on corporate finance. Not only is performance measured in various ways, but women’s contribution to firm performance is also quantified by numerous factors (experience, background, motivation, and others). Some papers measure firm performance by normal stock-market returns, ROI (return on investment), or CAR (cumulative abnormal returns). In my paper, I will measure performance by ROA (Return on Assets) and ROE (Return on Equity).

Most companies are founded by an individual who is likely to be both the owner and the manager. The manager and the CEO remain in charge of their businesses as they grow, being responsible for their direction and their management (Cadbury 2002).

Executives can affect firm outcomes as they can consistently influence key decisions in their firms. Therefore, I believe it is important to analyze the connection between firm performance and CEO’s characteristics and examine whether there are strong some relationships among the factors.

Furthermore, the paper examines the extent to which women have vanquished the glass ceiling by empirically analysing if there has been an increase in women’s representation in CEO positions. Therefore, it is important to discuss policies currently implemented in some countries and organizations to foster the advancement of women in business. Norway is one

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<sup>1</sup> The pioneering book in this area was Morrison et al.’s *Breaking the Glass Ceiling*. The book brought the term “glass ceiling” into the lexicon in 1987.

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of the countries that has the most participation of women in top management. Nevertheless, the large proportion of women on the firm's board of directors might be due to the quota mandated in December 2005 rather than women's efforts to break the glass ceiling by their own forces. In such a situation, when women are being promoted just because the company has to comply with the law, then women's strengths may go unrecognized and silence may lead to the obsolete belief that women bring nothing new to the table. Conversely, some directors may become what sociologists call the "Queen Bee": they take advantage of their token status posing as the single representative in their collectivity as they excessively criticize their potential women peers.

This paper contributes to the economic literature on gender and top management by attempting to solve the chicken-and-egg problem – do women change their working environment after reaching the highest level in corporate promotion, or do women reach to the top of the pyramid because they work in an environment that is already favourable to them? In other words, is firm performance dependant on the CEO gender or is the CEO gender dependent on firm characteristics?

Since the mid-1980s, advocates for women have worked hard to convince the business world that women are as capable as men in high executive positions. Therefore, their inclusion in the executive suite contributes to the goodwill of the company (Adler). Adler's study brings evidence that 215 Fortune 500 firms (from 1980 to 1998) show a strong correlation between promoting women into the executive suite and high profitability. Under three measurements of performance (profits as a percentage of revenues, profits as a percentage of assets, and profits as a percentage of stockholder's equity), Adler's study proved that firms that had women in the executive suite had better results than the other firms. However, another related study from 1999, shows that there had been no progress with respect to women as CEOs from 1987 to 1996, and there was no evidence that such progress would likely be forthcoming in the future (Daily 1999, 96-97).

I will investigate whether there has been a progress in this regard by examining all Norwegian firms over the past decade. In order to be more accurate, I will use three sub-samples: AS, ASA and listed firms. A specific aspect that I will take into account is the Norwegian quota obliging all PLC companies to have 40% females on the board of directors. The government mandated the quota in 2005. All PLCs registered after 1<sup>st</sup> January 2006 had to comply with the quota immediately. As for the other existing firms, they were given an interval of two years to meet the requirements of the law.

Therefore, I will examine if the quota mandated in December 2005 had an impact not only on board composition, but also on the executive suite. Are there more women CEOs after the quota was implemented?

## II. Literature Review

### Overview of Corporate Governance Literature

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, 737). This refers to the *agency problem* often known as the separation of ownership and control or the separation of management and finance. According to the definition given on the Oslo Børs official website, corporate governance addresses the triangular interaction between a company's shareholders, board of directors and management. In a somewhat wider context, corporate governance also embraces the relationship between a company and parties other than shareholders, such as employees, creditors, the local community, and other parties with whom the company has a connection.<sup>2</sup>

In Shleifer and Vishny's paper (1997), *A Survey of Corporate Governance*, the authors are dealing with the separation of financing and management as they are trying to analyze how this dissociation is handled with both in theory and in practice. Various methods and suggestions are given so as investors recuperate the money from the managers. Whether incentive contracts are offered to the managers<sup>3</sup>, legal protection to the investors and even considering the concentration of ownership<sup>4</sup> as a way of leveraging up legal protection, the managers of the companies should serve the interests of all shareholders and not only theirs. When dealing with concentration of ownership, it is debatable which part should own more (the state, the institutional, the personal, the industrial or the international owners) so as to emulate countries with good corporate governance systems such as those suggested by Shleifer and Vishny (1997) – United States, Germany, or Japan. Obviously, the type of governance system will strongly depend on which cultural and legal framework the companies employ. For instance, most of the studies on large ownership structure focus on the U.S and UK firms. The findings of Short and Keasey (1998) confirm that national culture and

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<sup>2</sup> In one word, *stakeholders* of the company.

<sup>3</sup> The forms of incentive contracts are: share ownership, stock options, and threat of dismissal if income is low (Berle and Means 1932 cited in Shleifer and Vishny 1997). In my paper, I will focus on share ownership.

<sup>4</sup> The forms of concentration are: large shareholders, takeovers, and large investors.

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governance systems have a major influence on the inception point at which managerial entrenchment occurs. Thus, a wider examination on the relationship between firm value and managerial ownership across different countries might bring new insights.

In the attempting of discovering which represents the best fit of management ownership so as to maximize the value of a firm, there have been made numerous researches in this field. One of the most eloquent is *Management Ownership and Market Valuation: An Empirical Analysis* (Mork et al. 1986). The paper uses a sample of 456 of the Fortune 500 U.S firms and investigates the relationship between management ownership and market valuation of the firm measured by Tobin's Q. The results show a positive relationship between ownership and Q in the 0% to 5% board ownership range, a negative and less pronounced relation in the 5% to 25% range and a further positive relation beyond 25%. In a related and more up to date study, Bhabra et al. (2003) examines the curvilinear relationship between director's equity ownership and firm performance in the Singapore economy. Firm value is also measured by Tobin's Q, and the findings indicate that Q is positively related to director ownership in the 0% to 20.34% range, negatively related in the 20.34% to 52.73% range, and again positively related when directors' ownership exceeds 52.73%. These inflection points are higher than the ones in Mork, Shleifer, and Vishny (1986) of U.S firms. In addition to the 1986 study, the research in Singaporean firms analyzes this relationship among three sub-samples: *founder*, *government linked corporations*, and *corporate*.

In other connected research, Demsetz and Lehn (1985) find a simple linear relation between profit rate (as an alternate measure of firm performance) and ownership by large shareholders, in contrast to Mork et al. (1986), who focus on ownership by management only. However, when estimating the relationship between the profit rate and board stake, Mork et al. (1986) get consistent results with the previous study from 1985. More refined results are obtained in later studies which capture a rather nonmonotonic relationship between profits and board ownership.

### Board Diversity and the Role of the CEO

Although the present paper mainly considers the economic and finance literatures, boards and CEOs' attributes have been a subject of interest in a wide range of domains: including accounting, management, law, sociology, and psychology. From the financial point of view, a deeper insight towards the board of the companies as well as a more detailed view upon its role and its relationship with the CEO of the company may offer new approaches of the agency problem (in the way that the CEOs' incentives could be misaligned with those of

the shareholders'). It is often questioned what is the role exerted by the boards and to what extent does their role matter within a corporation. By performing a linear regression between financial performance and governance attribute (e.g., measured by board size) gives an apparent negative relation which could easily lead to the conclusion that a firm would do better if it diminished the size of the board. However, as the survey by Adams et al. (2010 a) shows this is not the case as for a given firm there is a nonmonotonic relation between the attribute and financial performance.

In the Adams et al. (2010 b) survey on the role of board of directors in corporate governance, possible answers range from boards' being simply legal necessities, something akin to the wearing of wings in English courts, to their playing an active part in the overall management and control of the corporation. Other possible roles might be: setting the strategic direction of the company, the corporate policies, the overall direction, mission and vision (Demb and Neubauer 1992 cited by Adams et al. 2010). Another important role ascribed to directors is control of the process by which top executives are hired, promoted, assessed and, sometimes, even fired. Even though it would be at least challenging to analyze the structure of the board and correlate it with firm performance and with other efficiency indicators, the present paper is describing the relationship of the CEO with the board and how the CEO's attributes influence the firm's performance.

A CEO which has a good performance can win on two sides: he might bargain for more compensation and he might also bargain on the degree of the board's independence because it is assumed he would rather prefer to remain CEO than be fired. An interesting aspect worth dwelling upon is observing the evolution of the CEO's salary in parallel with board independence and monitoring by the board. An increase in the CEO's salary signals that the board is more willing to budge on the issue of independence (willingness to monitor) than salary; hence, there is movement on independence (Adams et al. 2010 c). In addition, a CEO who performs well faces a less independent board, whereas a CEO who performs poorly is susceptible to being fired or replaced. As a conclusion, measures of CEO bargaining power, tenure and the CEO's share are negatively correlated with board independence. Adams's (2010 d) results are in accordance with Ryan and Wiggins's (2004) findings that show that a CEO's pay becomes less linked to equity performance as his control over the board increases (proxied by his tenure and proportion of insiders). These results are similar to the ones obtained by Babchuk, Cremers and Peyer (2010) who found that higher CPS<sup>5</sup> is associated

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<sup>5</sup> CPS (CEO Pay Slice) is the fraction of the aggregate compensation of the firm's top-five executive team captured by the CEO (Adams, Almeida and Ferreira, 2005 b).

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with lower firm value, lower accountability, profitability, and lower stock market returns accompanying the filling of proxy statements for periods where CPS increases.

Nevertheless, in the organizational literature, there is some controversy whether top executives matter. It is debatable whether the CEO exercises power over firm profitability. Malmendier and Tate (2005) and Bertrand and Schoar (2003) cited by Adams, Almeida and Ferreira (2005, 1405 a) found some characteristics of top executives that are related to firm outcomes. These characteristics, often being the source of diversity, are of two categories: observable ones, which are readily detectable attributes of directors, and less visible ones, such as background of directors (Miliken and Martins 196 cited by Kang et al. 2007 a). On one hand, the observable diversity category includes race ethnic background, nationality, gender and age. On the other hand, the less observable diversity category comprises educational, functional and occupational backgrounds, industry experience, and organizational ownership.

### Gender Diversity and The Norwegian Quota

In my paper, I analyze the observable category of characteristics with focus upon gender. Gender is one of the most discussed diversity issue not only within corporations, but also in politics. Along the years there have been various quota systems aimed to raising representation of women both in government structures<sup>6</sup>, and also on boards. The most eloquent example is the coalition of the Norwegian government in 2002 who asked companies to comply with a new quota that all public limited liability companies should make their boards be comprised of 40% female<sup>7</sup>. The quota was mandated on 9<sup>th</sup> December 2005 and was only addressed to limited liability companies. The deadline for meeting the new regulation was 2008 and the sanction for non-compliance was firm liquidation (Nygaard 2011). Therefore, according to the Norwegian Business Register, by 2008 all PLCs were in accordance with the law. However, some firms succeeded in evading the law by converting from PLC to LTD. Results from the abovementioned paper suggest that, indeed, the conversion rate is associated with the quota. However, for the non-listed PLCs results show that there is a strong negative correlation between the conversion decision and the share

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<sup>6</sup> Gender quotas exist for political parties in countries such as France and Sweden.

<sup>7</sup> A weaker imitation of the law passed by the Norwegian government is the Spanish government's Gender Equality Act (*Ley de Igualdad*) in March 2007. The law requires that 40 % of candidates on political party ballots should be female, and it encourages greater employment of women by giving companies with greater ratio of female to male employees preferential treatment when bidding for government contracts. It also recommends, but does not require firms negotiating for public contracts to have at least 40 % of the least represented gender on their boards by 2015 (Miguez and Martin).

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female directors in both 2006 and 2007. This is consistent with the fact that the quota only had an impact after it was mandated in December 2005.

A similar study examines the differences in firm performance measured by profit among both listed and non-listed Norwegian firms. Matsa and Miller (2011) proved that the impact of the quota is negative, indicating that annual profits decreased: profits declined after 2006 by 2.7 % of assets among listed firms relative to the change in profits in unlisted firms during the same time period.

I will investigate whether the quota introduced in Norway had an indirect impact on the CEOs of the PLC companies and whether the quota had substantially increased the overall aggregated fraction held by female owners within the same type of Norwegian firms. Moreover, I will examine if there is a significant association between the gender of the CEO and financial performance measured by ROA and ROE for all Norwegian firms.

Using a sample of 200 large U.S firms, Shrader et al. (1997) did not find any significant relationship between the percentage of women in the upper management and firm performance. In 2009, Adams and Ferreira studied a sample of firms from 1996-2003 and found a negative relationship between gender diversity and both ROA and Tobin's Q. In another study of 250 listed companies from 200-2006, Hussein and Kiwia (2009) found no relationship between female board representation and Tobin's Q. In Canadian firms, Francoeur, Labelle, and Sinclair-Desgagne found a positive correlation between female officers and financial performance, but no relationship between women directors and performance. However, Adler's (2011) results are different from previous ones. He found that there is a strong correlation between women-friendliness and firm profitability. The sample in his study comprised of 25 Fortune 500 firms and showed a strong participation of women in executive slots.

Adams and Ferreira's results from the 2009 paper suggest that mandating gender quotas for directors can reduce firm value for well-governed firms. This result could occur because token<sup>8</sup> members are often marginalized as representing the "women's" or the "minority's" point of view, as if it were a monolithic position (Rhode 2010, 18).

Often, women regard quotas as rather pernicious for them. Imposing women by force could be in a way looking down on them. A specific quota for women could be interpreted as an underestimation of the women's capability to move beyond the glass ceiling through merit, competence and courage (Martin 2007). An important paper on women representation in boards is Adams and Funk's study from 2009. They surveyed CEOs of publicly traded

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<sup>8</sup> Tokenism is a formal or superficial compliance with a law, requirement, convention, especially in the hiring of members of a minority group.

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Swedish firms and showed that female and male directors differ systematically in their core values and risk attitudes. Even though, in general, women are more risk averse than men, results of the survey show that female directors are more inclined to take risks than men.

In the case that women directors are, indeed, more risk loving than men directors then one would expect a firm with more women on board to perform better. Performance is a broad term and includes not only profitability, but also risk. Markowitz marked these aspects when he first developed the Portfolio Selection Theory. Therefore, an investor will take more risk because he/she assumes to obtain more profitability and vice versa. Firms with less risky investment will have less profitability.

Further research in a wide number of countries would facilitate a comparative study of the impact of institutional and cultural differences of diversity factors both on CEOs and boards of directors. For example, as far as gender is concerned, the Swedish corporate boards have 27.3 % female members, Finland has 24.5 %, Canada 10.3 %, and Denmark 13.9 %. By contrast, women occupy fewer than 10% of corporate seats in China (8.5 %), Mexico (6.8 %) and the Arab countries (Catalyst<sup>9</sup>, 2011).

### Women in the Executive Suite

CEOs are in their majority male, and evidence from psychology shows that, *ceteris paribus*, men tend to be more favourably evaluated in roles occupied mainly by men. Women are less motivated to deviate from “masculine” behaviour when occupying such roles (Eagly and Johnson 1990). There is also evidence that the stock market reacts unfavourably to the hiring of a female CEO (Lee and James 2007). Therefore, what holds for female participation in top management below the CEO level may not hold for female CEOs.

Even though there has been evidence showing that women participation in the boardroom is positively correlated with firm performance, having a female CEO is not systematically related to performance. This suggests that there may be something special about the CEO position that interferes with the effectiveness of female managers (Deszo 2008).

I will investigate whether the number of female directors is associated with having a woman director.

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<sup>9</sup> Catalyst is the leading research and advisory organization in North America which fosters the advancement of women in business.

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An obvious question is: Are women making their firms perform better or have better performing firms been promoting women to senior positions? Are only the better performing firms using their female human capital at their best?

Barnard (2006, 315-316) names the women who get to the top or near the top of their respective corporate pyramids the “Alpha Women”, and those who are CEOs, the “Elite”. Barnard’s survey on women who break the glass ceiling gives a different view on the circumstances under which women enter the executive sector. Women reach the top management especially when risk of failure is extremely high. This is consistent with Ryan and Haslam’s “edge-of-the-cliff” theory that occurs when women become the heads of troubled companies. Therefore, Ryan and Haslam hypothesized a particular scenario: “Rather than the appointment of women leaders precipitating a drop in company performance, it is equally plausible that a company’s poor performance could be a trigger for the appointment of women to the board”. One eloquent example is Anne Mulcahy who was promoted to CEO of Xerox Corp in August 2001. According to *Business Week* (2004), the time Anne was promoted, the company was “in terrible shape” and “it looked like a lost cause”. What is remarkable about the story is that the company returned to profitability at the end of 2001. However, Anne Mulcahy is not the only women CEO who accomplished a corporate resurrection that seemed less likely at that moment in time. Mary Sammons - CEO of Rite Aid Corp., and Pat Russo – CEO of Lucent Technologies Inc. achieved a successful business turnaround when the companies were in precarious conditions.

Over the years, researchers have tried to identify and essentialize women’s unique management skills. However, it is still not known enough about Alpha or Elite women: how they strived in their way of reaching the top, how they faced difficulties and how they kept their determination in the face of failure, the role of their family and peer support, the impact of money, of values, of chance, and timing. Whether women are effective as CEOs, and, if so, under what circumstances are questions that must await future research.

### III. Data and Methodology

#### III.1 CCGR Database

According to the Centre for Corporate Governance Research's (CCGR) website, its objective is to improve the insight into how the governance of firms influences the welfare of its stakeholders. CCGR pays special attention to the private industry in general and to non-listed firms and family firms in particular.

CCGR focuses on empirical research and primarily studies Norwegian firms. The projects often use data that are difficult to obtain in other countries (such as unusually detailed ownership data for listed firms and high-quality accounting data for non-listed firms) or that reflect institutional environments which are unique internationally (such as mandatory representation of employees and females on the board of directors).

As of 2012, the CCGR database consists of six tables and has 16 years of accounting data on corporate governance from 1994 to 2010, 10 years of data on corporate governance from 2000 to 2010.

In my study, I will use three sub samples - AS firms, ASA firms, and listed firms – to examine the relationship between firm performance and CEO gender. However, for the AS and all ASA non-listed firms, I will only take into account the independent companies. For the listed firms, I will also take into account group companies (subsidiaries and parent firms), but I will exclude banks as they have a different regulation system.

*Allmennaksjeselskap* (literally "all men stock company"), or ASA, is the Norwegian term for a public limited company. "ASA" or "asa" is added to the company name of all Norwegian companies registered as *Allmennaksjeselskap*.

The ASA differentiates from the *Aksjeselskap* or AS in that it has rules regulating its ownership. There cannot be any rules limiting the company's ownership to certain interests and an ASA must offer a public tender to purchase stock, either new stock or from existing owners if the company is converted from an AS. Norwegian companies listed on the Stock Exchange must be ASAs. Norwegian banks are also ASAs, but they are exempt from certain regulation, including ownership regulation.

### III.2 Variables

The variables used in the paper are outlined below:

- |                       |                         |   |                                      |
|-----------------------|-------------------------|---|--------------------------------------|
| 1. Share owned by CEO | 2. Board size           | 3. Is subsidiary                              | 4. Industry codes                    |
| 5. CEO gender         | 6. ROA                  | 7. Organization type                          | 8. Company name                      |
| 9. CEO birth year     | 10. Result for the year | 11. Is parent                                 | 12. Foundation year                  |
| 13. CEO salary        | 14. ROE                 | 15. OSE Listed Status                         | 16. Number of female directors       |
| 17. Is independent    | 18. Revenue             | 19. Aggregated Fraction held by Female Owners | 20. Number of personal female owners |

Because different industries prefer to use different measures of profitability, I chose three measures of firm performance: Profit-to-sales ratio, ROE, and ROA.

1. *Profit-to-sales ratio* shows how many cents of profit are earned on each euro of sales (Sutton 2004 a, 51). The ratio can be calculated using various measures of profit (in this particular case, I used the net profit) and it provides insight into a firm's cost structure.

2. The *return on equity* shows the profit the company generates in a period on the capital invested in by its owners (Sutton 2004 b, 52).

$$\text{Return on equity (ROE)} = \frac{\text{Net profit (to shareholders)}}{\text{Average shareholders' equity}}$$

3. The *rate of return on assets* (or return on assets (ROA)) shows the profit the company generates in a period on the total assets employed by it (Sutton 2004 c, 53).

$$\text{Return on assets (ROA)} = \frac{\text{Operating profit}}{\text{Average total assets}}$$

### III.3 Objectives and Hypotheses

There is an association between firm performance and the gender of CEO with respect to firm characteristics.

$$\mathbf{H1: Firm\ performance} = f(\text{CEO gender/firm characteristics})$$

**H<sub>0</sub>**: There is no statistically significant relationship between firm performance and CEO gender;

**H<sub>1</sub>**: There is a statistically significant relationship between firm performance and CEO gender.

$$\text{ROA} = a * \text{CEO gender} + \Sigma \text{control variables (firm age, ln(sales))}$$

$$\text{ROE} = a * \text{CEO gender} + \Sigma \text{control variables (firm age, ln(sales))}$$

$$\text{Profit/Revenue} = a * \text{CEO gender} + \Sigma \text{control variables (firm age, ln(sales))}$$

There is a direct relationship between CEO gender and firm characteristics.

$$\mathbf{H2: CEOgender} = f(\text{firm characteristics})$$

**H<sub>0</sub>**: There is no statistically significant relationship between CEO gender and firm performance;

**H<sub>1</sub>**: There is a statistically significant relationship between CEO gender and firm performance.

$$\text{CEOgender} = a * \text{industry type} + b * \text{firm age} + c * \ln(\text{sales}) + d * \text{board size}$$

Industry 1 (consumer services/products)

Industry 2 (materials and industrials)

Industry 3 (others)

There is a link between the Norwegian quota and the number of female CEOs within the Norwegian listed companies.

$$\mathbf{H3: Aggregated\ fraction\ held\ by\ female\ owners} = a * \text{CEOgender} + b$$

**H<sub>0</sub>**: There is no statistically significant relationship between the Norwegian quota and the number of female CEOs within the Norwegian listed companies;

**H<sub>1</sub>**: There is a statistically significant relationship between the Norwegian quota and the number of female CEOs within the Norwegian listed companies.

$$\text{Aggregated fraction held by female owners} = a * \text{CEOgender} + b$$

$$\text{Number of female directors} = a * \text{CEO gender} + b$$

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There is a connection between firm performance and: CEO ownership, CEO salary, CEO gender, CEO age, and firm age.

**H4:**  $ROA = a*CEO\ salary + b*CEO\ gender + c*CEO\ age + c*CEO\ ownership + d$

$$ROE = a*CEO\ salary + b*CEO\ gender + c*CEO\ age + c*CEO\ ownership + d$$

$$Profit/Revenue = a*CEO\ salary + b*CEO\ gender + c*CEO\ age + c*CEO\ ownership + d$$

**H<sub>0</sub>:** There is no statistically significant relationship between firm performance and: CEO ownership, CEO salary, CEO gender, CEO age, and firm age;

**H<sub>1</sub>:** There is a statistically significant relationship between firm performance and: CEO ownership, CEO salary, CEO gender, CEO age, and firm age.

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