

Gender Equality in the Boardroom: The Norwegian Case of Rosa Parks?

An event study

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NORGES HANDELSHØYSKOLE

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Preface

The master's thesis is an integral part of our Master in Financial Economics education at the Norwegian School of Business and Economics (NHH) in Bergen, Norway. After attending Tommy Stamland's classes in *FIE401 – Empirical Finance* during the fall semester of 2007, we were introduced to the methodology event studies. Our aim was to produce such an event study on a topic that has not been previously investigated by using the event study methodology. While Tommy Stamland provided us with the tools, Per Östberg provided us with a topic that suited our criteria: namely to investigate the effects of an increase in the number of female board members and report the effects of the law of gender equality on Norwegian boards.

Media has thrown itself upon the debate regarding the absence of women on Norwegian boards; a debate that has flourished during the past decade. Despite there being numerous research papers focusing on various effects regarding women on boards, board equality and optimal gender balance, there is currently a surprising clear lack of research that takes into account the pure stock price effects of an increase in the number of female board members to Norwegian boards. Event studies have been time tested and is relatively precise in estimating the effects of announcements on the stock holders' values.

The anticipated largest challenge when embarking on the study was that the data gathering process would be time-consuming. Because of the extensive use of sources needed as well as the lack of a searchable database with board changes announcements, our predictions would later prove to be justified. However, despite spending over two and a half months on gathering data and washing it against our criteria, the process would have taken much longer if not for the help of a number of people. On that note, we wish to thank all the people who provided us with information: the company representatives of various public limited companies, Silje Sundt in *Finansavisen*, the consultants at *Brønnøysund Register Centre*, Marit Hoel and everyone else who contributed.

Furthermore, we wish to extend our appreciation to Per Östberg for his help on providing a topic and his feedback during the course of the study, Tommy Stamland for his constructive feedback, Aksel Mjøs for providing us with new sources of gathering data, when we thought all resources had been exhausted and finally, our supervisor, Svein Olav Krakstad, for his

patience, constructive feedback and dedication from beginning until the end. He proved to be resourceful and we thank him.

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Abstract

As the only country in the world, Norway recently passed a law that requires gender neutral boards in all public listed companies. Although the media attention abroad and in Norway, gorged on the controversial ruling, there is an absence of research done on the effects of changing the gender composition of a corporate board. In our event study we propose an approach to valuing the effects of a change in the gender composition of Norwegian, stock exchange listed, corporate boards. We investigate the effects of the legal requirement and look at differences between size and industry. Analysis of 44 events reveals an insignificant, market adjusted decline in the value of companies of -1.96% where there is an increase in the number of female board members. Our results additionally show a larger, insignificant effect for events captured before the enactment of the law for smaller companies and differences between certain industries.

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1. Introduction

By refusing to obey the bus driver's instructions to give up her seat for a white male on the 1st of December 1955, Rosa Parks' sparked off an unprecedented campaign to end racial segregation in the United States¹. The incident culminated in a United States Supreme Court ruling deeming the racial segregation as unconstitutional. On 13th of July 2003, Norway passed an act named *The Norwegian Public Limited Liability Companies Act §Section 6-11a Requirement regarding both sexes on the board of directors* stating that there has to be a gender representation of at least 40% on Norwegian boards². Although a ruling deeming racial segregation as unconstitutional can hardly be put on the same footing as *The Act* imposing gender equality on the boards of Norwegian firms – the comparison is interesting.

Firstly, both cases caused turmoil in the media. In Norwegian media, the debate was mainly between feminists, left-wing parties and trade unions on one side against right-wing parties, business leaders and trade organizations on the other. The general impression is that the topic is *emotionally* important for the parties involved, but the debate lacks references to expert comments and research papers³. In fact one of the most experienced researchers in the field of gender diversity on boards, Renée B. Adams, stated that “*the consequences of changing the gender diversity of the board are, as yet, little understood*” (Adams and Ferreira, 2004).

Secondly, “segregation” of women from the boards of companies before *The Act* seems to be present. Estimates from the female gender representation in the boardroom portray a gloomy picture. In 2002, an article in the financial magazine *Økonomisk Rapport* states that during the year the number of female board members increased, but only 10% of the chairmen of the board were women⁴. A few weeks later another newspaper reported that 470 of 611

¹ Time.com - 14.06.1999 and Africanaonline.com

² Hereafter referred to as *The Law* and *The Act* interchangeably. Following is a list of the various gender requirements for different board sizes as noted in *Appendix 11.1*: (1) two to three members, each gender is required to be represented, (2) four to five members, each sex shall be represented by at least two representatives, (3) six to eight members, each sex shall be represented by at least three representatives, (4) nine members, each sex shall be represented by at least four representatives and (5) more than nine members, each sex shall make up at least 40 per cent of the representatives.

³ For instance, in the public inquiry the argumentation for imposing *The Act* refers to a master thesis (Kleveland and Miao 2000).

⁴ *Økonomisk Rapport* – 27.06 2002.

Norwegian public limited companies were without any women on the board⁵. The trend continued without much improvement into 2004, where another article reported that only 13.3% of the board members were females in the companies listed on the Oslo Stock Exchange (OSE). A summary of the years 2002 – 2004 can be found in *Figure 1* below:

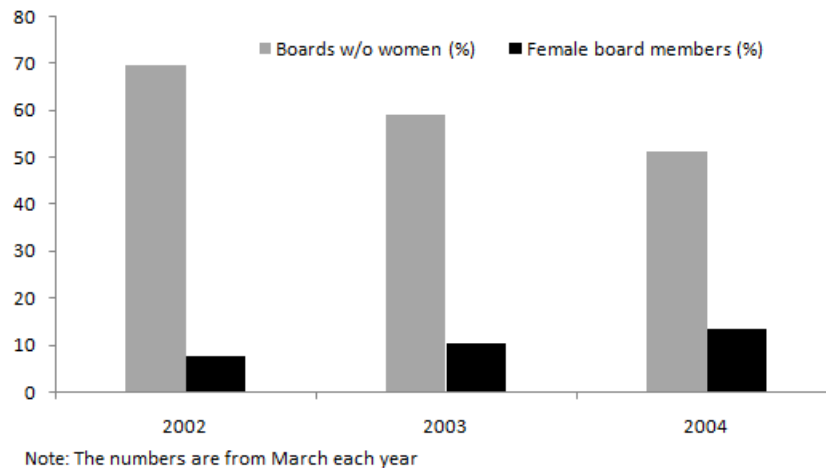


Figure 1: The percentage of OSEBX companies with no female representation and the overall female board ratio

From *Figure 1* one can see that there is a trend towards adding women to the board, however the progress is slow and ultimately lead to *The Act* being enforced. Despite being low, it is estimated that only 1-2% of corporate board positions in private companies within the EU are held by women (The Wall Street Journal 19.07.2002).

Finally, both cases were forced through. The Rosa Parks case was forced from internal pressure through demonstrations, riots and boycotts. On the other hand, *The Act* was forced externally and not by potential, female board members, but instead by The Government of Norway. The initiative was spearheaded by the former *Minister of Trade and Industry*, Ansgar Gabrielsen. He was a large initiator that ensured the passing of the legal requirement, ensuring the case stayed alive in the media through interviews; focusing on the benefits of women and not the quota itself. He stated in a local newspaper that “*the smart move would be for businesses to add women to their board of directors sooner, rather than later. Resources and diversity are not utilized in the current situation*”⁶.

⁵ Dagens Næringsliv Morgen – 04.07.2002.

⁶ Fædrelandsvennen – 08.08.2002.

In order to investigate these effects, the event study methodology was chosen. Event methodology draws on the efficient market hypothesis, which suggests that capital markets are efficient mechanisms that process all relevant information available about current and future benefits to determine the stock price of a firm (Fama et al 1969). Further, the logic underlying the hypothesis is that investors in capital markets continuously evaluate all relevant information about the firm activities to assess the impact of its activities and future performance. When stock sensitive information is released about a firm the stock price changes to reflect the new assessment of the present value of the firm. The strength of the model lies in the fact that the study captures the overall assessment by a large number of investors of the discounted value of current and future firm benefits attributable to a particular event.

To sum up, the quota placed on corporate boards is a unique one. In this study we will delve deeper into the effects that an increase in the number of females has on stock prices and test the effects of Gabrielsen's principal case. Is *The Act* proving to be the "Rosa Parks case" of Norway where other countries should follow suit? Or is *The Act* a burden on shareholders, reducing their values?

The rest of the paper is organized as follows: in section 2, the theory regarding the board of directors will be presented as well as theory regarding women and their role in the boardroom. Section 3 discusses the data sources used to identify the sample of increases in female board members. Section 4.0 presents the Event study methodology, while section 5 provides the corresponding results. In section 6 we test the robustness of our data and continue by explaining the limitations in our study (section 7). In section 8, we present our conclusions before finally, presenting our proposals for further studies in section 9.

2. Board of Directors

This chapter will account for the functions of the board of directors, female representation in a historical perspective, what effect a female director might have on firm value and the Norwegian gender diversity strategy. Based on the presented theory, our hypotheses regarding the study will follow thereafter.

2.1 Theory

The board of directors plays a *vital role* in the organization. The board is legally responsible for the management of the corporation and has duty to protect the interests of the stockholders as well as presenting them with an adequate return on investment (Burke 1997). Others have focused on the board as an arena to gain power to ensure its duties and achieve a better interaction with the management (Lorsch and MacIver 1989). Moreover, Selvik (2003) views the board as a working and developing unit and therefore is one of the most important instruments for managing the firm. The importance of each individual member is highlighted by Pfeffer and Salancik (1978) who claim that by selecting a director with valuable skills, influence, or connections to external sources of dependence, the firm gains valuable resources⁷. Additionally, Dalton et al. (1999) argues that there is an optimal board composition, which is valuable for a firm and should be strived to achieve. The same conclusion is drawn by Tanna et. al (2008) when analyzing the effect on board size and composition on the efficiency of UK banks.

The composition of the board may vary, but usually it consists of a chairman, vice-chairman, non-executive and executive directors, employee representatives and deputy directors. In theory both males and females can hold every position at the board.

⁷ Pfeffer (1972) and Pfeffer and Salancik (1978) present the notion of the *resource dependence theory*. In brief, the theory emphasizes the interdependence between organizations and entities in their external environment that control important resources. A key insight of this perspective is that organizations are open systems, dependent upon external entities for survival, and that the resulting uncertainties pose significant challenges and costs to the organizations. The firm therefore form links with elements of its external environment upon which it depends to reduce dependency and obtain resources. Boards of directors are a primary linkage mechanism for connecting a firm with sources of external dependency. As environmental dependencies change, so do the resource needs for organizations and thus the needs for specific types of directors (e.g., Hillman et al., 2000).

Members of the board are elected by stock holders on a general meeting. However, any member can resign or be asked to leave at any time. Board members are usually elected for a period of two years, but there are exceptions. Some firms use nomination committees that recommend possible candidates for a position on the board. The committee's findings are usually issued to all stockholders along with the notice of the general meeting, but there are expectations here as well.

2.2 Female board representation historically

The female representation on the board of directors in Norway has been low. A study by Hoel (2002) depicts the challenge of integrating females on the board. She found that a mere 23% of the largest firms in Norway have female board representation. A more recent study initiated by the government and undertaken by ECON (2003) shows that there is no change in the situation. The main results are shown below:

Female representation on board of Norwegian Public Limited Companies (adapted version of the ECON 2003 report)

Panel A: Board positions		
	All	Plc
Board positions including deputies:		
No. of board positions in total	5410	3636
No. of board positions held by women	1040	314
Women's share of total board positions	19.2	8.6
Average female ratio on the boards	13.8	6.4
Board positions excluding deputies		
Women's share of total board positions	18.0	6.4
Average female ratio on the boards	12.1	5.4

Panel B: Female board representation by industry				
	No. of board positions in total	Women's share of board positions	No. of boards	Average female ratio on boards
Real estate, commercial services and rental business	1022	5.8	194	4.5
Financial services and insurance	725	9.4	143	6.5
Manufacturing industry	719	11.8	86	10.1
Transportation and communication	362	8.6	50	5.3
Commodity trade, repair of vehicles/home appliances	300	8.7	48	7.3
Other social and personal services	138	6.5	24	7.1
Mining and extraction industry	103	9.7	19	7.1
Agriculture, fishing and forestry industry	69	5.8	13	2.7
Health- and social services	42	9.5	7	5.8
Electricity- and water supply	52	17.3	6	13.3
Building and construction work	32	6.3	3	5.6
Hotel- and restaurant industry	14	0.0	3	0.0
Others	58	12.1	15	11.1
Total	3636	8.6	611	6.4

Note: The numbers include deputy board members

Table 1: Female representation on Norwegian boards, divided by industry (ECON 2003)

ECON's *Table 1, Panel A* finds that the female representation was only 6.4% on the boards of public limited companies (also called public limited liability companies or plc's). In fact, out of 611 plc's which were registered at *The Brønnøysund Register Centre* in September 2002, 467 companies had no females in the boardroom⁸. In addition, ECON's report reveals that the women that do have a board position tend to have multiple directorships. An example of this is the former *Norwegian Minister of Oil and Energy*, Thorhild Widvey, who has taken 11 corporate board seats where five of them at publicly traded companies after leaving the government in 2005. She also turned down about 40 more offers. This development was also found by Lublin (2001). Her findings suggest that qualified women are a scarce commodity.

The results in *Panel B* reveal that there are large differences between the industries with regard to the percentage of female directors in the plc's. Out of the 725 total board positions in the finance sector, the average female ratio on boards is only 6.5% (in line with the average across all industries) and the need for new board members is large if they are to reach 40%. Even though the manufacturing industry has a relatively high percentage of

⁸ *The Brønnøysund Register Centre* is a government body under the *Norwegian Ministry of Trade and Industry*, and consists of several different national computerized registers. These registers contain information and key data both for firms and individuals.

10.1%, female participation is still low. Fryxell and Lerner (1989) and Harrigan (1981) conclude that the reason for the industry difference is that women are customarily identified with highly consumer-oriented industries. Therefore, female representation on boards tends to be concentrated in food-related, drug and cosmetic industries where women are the principle buyers. As a result, these industries have a greater pool of female executives who are willing to serve on their corporate board (Harrigan 1981). In addition, the industry differences may be due to a lack of industry experience and expertise by women for certain industries.

Further explanation for the low female participation in general is documented in a study done in the US and in France. The study documents that cliques of well connected businessmen vote together and control the decision-making on corporate boards, which makes it difficult for women to obtain influence (Weber 2004)⁹. Farrell and Hersch (2004) present the argument that the probability of adding a woman director is materially increased when a female director departs the board. Therefore, adding a female director is clearly not gender neutral. Everett et. al (1996) also found that men have a negative *attitude* towards female top-executives, while the attitude was positive for women. Since most board members are men, they will be reluctant to increase the number of females on the board due to the negative attitude.

2.3 Possible effects of females on the board

The discussion around the contribution of women in the boardroom is divided. However, most researchers find that women contribute positively on the board.

Burgess and Tharenou (2002) tested the stereotypical hypothesis that women have greater corporate sensibility than men. They found that the *corporate social performance* was notably better in companies with female directors. This can be related to the natural differences in ethical standards between men and women as found by Singh et al. (2002)¹⁰.

⁹ This finding is also documented by ECON (2003)

¹⁰ The Burgess and Tharenou study (2002) was based on Singh et al. (2002) and Luthar et al. (1997) ethics studies. They found that females show a significantly more favorable attitude toward ethical behavior than males. Women think of moral questions as problems of care involving empathy and compassion, whereas men consider them as problems of rights,

The *firm performance* is positively related to the diversity in the boardroom. This has been proved in several studies. The cross-sectional study by Carter's et al. (2003) and Adams and Ferreira (2003) found a positive relation between the percentage of women on the board of directors and firm value as measured by Tobin's Q (Tobin 1969)¹¹. Catalyst (2001) also documents a positive relationship with female representatives at the board in respect to increased sales¹². In addition, a panel study of 2,500 Danish firms found a positive correlation between firm performance and female executives (Smith et al. [2005]). Kleveland and Miao (2000) found that the female representation on the board of directors of unlisted Norwegian companies was strongly positive correlated with a firm's performance, which is consistent with Erhard et al.'s (2003) findings. Ellis and Keys (2003) documented that gender diverse corporate boards may have better relationships with customers, suppliers and employees. In general, the authors found that the market place values diversity in companies, when diversity is not imposed upon the organization. They document a positive stock price reaction following the announcement of gender diversity-promotion actions.

On the other hand Adams and Ferreira (2004) found three robust results in respect to gender diversity in the boardroom. First, firms facing more variability in their stock returns have fewer women on their board of directors. Second, firms with more diverse boards provide their directors with more pay-performance incentives and third, firms with gender diverse corporate boards hold more board meetings. Shrader et al. (1997) established evidence of a significant negative relationship between the percentage of female board members and certain accounting measures of performance for a sample of approximately 200 Fortune-500 companies in 1993. However, they argued that it may be necessary for a firm to achieve a critical number of female board members before they can exert positive influence. In their sample, few firms had more than one female board member, which reduces the power of their findings. Besides from the above mentioned positive externalities, a company that introduces women on the board of directors is viewed as innovative according to Kleveland

justice, and fairness. Akaah (1989) also found differences in moral reasoning in males and females. His study documented that if female executives were found to show higher ethical attitudes and behavior than males, then ethical decision making in business organizations would increase as the ratio of women in executive positions improved. Women leaders tend to be more people oriented, democratic, and consultative; to show interpersonally oriented behavior; and to have concerns for other people's satisfaction, in addition to having been shown to be more ethical than men (Loo 2003).

¹¹ Tobin's Q compares the value of a company given by financial markets with the value of a company's assets.

¹²Catalyst is the leading American non-profit corporate membership research and advisory working globally with businesses and the professions to build inclusive environment and expand opportunities for woman and business.

and Miao (2000). What is more, Waddock and Graves (1997) states that by refraining from including women on the board of directors is a negative indicator by the company. In fact, they say that a diverse board is a positive signal. Adams and Ferreira (2004) have provided evidence that changing the gender composition of the board may entail costs. This is put in connection with the fact that diverse boards may require additional incentives to work cooperatively and may require additional time to digest different viewpoints and resolve disagreements.

There are also other relevant issues that have to be taken into consideration which indirectly could affect female participation in Norway. Firstly, female participation in *higher education* has increased significantly over the last decade. Statistics from *Statistics Norway* show that 59% of all students taking higher education are females and that they outnumber men with a four-year university degree in 2001¹³. Secondly, the trend is the same when analyzing the *type of education* that historically leads to top-management and positions on the boards. In 2000, almost half of all students finishing with an economics degree were women. The corresponding number for law students was in excess of half, but only a fourth for engineers. In addition the percentage of females finishing medical school has outnumbered men significantly. Finally, the trend in the *business environment* seems to be the same. The *Statistics Norway* also shows that the level of activity by females in businesses increases and is close to men's with only 7% separating the two (The Odelsting Proposition No. 97, 2002-2003). These facts indicate that the pool of qualified candidates for the board candidates has increased in the past decade.

2.4 The Norwegian case

With respect to gender equality in the boardroom, Norway finds itself in a unique position due to *The Act* that was recently imposed. Ms Marie Donnely, the EU's gender equality head stated that: "*The Norwegian plan is hugely important*" while referring to *The Act*. Donnely also views the initiative as a potential model for future legislation elsewhere¹⁴. Therefore, we

¹³ *Statistics Norway* provides official statistics daily and makes frequent analyses of a large number of topics. In group 20-24 years almost twice as many females have a four-year degree than men. Men only outdo females in the group 60+.

¹⁴ The Wall Street Journal 19.07.2002

will now look at the development of *The Act* and its consequences. In addition, we will briefly outline the main initiatives to counter-act the low female ratio on boards in Norway.

2.4.1 The Norwegian Public Limited Liability Companies Act

The idea of gender equality on the boardroom is not a new one. Already in 1999 the Bondevik-administration initiated the debate concerning the male-dominated boards in Norway¹⁵. Their proposition was sent back and forth between departments, bodies entitled to comment, experts on the subject and administrations before an act was passed on the 13th of July 2003¹⁶. This act was contingent on the public limited liability companies being able to comply voluntarily, in which the act would not be enforced. However, as the gender diversity increased only slowly during the two years up to 2005 despite various actions to increase female integration (see 2.4.3 *Initiatives to increase female participation*), *The Act* was finally passed again in 2005 and enforced starting on the 1st of January 2006¹⁷.

2.4.2 The consequences of *The Act*

The Act's purpose is to *increase female participation* and to *add value to the commerce sector*. Firstly, the consequence of *The Act* is that public limited liability companies founded before 2006 must reach 40% gender equality in the board before January 2008. Secondly, public limited liability companies founded in 2006 or after must be gender balanced from day one i.e. have at least 40% of each gender on the corporate board. This includes the regular members and the deputy directors, but not the employee representatives. Finally, companies that have not complied with the law will be given a warning by the *Brønnøysund Register Center*. Inability to conform to the warning will result in a letter to the courts, which could dissolve the company.

¹⁵ Mr. Kjell Magne Bondevik is a former *Prime Minister of Norway* and was elected for two periods (from 1997 to 2000 and from 2001 to 2005). He also served as the *Norwegian Minister of Foreign Affairs* from 1989 until 1990. In a proposition (The Odelsting Proposition no. 97, 2000-2001) *The Ministry of Children and Equality* outline the background of *The Act*.

¹⁶ A proposal to the law text was first designed as an amendment to the Norwegian Gender Equality Act and not the act relating to the Norwegian Public Limited Liability Companies Act. The full proposal to the law text and comments on the inquiries can be found in The Odelsting Proposition no. 97, 2000-2001.

¹⁷ The female ratio in Norwegian public limited companies was only 12% according to *Statistics Norway* (Dagens Næringsliv Morgen 08.03.2005).

There have been reactions by companies to circumvent the law. As an example, some firms have changed their business structure from public limited companies to private limited companies e.g. as in the case of three companies that were threatened to be dissolved¹⁸. This shows that instead of adding women to the board, some companies will rather incur the costs of changing the business structure of a company. An explanation for this may be that in general, men dominate as investors¹⁹. Therefore, they are unwilling to give up their position on a board for a female as they may lose control over their investment²⁰. On that note, this will be positive for the remaining plc's as there is a larger pool of qualified women for them to nominate female board members from.

2.4.3 Initiatives to increase female participation

Despite that most companies did not meet the requirements of *The Act* voluntarily, the focus on gender equality increased immensely after 2003. Several projects were initiated in order to increase the female participation on the board of companies. Firstly, the *Ministry of Trade and Industry* gathered and distributed information on a frequent basis, while motivating companies to comply with *The Act* through debates while following the development in the market diligently. Secondly, the *Department of Commerce and Industrial Development Fund* (SND) focused their investment strategy to bring forward successful corporations owned and managed by women. SND also held seminars for men and women in association with the *Norwegian Business School* (BI) to increase the strategic competence for board members²¹. Thirdly, *The Confederation of Norwegian Enterprise* (NHO) spearheaded the initiation of *Female Future*, a network for professional women. Finally, The Norwegian Employment and Welfare Service (NAV) established a database for companies to find qualified females for their boards²².

¹⁸ Brønnøysund Register Centre 10.04.2008

¹⁹ ECON (2003) found that males in general have larger owner-interests in business than females.

²⁰ Adressa.no 15.01.2007

²¹ By 2002/03, 620 females and men were qualified for a board position through the course and the demand for female candidates for board positions was increasing (The Odelsting Proposition no. 97, 2000-2001)

²² Today the database *kvinnebasen.no* consists of more than 3,500 competent females.

2.4.4 The views on The Act

From the beginning of the debate of gender equality there has been critique against the proposed Act. According to the proposition which also reproduce the public inquiries, the most important critic against *The Act* were the consideration to the *shareholder democracy*, i.e. mainly concentrated towards that the owners of a company should be free to choose who to control their investments²³.

The opponents were also concerned with the extent *The Act* would influence *small and semi-small companies*. These companies may have to recruit board members lacking knowledge of the company's business and therefore the gender diversity would create problems for them. Neither do they have access to the same international pool of women as large companies. In other words, the *pool* of readily, qualified women is smaller for *small and semi-small companies*. They were also doubtful to if females had *adequate industry competence* for a position on the board.

Yet another argument was that *The Act* affected the *wrong companies*. While all plc's have to obey to gender diversity there are still large limited companies (ltd's) that do not have to change their board composition. In 2005, over 300 plc's had fewer than 30 employees while over 1000 ltd's had over 100 employees²⁴. One example of a large ltd is one of the world's leading producers of paint, coatings and power coatings, namely Jotun²⁵.

On the other side of the table was the Norwegian government. When presenting *The Act* it was emphasized that based on the increased pool of *females taking higher education* and *female participation in business* the situation of gender composition in Norwegian plc's was unjustified²⁶. Therefore, the government found it necessary to force a change in the situation by promoting their case, not as a quota, but an opportunity for companies to expand diversity and take advantage increased competence represented by increased diversity. If no actions

²³ The Odelsting inquiries were held in 1999 and 2001 (The Odelsting Proposition no. 97, 2000-2001).

²⁴ Dagens Næringsliv Morgen 26.05.2005

²⁵ The Jotun group has 71 companies and 40 production facilities on all continents. In addition, Jotun has agents, branch offices and distribututors in more than 70 countries.

²⁶ Arguments taken from The Odelsting Proposition no. 97, 2000-2001 and The Odelsting Recommendations no.13.

were taken, it was claimed, the country could lose part of the competence that the females hold. The government also underlined that *The Act* also was a contribution to *increase general equality* and *promote democracy*.

2.5 Hypotheses

In order to utilize our data fully for analysis while at the same time testing the theory presented in the previous sections, the subsequent paragraphs present the four hypotheses that will be tested.

Hypothesis I:

Theory regarding gender diversity in the board room signifies the importance of heterogeneous boards i.e. boards that are diverse with respect to expertise, network and gender. An increase in the number of female board members may increase the gender diversity in most cases i.e. where the number of females represented is inferior to men. Therefore, an increase could be viewed as positive by the market.

On the other hand, there is no evidence of this being the case. As seen in the *Introduction*, there is a remarkable low female representation on boards suggesting that the best candidates (i.e. in general and in the eyes of the shareholders) are men. This would suggest that increasing the number of female members will lead to a stock price decline, since there are better qualified, male candidates. With these arguments in mind, our study is conservative as the burden of proof is levied on the theory. The null-hypothesis is based on there being no relationship between stock prices and an increase in the number of female board members. The alternative hypothesis is the opposite i.e. that increasing the number of women on the board produces a change in the stock price.

H₀: An increase in the number of female board members will not affect firm value

H_A: An increase in the number of female board members will affect the firm value and produce abnormal returns

Hypothesis II:

As stated in the earlier discussion there is an absence of theory regarding the gender equality and the effects on the firm in terms of stock prices changes. When also including *The Law* we have an area that has yet to be analyzed.

Initially, *The Act* was criticized by media and opposition parties. As time went by the criticism diminished. The reduced negative attention may be explained by the systematic actions undertaken by the government to increase awareness of gender equality in the boardroom. This may have lead to the market having less of a negative view on *The Act*. On the other hand, since the requirement of gender equality on the corporate board was made legal, the market may view an increase of a woman on the corporate board as positive merely as a result of the company complying with the new regulations. To investigate this notion, we compare changes in stock prices prior to and after *The Act* was imposed. The null-hypothesis is also here that there is no change in prices.

H₀: An increase in the number of female board members prior to and after The Act does not affect firm value

H_A: An increase in the number of female board members prior to and after The Act does affect firm value

Hypothesis III

As presented, one of the main arguments against *The Law* was implications it would have for *small* and *semi-small companies*. The argument was that that these companies do not have the same access to an international pool of women nor a domestic pool of women with the desired industry competence, as larger companies. If this critic is valid we may observe that these firms experience a value reduction when appointing a female director. An explanation for this could be that the pool of female candidates is smaller for these firms and directors with the adequate competence are not recruited.

On the other hand, the government focused on the competence held by females thus believing that the pool of possible candidates is sufficient. This suggests that the *small* and *semi-small* companies' argument of there being few, qualified women, is not valid and may be a result of a threat towards men's influence on the board (Weber 2004). When dividing our sample into *small* and *semi-small* companies on one side and *large* companies on the

other we can analyze differences between the two. The evidence is again put on the corporate board theory and our null-hypothesis is therefore conservative:

H₀: There is no difference in CAR between small- and semi-small companies, and larger companies

H_A: There is a difference in CAR between small- and semi-small companies, and larger companies

Hypothesis IV

ECON's study from 2003 shows that the female representation varies among industries. As presented earlier, female representation tends to be concentrated in industries where women are the *principle buyers*. An additional argument, as mentioned previously, may be that women do not hold the adequate competence to justify board seats in all industries. Based upon the increase in females taking higher education this argument may seem unjustified (*Statistics Norway*). Weber (2004) suggests that businessmen vote together to control the decision making on corporate boards and therefore females do not get the chance to be represented. If this is true one may expect the female representation to be low across all industries, which seems to be the case. However, if the females instead do not hold the adequate competence we might observe large differences between industries. Again the burden of evidence is on the gender equality theory and therefore the most conservative:

H₀: There is no difference in CAR between industries

H_A: There is a difference in CAR between industries

3. Data

Reviewing the various aspects of female participation in the boardroom and the consequence of *The Act*, all firms listed on the Oslo Stock Exchange are affected and thus can be analyzed. All historical prices were gathered using *Thomson's Datastream*, *Yahoo's* financial platform and *Børsprosjektet*²⁷.

3.1 Companies

We define the event as a *public announcement of a change in the number of female directors*. However, for comparison reasons events of changes in the number of male directors were also gathered.

Data from a full search of company announcements from Newsweb in the period 1st of January 1998 to 6th of June 2008 was collected²⁸. Following the search, we identified announcements containing the key words of *board changes, new members of the board, election of board members, annual-/extraordinary general meeting, minutes from annual-/extraordinary general meeting, notice from annual/extraordinary general meeting, the board of firm X, chairman Mr/Ms X leaves/steps down/resigns from the board, Mr/Ms X proposed as new director of firm X or nomination committee's recommendations*. The event was verified by finding the board composition prior to and after the event. A list of events found for an increase or decrease in the number of female board members can be found in *Table 2*. For a complete list with information of changes see *Appendix 11.2 Table of complete events and changes*.

²⁷ *Børsprosjektet* is a library database accessible for NHH-personnel.

²⁸ Newsweb is Oslo Stock Exchange's provider for firm announcements for all companies listed on the Oslo Stock Exchange.

Firm	Ticker	N. of Obs	Firm	Ticker	N. of Obs
Aktiv Kapital	AIK	1	Norske Skogindustrier	NSG	1
Aker Drilling	AKD	2	Odfjell	ODF	1
Aker Seafoods	AKS	2	Odim	ODIM	1
Aker Yards	AKY	1	PA Resources	PAR	1
Apptix	APP	6	Petroleum Geo-Services	PGS	3
ABG Sundal Collier Holding	ASC	3	Photocure	PHO	2
BW Offshore	BWO	1	Q-Free	QFR	1
Data Respons	DAT	2	Renewable Energy Corp.	REC	2
DnB NOR	DNBNOR	5	Revus Energy	REVUS	2
DNO International	DNO	1	Rieber & Søn	RIE	2
Ementor	EME	1	Schibsted	SCH	1
Frontline	FRO	1	Scana Industrier	SCI	1
Hjellegerde	HJE	1	Synnøve Finden	SFM	3
Int. Gold Exploration	IGE	1	Storebrand	STB	4
Itera Consulting Group	ITE	1	StatoilHydro	STL	12
Lerøy Seafood Group	LSG	2	SuperOffice	SUO	4
Ementor (was MED)	MED	1	Tandberg	TAA	2
Norwegian Air Shuttle	NAS	1	Telenor	TEL	6
Norse Energy Corp.	NEC	1	Tomra	TOM	1
Norman	NORMAN	1	TTS Marine	TTS	1
			Veidekke	VEI	1
Sum of events					87

Table 2: Event observations for various companies

3.2 Data selection and filtering

In total, the number of changes to the board of directors is much larger than the events gathered in this report. For instance, we found 432 events for the 25 most liquid companies listed on the Oslo Stock Exchange. The reason for the reduction in the number of events can be related to our strict data criteria listed below. For an event to be included:

- (1) the event's stock must be traded every day during the event period
- (2) the event's stock must be listed on the Oslo Stock Exchange and thereby having to abide by Norwegian laws and regulations
- (3) the event has to involve an increase or decrease of female board members (male board members were also included for comparisons)
- (4) the event must be clean i.e. no other events from the same firm on the same date except events that included more than a single change in the board of directors
- (5) the event's exact date must be established credibly (i.e. from the primary source)

Using the criteria for the events listed above, a majority of the events were removed. Our explanations and reasons for excluding such a large number of events will now be presented. A number of events contained too much *noise* to be accepted. The explanation for this is that an election of a board member has to occur on an annual general meeting, extra-ordinary general meeting or through the corporate assembly²⁹. Consequently, when a woman is elected to the board of directors there is often other information of significance around the same event date. This leads to *noise* around the event that would interfere with our results. The same argument can be made for possible gender changes announced in financial newspapers i.e. difficult to establish the exact date of the event. Note that we focus on when the information is first released i.e. when the market picks it up. Therefore, if a notice is sent to the stockholders prior to an annual general meeting, with recommendations from the nomination committee, this is the event date and not the actual day of the meeting.

Another issue has been incompleteness of information regarding changes to the corporate board. In our search for events *Newsweb* has been used as a primary source of information. Ideally a press release should consist of all changes made to the board, but often only the new members' names are announced while ignoring commenting on who has left the board. Even though we observe more complete information after *The Act* was imposed, some were still inadequate and lacking information about changes. To solve this, a range of initiatives were taken. We used the various company web pages and their annual reports to find the correct *a priori* composition. Various public databases containing firm specific information were used, investor relations, academics and journalists, who have been referred to in the media, were contacted. For a list for our sources that were used in the data search see *Appendix 11.3*.

Of our sample of 87 events, all with changes in the gender composition, some involved only changes in the total number of men at the board when there is female participation. We have included these events on the foundation that a change in men can occur to fulfill *The Act* i.e. instead of adding a woman to the corporate board a company may reduce the number of men in order to fulfill the requirements.

²⁹ Not all companies have corporate assemblies. In general only large, international companies give priority to this function

Another event restriction was that some companies bypassed *The Act* as mentioned in the introduction. This occurs by changing from a public limited company to a limited company or by becoming a holding company of an abroad parent company. These actions reduce the number of events. However, this problem was not significant in our case (i.e. for stocks listed on the stock exchange) as no companies were taken off the Oslo Stock Exchange as a result of *The Law*.

Based on our criteria all events consist of a change in the female board members ratio. Note that whenever we were uncertain about the gender of a board member's sex, background research of the person was performed to decide the gender³⁰.

³⁰ To find the correct gender of a name we researched the person using the Internet and an Internet-name dictionary.

4. The event study methodology

In our event analysis we have chosen to follow A. Craig MacKinlay's model (1997). With a number of modifications through the following years, MacKinlay presents in his paper a recognized method of how to perform an event study. Readers who are familiar with this procedure may comfortably skip sections *4.2 Models for measuring normal return* to *4.5 T-tests*.

In brief, we analyze the impact of new information by looking at the abnormal return on a stock around the time when new information regarding the change in gender composition of a board is released. To find the abnormal return, the normal return must first be found in order to test whether the stock price changes are statistically different from what is normal. To test this we use a two sided t-test. The normal return is found by sampling stock price changes over a certain period (estimation window) to estimate the market model. In the following paragraphs, we will go into detail how our event study was executed and the various issues that were considered.

4.1 Defining the event window and the estimation window

It is important for the result of the event study to have a clear definition of the time period one will analyze to account for the abnormal returns. This is the event window in the analysis. A common practical approach is to include a few extra days around the event to account for lags in the market, but more importantly to gather the effect from non-trading days and news received in the market after the trading has terminated for the day. Even if the announcement has been made public on the event day, one may argue that the announcement cannot be kept a secret, since the process of electing a new member often involves head hunting through professional networks by the board, as well as personal adaptations made by the nominee (e.g. resigns from other corporate boards). Therefore, more trading days prior to the event should be included. However, through verbal contracts and the aim to continue business in the future, the parties involved in the nomination and the head hunting keep a tight lid on the candidate's name until an announcement is made. To adjust for non-trading days and *stickiness* in the market, we increased the event window after the event took place. Extending the event window further would only add noise to our estimate as the

announcement of a new female board member is usually followed up by other events such as a reorganization plan or an annual general meeting³¹. We analyzed a five day event window, which included one day prior to the announcement day, the event day and three days ex-post. In order to have the ability to do a sensitivity analysis, two extra days were included prior to the event date and two extra days after the event day. By expanding our event window with extra days of observations more of the effects from events will be gathered, since this compensates for leakages, rumors, corrections and lags in the market.

Another argument to broaden the event window is the difficulty in identifying the exact time that the event is known in the market. Most multinational companies have nomination committees that find candidates for the board. Their work can stretch over several months and leakages may occur. The committee may also distribute their recommendations before a notice of a general meeting is sent to the market. This may be done during the trading hours on the stock exchange or after its closure for the day.

MacKinlay (1997) uses an event window of twenty-one days in his example. However, in our case there is a higher likelihood of events interfering. By increasing the event window, one may risk including other events since our events are generally speaking released in a period of high information activity from the company. In our sample such coinciding events are e.g. annual- or extraordinarily general meetings. An example of this was when John Fredrik Odfjell was nominated as the new chairman of the StatoilHydro board (25th of May) and withdrew his candidacy only six days later (31st of May).

For the estimation windows, historical returns are used whenever possible³². In a few cases, an estimation window after the event has been used since some events occur too frequently or too close to when the company was listed for an estimation window to be extracted³³. For our

³¹ Notice that following the announcement of a new female board member, companies systematically issue press releases with “positive” comments of the candidate. Therefore a longer window would only bias the results in our favor. Empirically, the additional price drop in the longer window occurs mostly for small companies and is absent for large companies, thereby signifying that small companies make less frequent announcements than larger companies. Therefore, it is unlikely that the results are generated by additional events.

³²If more than one event occurs during this period, according to Brown and Warner (1985) the same estimation window is used for both events, since we do not want to include the event window in the estimation window as this will affect our estimation of the normal return.

³³ An example of the latter is Aker Drilling’s event from the 3rd of March 2006. An historical estimation window was inaccessible since the company was listed on the 21st of December 2005.

regression parameters to be statistically viable we use an estimation window of 239 trading days as suggested by Brown and Warner (1985)³⁴. We have used daily data as recommended by Morse (1984) since there is a substantial payoff in terms of increased power from reducing the sampling interval from example weekly or monthly data. Additionally, we do not include the event window into the estimation window. This is done to avoid that event period fluctuations in returns affect the estimation of the normal return.

Occasionally, a post-event window is included in the estimation window to estimate the normal return model. The aim is to increase the robustness of the normal market return measure to account for gradual changes in its parameters (i.e. alpha and beta). This was ignored in our study since we assume that a change in the gender composition on the board has no effect on the risk of the firm. To sum up, *Figure 2* shows the timeline in an event study.

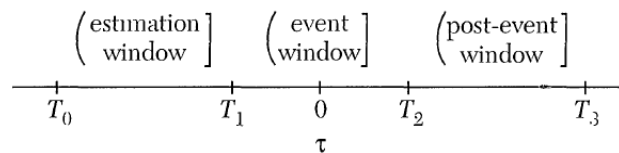


Figure 2: Time line of an event study (MacKinlay 1997)

We use the following notation when measuring the abnormal return and performing our analysis³⁵. Returns will be indexed in event time using τ . We define $\tau = 0$ as the event date i.e. changes in the gender composition on a corporate board. $\tau = T_1 + 1$ to $\tau = T_2$ represents the event window and $\tau = T_0 + 1$ to $\tau = T_1$ to represents the estimation window. Let $L_1 = T_1 - T_0$ and $L_2 = T_2 - T_1$ be the length of the estimation window and the event window respectively. This notation facilitates the use of abnormal returns around the event day in our analysis.

³⁴ The trade-off between statistical reliability and event relevance is a common dilemma when estimating parameters. From a statistical stand-point, it would be favorable to increase the time period. However, Brown and Warner (1985) argue that a time period of 239 days gives the optimal parameters.

³⁵ Same notation as MacKinlay (1997)

4.2 Models for measuring normal return

MacKinlay (1997) groups the number of approaches for harvesting the normal returns into two categories; namely statistical and economic. The statistical approach follows statistical assumptions and is unmotivated by economic arguments. Economic models, such as the *Fama-French three factor model*³⁶ are also based on statistical empirical evidence, but accounts for economic preferences like returns and standard deviations. Therefore, the advantage of using economic models, according to MacKinlay (1997) is the opportunity it gives to calculate more precise measures of the normal return using economic restrictions. Our model is based on the *CAPM*³⁷:

$$R_{i\tau} - R_f = \alpha_i + \beta_i(R_{m\tau} - R_f) + \varepsilon_{it}$$

By definition α is zero in *CAPM*. The link between *CAPM* and the market-model can be shown in the following calculations

$$a = \alpha_i + (1 - \beta_i)R_f$$

where a is the excess return in the market model:

$$R_{i\tau} - R_f = a_i + b_i(R_{m\tau} - R_f) + e_{it}$$

is written as: a market model which is a statistical tool and relates the return of a stock to the return of a market portfolio. In practice the market portfolio is unobservable. Therefore a broad index can function as a good proxy variable³⁸. Our assumption is therefore that the benchmark index is a representative index for the stocks in our study. We use excess returns instead of simple returns, denoted by R^e .

Our study is based on the *CAPM*, which assumes linearity and that the stock's return is normally distributed. For any stock i the market model can be written mathematically as

³⁶ Fama and French (1993) and (1996)

³⁷ Sharpe (1964), Lintner (1965) and Mossin (1966)

³⁸ We have used the OSEBX index which represents a representative sample of all stocks listed on the Oslo Stock Exchange.

$$R_{it}^e = \alpha_i + \beta_i R_{m\tau}^e + \varepsilon_i \quad \text{where } \varepsilon \sim \text{NIID}$$

$$E(\varepsilon_{it} = 0), \quad \text{var}(\varepsilon_{it}) = \sigma_\varepsilon^2, E(\varepsilon R_m) = 0$$

where R_{it}^e and $R_{m\tau}^e$ are the period- t returns on security i and the market portfolio, respectively, and ε_{it} is the zero mean disturbance term. α_i , β_i and σ_ε^2 are the parameters of the market model that are to be estimated.

4.3 Estimating the market model

When estimating the market model a regression analysis of the returns in the estimation window is performed by using the OLS-method (Ordinary Least Squares). OLS assumes that there is no autocorrelation in the error term and that

$$\text{Var}(\varepsilon_{it}) = \sigma_\varepsilon^2 \text{ as } \text{Var} = \text{constant through time}$$

If these assumptions hold, OLS is *unbiased* and *efficient*. Under general conditions, OLS is also a *consistent* estimation procedure for the *CAPM* parameters. For a company i the calculations of the OLS parameters in the estimation window are as follow:

$$\hat{\beta}_i = \frac{\sum_{\tau=T_0+1}^{T_1} R_{it}^e R_{m\tau}^e}{\sum_{\tau=T_0+1}^{T_1} R_{m\tau}^e{}^2} = \frac{\text{cov}}{\text{var}}$$

$$\hat{\sigma}_{\varepsilon_i}^2 = \frac{1}{L_1 - 2} \sum_{\tau=T_0+1}^{T_1} (R_{it}^e - \hat{\alpha}_i - \hat{\beta}_i R_{m\tau}^e)^2$$

R_{it}^e and $R_{m\tau}^e$ are the period- τ excess returns on security i and the market portfolio, respectively³⁹. $\hat{\beta}$ measures the sensitivity to the OSEBX index and $\hat{\alpha}_t$ outlines the intercept of the regression line.

³⁹ We have used the Bank of Norway's 3-months Treasury bills as the risk-free rate.

4.4 Abnormal returns calculations

Abnormal return for stock i can be defined as AR_{it} , where $\tau = T_1 + 1, \dots, T_2$ is the interval (L_2) for abnormal return in the event window for company i . Using the market model to find the normal return, abnormal return can be defined as

$$AR_{it} = R_{it}^e - \hat{\alpha}_i - \hat{\beta}_i R_{m\tau}^e$$

The abnormal return observed in the event window, in connection with changes in gender composition, is explained by the noise-/error term calculated under *CAPM*. The standard error to alpha and beta can be defined as

$$\hat{\varepsilon}_\tau = y_\tau - \hat{\alpha} - \hat{\beta}x_\tau \quad \text{and} \quad \hat{\sigma}_\varepsilon^2 = \frac{1}{T-2} \sum_{\tau=1}^T \hat{\varepsilon}_\tau^2$$

Under the null hypothesis, the abnormal returns follow a normal distribution with zero mean and variance equal to

$$\sigma^2(AR_{it}) = \sigma_{\varepsilon_\tau}^2 + \frac{1}{L_1} \left[1 + \frac{(R_{m\tau} - \hat{\mu}_m)^2}{\hat{\sigma}_m^2} \right]$$

The first term in the equation is the disturbance variance, while the second term is additional variance due to sampling errors in the parameters. MacKinlay (1997) claims that such sampling errors, which are common in all event windows, leads to serial correlation on the abnormal returns even if the true disturbances are independent through time. Assuming that the estimation window (L_1) is sufficiently long, this last term can be set equal to zero. The variance is then

$$\sigma^2(AR_{it}) \approx \hat{\sigma}_\varepsilon^2$$

This allows us to test whether the normal return is significantly different from zero. Additionally, we will aggregate the abnormal returns across assets. First, the cumulative abnormal returns (CAR_i) over time were calculated for each firm. Second, the CAR_{it} was found by the sum of the daily AR in the event window. Our CAR is based on five trading days prior and four trading days after the event. Mathematically, CAR can be defined as

$$CAR_i(\tau_1, \tau_2) = \sum_{\tau=\tau_1}^{\tau_2} AR_{i\tau} \quad \text{with distribution} \quad CAR_i(\tau_1, \tau_2) \sim N\left(0, \sigma_i^2(\tau_1, \tau_2)\right)$$

Asymptotically, as L_1 increases, the variance of CAR_τ is

$$\sigma_i^2(\tau_1, \tau_2) = (\tau_2 - \tau_1 + 1)\sigma_{\varepsilon_\tau}^2$$

If the value of L_1 is small, the variance of the cumulative abnormal return should be adjusted for the effects of the estimation error in the normal model parameters. However, we assume that our L_1 is sufficiently long in our case for the asymptotic approximation to work.

We find the average CAR and its corresponding variance for all companies equal to

$$\overline{CAR}(\tau_1, \tau_2) = \frac{1}{N} \sum_{i=1}^N CAR_i(\tau_1, \tau_2)$$

and

$$var(\overline{CAR}(\tau_1, \tau_2)) = \frac{1}{N^2} \sum_{i=1}^N \sigma_i^2(\tau_1, \tau_2)$$

4.5 T-tests and P-values

We briefly revisit t-values and p-values. In our results we present the p-values of our $CARs$.

When testing the null hypothesis H_0 : average $CAR = 0$ i.e. that the average abnormal returns are zero, inferences can be drawn using

$$\overline{CAR}(\tau_1, \tau_2) \sim N[0, var(\overline{CAR}(\tau_1, \tau_2))].$$

Since the real $\sigma_{\varepsilon_t}^2$ is unobservable, the estimated variance from the market model is used. Then the null hypothesis can be tested using

$$\theta_1 = \frac{\overline{CAR}(\tau_1, \tau_2)}{var(\overline{CAR}(\tau_1, \tau_2))^{1/2}} \sim N(0,1)$$

The above distribution result is asymptotic with respect to the number of securities N and the length of the estimation window L_1 .

The alternative hypothesis (H_1) states that the average cumulative returns are statistically different to zero i.e. $H_1: \text{average CAR} \neq 0$. Whether the H_0 can be rejected is tested on a 99%, 95% and 90% confidence level, with critical t-values calculated using $N-2$ degrees of freedom. N is here the sample size and 2 is the number of estimators.

The p-values presented in our results are standard p-values i.e. the probability of obtaining a value of the test statistic at least as extreme as the one that was actually observed, given that the null hypothesis is true. For a p-value of higher than 0.10, the null-hypothesis cannot be rejected. While a p-value of 0.10 indicates that our observed value is 10% likely to be as extreme as just seen given that the H_0 is true.

5. Results

In the previous chapter, the core elements of the event study methodology were presented. The findings will now be shown. The results reported in the paper are based on the event windows (-1,1), (-1,3) and (-1,5), where time 0 is the date of the announced increase in the number of women⁴⁰. Note that although we have included all the event windows tested in our tables, our focus will be on the longest window i.e. the (-1,5) window. So unless stated otherwise, the *CARs* are from the longest event window. The data in *Table 3, Panel A* includes events of the overall sample while the data in *Panel B* are based on the *synthetic* increase in the number of women as displayed in *Difference* in *Panel A*⁴¹. This was done in order to increase the number of events. This assumption will be tested for robustness as explained in section 6. *Robustness tests*. The effect of an increase is therefore expected to give the opposite results of a decrease in the number of women. Results are presented in *Table 3*.

Companies' *CARs* and associated statistics. The *CAR* for each company is calculated by summing the difference between the firm's stock return and the return of the Oslo Stock Exchange Benchmark Index (OSEBX) over the interval beginning one day prior to the press release of a changes to the board of directors and ending one, three or five trading days after the event. *Difference* is a synthetic increase in the number of female board members in order to increase the number of events. A decrease is included as the inverse of an increase in the sample. *Market cap* is the market capitalization for firms listed on the Oslo Stock Exchange (OSE) and the stocks are separated based on their market capitalization compared to the mean market capitalization of OSEBX stocks. *The law* is the act of gender equality in the board room that was passed on the 13th July 2003 and the stocks are subsequently divided into two sub-groups: prior or after this date. *Industry* are the industries that the stocks in our sample are categorized in, according to the industry category codes used by Dagens Næringsliv.

Panel A: Overall sample					
	N. of Obs.	Event window:	(-1,1)	(-1,3)	(-1,5)
Increase no. of females:	33				
Mean CAR			-0.01%	-0.60%	-1.96%
<i>p-value</i>			1.00	0.85	0.55
Decrease no. of females:	11				
Mean CAR			1.38%	2.01%	2.08%
<i>p-value</i>			0.71	0.56	0.54
Difference: ⁴¹	44				
Mean CAR			-0.35%	-0.96%	-1.99%
<i>p-value</i>			0.92	0.77	0.55

⁴⁰ All three event windows were included as an empirical sensitivity analysis.

⁴¹ As explained in the caption to the figure, the *synthetic* increase is the increase of women as well as the inverse of a decrease in the number of women. This assumes that there is perfect correlation between the two types of events.

Panel B: Results with synthetic increase in no. of female board members in sub-samples							
	N. of Obs.	Mean CAR <i>p-value</i>					
		(-1,1)		(-1,3)		(-1,5)	
Before passing the law	12	-2.85%	0.54	-3.91%	0.37	-4.45%	0.30
After passing the law	32	0.58%	0.85	0.15%	0.96	-1.14%	0.69
Market cap > mean	14	-0.92%	0.68	-1.60%	0.45	-1.70%	0.41
Market cap ≤ mean	30	-0.09%	0.98	-0.66%	0.86	-2.07%	0.58
Industry:							
Energy	11	-1.09%	0.68	-1.47%	0.56	-3.25%	0.21
IT	10	-1.02%	0.84	-1.76%	0.72	-2.82%	0.56
Finance	10	-0.51%	0.81	0.14%	0.51	1.04%	0.60
Manufacturing industry	5	3.69%	0.81	2.40%	0.46	1.05%	0.74
Telecom	1	-2.90%	0.29	-8.07%	0.02 **	-8.26%	0.01 ***
Material	2	-1.36%	0.79	-2.67%	0.59	-6.75%	0.19
Consumer Goods	4	1.73%	0.56	-0.12%	0.97	-2.38%	0.38
Health	1	-7.98%	0.16	-7.91%	0.10 *	-6.32%	0.13

Asterisks indicate CARs that are statistically different from 0 at the 10%, 5% and 1% level of significance.

*Assumes a correlation between a decrease and an increase of one i.e. they are complete opposites.

Table 3: Cumulative abnormal returns (CAR) around the time of a change in the number of female board members in public companies in Norway

5.1 Support for Hypothesis I

The first test in *Table 3, Panel A* is an analysis regarding gender composition, i.e. an increase or decrease in the number of females on the corporate board over the whole sample period. For an increase there is a negative *CAR* of -0.01% in the (-1,1) window that turns negative in the (-1,3)- and the (-1,5) window, to -0.60% and -1.96% respectively. The results are not statistically significant. Although Burgess and Tharenou (2003) argued that women have higher ethical standards- and corporate social awareness than men, this does not seem to be valued by the market. The critics of *The Act* argued against the equal opportunities system and not against women. However, our results indicate that women may affect firm value negatively. This is consistent with Shrader et al.'s findings, from 1997, of a negative correlation between the number of female board members and certain accounting measures. An argument against *The Act* was the small pool of qualified women. Another explanation for the negative *CAR* may be that most investors/investment firms are men/controlled by men. Therefore the shareholders regard it as negative if they have to give up their board position for a woman. A statement by the CEO in Teeness highlights the problem when asked why they have not increased the number of female board members: “*We have majority*

*shareholders who want to have a say on the corporate board, and they are men*⁴². The results seem to highlight this argument.

A decrease in the number of female board members yields an insignificant price increase and a positive *CAR* of 1.38% in the (-1,1) window, which increases to 2.01% in the (-1,3) window and further to 2.08% in the (-1,5) window. An argument used against *The Law* was that women may not hold the necessary competence and therefore removing female board members, leads to the positive *CAR*. Alternatively, using Weber's (2004) findings, suggests that by removing a woman, the men gain a larger influence, which is positive, since the two groups identify with different cliques and the men can therefore exert influence in their work. A decrease in the number of women may not be a positive signal as long as there is a *critical number*, of female directors left on the board to exert an influence and maintain a female clique (Shrader et al. 1997).

Difference in Table 3, Panel A is the *synthetic* increase in the number of female board members. An insignificant *CAR* of -1.99% is similar to the results for the *pure* increase and may suggest that our assumption of perfect correlation between an increase and a decrease holds. When comparing the results for the increase and the decrease, the two have opposite effects. The *difference* is therefore used in the tests in Panel B. The steady increase in *CAR* when going across the event windows may be explained by the market's need for time to reflect upon the full effect of the announcement.

To summarize, the H_0 cannot be rejected. However, the results suggest that adding a woman to the corporate board destroys shareholder value while the opposite is true for a reduction in the number of women. Possible explanations may be that women are regarded as inferior to men in terms of competence and qualifications, there is a small pool of women to choose from and the men can exploit their influence to their full, when there are fewer women on the board representing a different clique.

⁴² Adressa.no - 15.01.2007

5.2 Support for Hypothesis II

The effects of *The Act* are summarized in *Panel B* using a *synthetic* increase in the number of female corporate board members. For events prior to *The Act*, the *CAR* is -2.85% for the (-1,1) window, -3.91% and -4.45% for the (-1,3)- and (-1,5) windows, respectively. The findings are not statistically significant. The explanation for the negative *CAR* is mentioned in the discussion in *section Support for Hypothesis I*. Additionally, the finding may be explained by theory if either: (1) a firm loses a highly regarded male board member to a woman, (2) the number of board members becomes higher than the optimal number viewed by the market or (3) the marginal woman is viewed inferior to the alternatives.

First, if (1) explained the negative *CAR*, one would expect to see similar results for men. However, although insignificant, the results for men may indicate a difference (see *11.4* for the *CARs* for men). The likelihood of a qualified man replacing an inexperienced woman may be equally likely as a qualified woman replacing an inexperienced man. Second, (2) may be an unlikely explanation as one can also expect to find similar effects for sub-optimal board size between an increase in men and women. The results in *Appendix 11.4* do not seem to indicate that this is the case. Therefore, we are left with (3) as one possible explanation for some of the insignificant difference. The results indicate that *before The Act* was passed; increasing the number of female board members decreases stock price. For an increase in men, there is no significant change in *CAR*. Based on this insignificant difference between men and women, one may infer that the women elected are viewed as inferior to their male counterparts by the market. This is economically viable since the pool of qualified female board members is lower than the pool of qualified male board members.

Resuming to the analysis of *Panel B* one can see that there are no statistically viable conclusions to be drawn for an increase in the number of female board members *after The Law*. The *CAR* is 0.58% in the three day event window and 0.15% and -1.14% respectively in the five and seven event day windows. As a consequence of *The Act*, firms will have to add women to their board or reduce the number of men. Therefore the demand for competent women will increase, which reduces the pool of available, qualified women. On the other hand, as a consequence of *The Law* as we have shown in *section 2.4.3*, several steps were initiated to increase the pool size thereby reducing the problem of a small pool as found by Harrigan (1981). Therefore, an increase in the number of women can be regarded as positive

since the firm is complying with the rules and regulations set, given that the firm is not already in the 40% bound as stated by *The Act*. The drop when increasing the event window to the seven day window may suggest that investors initially regard the news as positive since the company is complying with the law, but eventually judge the female candidate as inferior to the potential alternative. Alternatively, the *CAR* may be zero and due to noise the *CAR* fluctuates between being positive and negative. In any case, a test was performed to see whether a company was complying to the law affected our results as explained below.

We tested whether there was a *CAR* statistically different to zero when looking at female board *ratio* increases, which could then help us explain the results found in *Table 3*. The area of interest was when the change ensured a 40% female ratio or better on the corporate board. The events were analyzed prior to- and following the law. The null-hypothesis for this analysis is that $CAR=0$ and the alternative hypothesis is that $CAR\neq 0$. The results are shown in *Table 4, Panel A* and *Panel B* below.

Companies' *CARs* and associated statistics. The *CAR* for each company is calculated by summing the difference between the firm's stock return and the return of the Oslo Stock Exchange Benchmark Index (OSEBX) over the interval beginning one day prior to the press release of a changes to the board of directors and ending one, three or five trading days after the event. Whether a company meets the requirement of the law or not (i.e. 40%) is divided into two groups and displayed in *Panel A*. This is then tested *before* and *after The Law* in *Panel B*. Events that do not change whether a company meets the requirements of *The Act* are not included.

Panel A: Overall sample							
	N. of Obs.	Event window:					
		(-1,1)	(-1,3)	(-1,5)			
Meets requirement:	20						
Mean <i>CAR</i>		0.94%	0.46%	-0.83%			
<i>p-value</i>		0.79	0.89	0.80			

Panel B: Results with increase in female board ratio before and after <i>The Act</i>							
	N. of Obs.	(-1,1)		(-1,3)		(-1,5)	
		Mean <i>CAR</i>	<i>p-value</i>	Mean <i>CAR</i>	<i>p-value</i>	Mean <i>CAR</i>	<i>p-value</i>
Before passing the law	4	1.61%	0.73	-1.18%	0.79	-1.01%	0.81
After passing the law	16	0.77%	0.80	0.87%	0.77	-0.78%	0.78

Asterisks indicate *CARs* that are statistically different from 0 at the 10%, 5% and 1% level of significance.

Table 4: Cumulative abnormal returns (CAR) of female board ratio increases

Looking at the table above, the market does not seem to price in any changes when the company announces that it is within the 40% bound as stated by *The Act*. This may be due to the market already having priced in expectations that the companies will comply to the law. The *CARs* are insignificant and -0.83% when meeting the requirements, for 20 observations. The number of observations becomes too low, when looking at the sub-sample in *Table 4*,

Panel B, to make any credible conclusions about the change in *CAR* when meeting the requirements set by the law. The *CARs* seem to be rather random and a conclusion may be that the market has already priced in expectations of an act being passed. In addition, the market may expect that any changes made to the board will eventually ensure that the company will comply by having a 40% female, corporate board representation. This suggests that the market does not take the threat, of dissolving companies that do not comply, seriously.

Comparing the results *prior to and after the law* in *Table 3 Panel B*, the change in *CAR* reveals that the law may have had an effect. The *CAR* has improved 3.43%, 4.06% and 3.31% (respectively for the [-1,1], [-1,3] and [-1,5] event windows). This trend may be explained by a change in the market's *attitude* towards female representation in the boardroom. Furthermore, such a change suggests that various initiatives to increase female awareness were successful. This finding corresponds to Burgess and Tharenou (2002) who found that females have greater corporate sensibility than men. Carter et al. (2003), Catalyst (2001) and Ellis and Keys (2003) document that females have a positive influence on firm performance which may have been conveyed to the market. On the contrary, the positive change may be a result of *The Act* itself. In other words, the market has not changed its view on women on corporate boards. Instead the market judges an increase in female representation as positive since the company is then in compliance with the law.

The media coverage may also play have played a role. Prior to the law being passed, the media coverage was substantial with a *skeptical* view thereby fueling the negative view on making diversity a legal requirement⁴³. However, following the law from 2003 and onwards, the view has changed from *skeptical* to *neutral*, focusing more on the positive and negative sides instead of pure criticism. On the other hand, the improvement in *CAR* might be explained by firms adjusting to *The Act* as already mentioned.

In conclusion, the H_0 cannot be rejected. The results may suggest that *The Act* has had a positive impact on the *attitude* towards women in the boardroom despite not showing any statistically significant results. On the other hand, the results also suggest that some of the improvement in *CAR* may be due to the companies merely complying with the law.

⁴³ This view is the authors' subjective feeling of the media coverage after following the media's view, chronologically, using the articles found in the Retriever database.

Furthermore, our results indicate a lower, negative *CAR* after the law being passed, when looking at the longest window, than the corresponding *CAR* prior to the law. One can therefore argue that the law has had a positive impact possibly due to the female focus over the years before implementation.

5.3 Support for Hypothesis III

The comparison in *CAR* between *small- and semi-small* companies against *large* companies is shown in *Table 3, Panel B*. Firms were compared to the mean of the OSEBX index in order to group the firms' events in the *Mean cap > mean (large companies)* or the *Mean cap ≤ mean (small- and semi-small companies)*⁴⁴. Although the mean of the OSEBX index is time-variant along with the market capitalization of each firm, the mean did not affect the grouping of the largest firms in the study and therefore was not viewed as critical for the study. From the results in *Table 3 Panel B*, the *large* companies yield an insignificant decrease in the stock price of -0.92% in the (-1,1) window, -1.60% in the (-1,3) window and -1.70% in the (-1,5) window. The results may be affected by the large differences in *CAR* prior to- and following *The Act* as discussed in *Support for Hypothesis II*. The *large* companies were not the most blustering critics of the law. Some of these companies had already a fair share of female directors or a strategy to increase the ratio to pursue optimality (Dalton et al. 1999), as a result of large ownership by the *Minister of Trade and Industry* (e.g. in Telenor and StatoilHydro). Large corporations often have access to an international pool of women due to their size and operations in foreign countries. Therefore, the argument of a small pool of women may not hold to support the negative *CAR* found in the results. Instead, the results may indicate, as described above, that there is a negative attitude towards women becoming directors among investors or that by increasing the number of women, the natural *clique* in the boardroom is interrupted.

Although not statistically significant, there is a *CAR* of -2.07% in the (-1,5) window for the smallest companies. This drop in stock prices for small stocks is consistent over the event window spanning from (-1,1) to (-1,3) with an increasing negative *CAR* (-0.09% to -0.66%).

⁴⁴ The mean was calculated from the OSEBX total value and was found to be MNOK 12,158 (Oslo Stock Exchange, excel file).

Small companies may sometimes not enjoy the same access to qualified women as larger companies due to their small size and inability to recruit directors from abroad.

Juxtaposing the *small*- and *semi-small* stocks with the *large* stocks reveals that there is a larger “punishment” for increasing the number of female directors in small companies when looking at the longest window. An explanation for this may be the already mentioned difference in the availability of qualified women. To investigate whether the critic against *The Law* by the *small*- and *semi-small companies* holds an additional test was done and is shown in *Table 5* below.

Companies' CARs and associated statistics. The CAR for each company is calculated by summing the difference between the firm's stock return and the return of the Oslo Stock Exchange Benchmark Index (OSEBX) over the interval beginning one day prior to the press release of a changes to the board of directors and ending one, three or five trading days after the event. *The law* indicates whether the event occurred prior to or after the law on the 13th of July 2003. *Market Cap* indicates the size of the company compared to the mean of the OSEBX index.

Panel A: Synthetic increase in number of female board members divided by size and date							
	N. of Obs.	Mean CAR <i>p-value</i>					
		(-1,1)		(-1,3)		(-1,5)	
Before passing the law							
Market cap > mean	4	-2.00%	0.45	-3.23%	0.20	-3.47%	0.15
Market cap ≤ mean	7	-3.70%	0.52	-4.89%	0.37	-5.78%	0.27
After passing the law							
Market cap > mean	9	-0.13%	0.95	0.01%	1.00	0.22%	0.90
Market cap ≤ mean	24	0.81%	0.81	0.21%	0.95	-1.46%	0.65

Asterisks indicate CARs that are statistically different from 0 at the 10%, 5% and 1% level of significance.

Table 5: Cumulative abnormal returns (CAR) for events divided into groups of date and market capitalization

Looking at *Table 5*, the test attempts to find evidence to support the critic from *small*- and *semi-small* companies against the law. There is an insignificant, difference in *CAR* between the two sub-samples of events. The results depict that *ex-ante* the critic may have been justified as small companies experienced a drop in stock price when increasing the number of female directors as the *CAR* is -5.78% for the longest window. Although the *CAR* seems to be *greatly reduced ex-post*, the critic does seem to hold as the *CAR* is still negative at -1.46%. For larger companies the *CAR* has changed sign and has become positive, although not far from zero, at 0.22%. Again, this indicates that there have been positive effects of the law, but the table is inconclusive whether this is *directly*- or *indirectly* linked to the introduction of the law. *Directly*, since the market may anticipate that the board will increase

their female board ratio and the event will not have an effect and *indirectly*, by the initiatives undertaken by the government to increase female boardroom participation.

To conclude, the H_0 cannot be rejected. Both large and smaller companies experience a reduction in shareholder value that may be explained by *The Act* directly or indirectly. The results show that even when the market may expect an increase in female board members (i.e. after the law), small companies experience a decrease in stock prices of -1.46% and 0.22% for large companies as shown in *Table 5*.

5.4 Support for Hypothesis IV

Regarding the industry grouping in *Table 3 Panel B* the idea is that there are differences with respect to the pool size of readily, available and qualified women. ECON has already proved that there are large industry differences with respect to the share of female representation on the board (refer back to *Table 1: Female representation on boards [ECON 2003]*)⁴⁵. The industry grouping of ECON is different than the industry grouping in our study, due to the wide range of criteria used by different sources to class companies into industries. In fact, ECON admits that “*the listed industry codes for certain businesses seem odd, considering that seemingly identical companies can be grouped into different industries*”⁴⁶. In addition, the low number of observations (a total of 44) in our study limits the number of industries that the data can be divided into. Therefore, our focus will be on general remarks with regards to the results found in *Table 3 Panel B* under *Industry*.

Panel B tests whether there are differences in respect to various industries, i.e. the industry sub-sample. For the *Energy* industry the *CAR* is -1.09%, -1.47% and -3.25% in the three event windows. The development in the *IT* industry is similar, with *CARs* of -1.02%, -1.76% and -2.82%. Neither result is statistically significant. The results may support Fryxell and Lerner (1989) who suggested that female representation tends to be concentrated in

⁴⁵ ECON does not conclude why there are industry differences or whether a high female representation conveys that qualified women are readily available or not. A high representation could be judged as there being a large pool as many females have taken board positions. Conversely, a high representation could also be viewed as there being a small pool, since the women in these industries have already taken on board positions. However, by experience qualified board members seem to manage numerous board directorships thus suggesting that a high representation means that the pool is larger.

⁴⁶ The original, Norwegian text can be found in ECON (2003) p. 16

industries where females are principle buyers. Examples include food-related-, drug- and cosmetic industries. As a result the pool size of qualified females may be low in the energy and IT sector, since these are technical fields and therefore dominated by men. Additionally, Weber (2004) finds that well-connected businessmen vote together to control decision-making on corporate boards. An interpretation of the enforced law may be that the old decision-making board, primarily male dominated, is losing some of its control power. The idea is here that losing control power might be interpreted negatively leading to a negative *CAR*. This explanation may suggest that female candidates do not hold the necessary competence and are therefore inferior to men. On the other hand, ECON have documented that the average female board ratio in the *manufacturing industry*, which is used as a proxy for the energy industry, is 10.1%. This is above the average for the population⁴⁷. In theory this should indicate that the *Energy* sector has a large pool of potential female board members. However, as mentioned above, since the majority of investors and entrepreneurs (especially in the energy sector and in oil) are men, these may be reluctant to give up their board positions for a female partner.

Regarding the *Finance* industry, the *CAR* is an insignificant -0.51%, 0.14% and 1.04% in the presented event windows. ECON (2003) shows that the female board representation is 6.5% in the finance industry, which is equal to the average for all industries. The result may indicate that despite there being a low pool of women in the *Finance* industry, the market is positive to an increase. Due to the low pool, the market may well translate an increase as positive, since there are few women in the industry. On the other hand, most of the *Finance* companies in the sample are large (e.g. DnB NOR and Storebrand). These large companies have better access to an international pool as explained in the previous section.

To conclude, the H_0 cannot be rejected. For the industries, *IT* and *Energy* seem to experience a drop in its stocks when there is an increase in female, corporate board members. The *Finance* industry however, might experience a positive turn in *CAR*. Many of the *Finance* industry, companies are large. The insignificant disparity between industries may be explained by variation in *size*. Another explanation for the intra-industry differences may be that the access to competent women varies. The remaining industries have such a low number of observations that no discussion will be viable.

⁴⁷ The *Energy* sector is here compared with ECON's manufacturing sector.

6. Robustness tests

The reader may not fully agree with some of our assumptions and findings. Therefore, to accommodate for these readers, some of the results were recomputed using different assumptions.

6.1 Sensitivity analysis

First, a decrease in the number of female board members is treated as the opposite of an increase in *Table 3*. This assumes perfect correlation between the two types of events, which may not be the case. Consequently, the events for an increase in the number of female board members were used instead of the *synthetic* increase for the robustness test. The results of this test can be found in *Appendix 11.5*. Interestingly, there are no major differences and the same conclusions are reached as in the results of *Table 3*. The difference between *prior to* and *following The Law* as well as the difference between small and large cap stocks seems equally clear. Due to the low number of events, the *Industry* sub-samples were not included in this robustness test.

Second, due to the long political process of introducing *The Act* and the subsequent step-wise implementation of *The Act*, the date at which the law was introduced is rather ambiguous. The tests in *Table 3* are based on the first introduction on the 13th of July, 2003, assuming that this is the date that the market starts pricing in the effects of an increase in the number of female board members. However, it was not until 1st of January 2005 that the bill became a law (the period from 2003 and up to 2006 was an initial testing-phase, where companies were ushered, but not obliged to increase their female board ratio). Therefore, we re-tested the data as if the 1st of January 2006 was the date of the enactment of *The Law*. The results are shown in *Appendix 11.6*. These results portray a different picture than the data in *Table 3, Panel B*. Although it seems like it is less negative to introduce a woman to the board after the law, the difference is now almost non-existent. Statistically, the *CAR* of -2.11% for the longest window is significant at the 1% level and therefore the null-hypothesis of no change in *CAR* after the law, is rejected. The evidence suggests that introducing a woman to the board of directors after the law produces a negative *CAR*, but this is lower than the negative *CAR* (-3.39%) prior to the law being introduced. The market may expect the

companies to comply with *The Act* by introducing women to the boardroom. The negative *CAR* may be explained if there are more qualified male board members that are being suppressed. The low number of observations, however, makes it difficult to produce credible inferences about the population.

Finally, as some of the observations include other members leaving or entering, a final robustness test was done on *clean* events i.e. events where there is a single change of either a woman exiting or entering. The results are displayed in *Appendix 11.7* and do not change our conclusion.

6.2 Statistical inferences

The *CAPM* model used to define the normal/expected return links the return of the individual company to the return of the market portfolio. Furthermore, the normal return is used to evaluate the cumulative abnormal returns (*CAR*), which makes up the foundation of our event study. A statistical discussion may put light on a number of assumptions and reveal strengths and weaknesses with our analysis.

6.2.1 Type I and type II errors

There are two types of errors that can surface when using statistical analysis. These are the type I and type II errors. The type I error is when the H_0 is rejected when it is in fact correct. Type II error is when the H_0 is not rejected when it is in fact wrong. In our results, since most H_0 were kept, we may be dealing with type I errors. Therefore, we will briefly discuss the characteristics of the event study methodology. These are whether the t-test is correctly specified and the strength of the test. The latter is the analysis' possibility of actually finding a *CAR* when this exists⁴⁸.

6.2.2 Specifying the t-test

The p-values are based on the t-values. The t-tests for an event study are only correctly specified when its assumptions hold. Therefore, not only do we have to make statistically significant findings of a *CAR* different to zero, but the model used to find the *CARs* is based

⁴⁸ Kothari and Warner (2004)

on OLS. In the analysis, it is assumed that the OLS regression assumptions hold. For instance, when performing a t-test the *CARs* are assumed to be normally distributed. Considering the low number of events that we gathered, this is a strong assumption. However, looking at *Figure 3* we are satisfied with the distribution of the *CARs*.

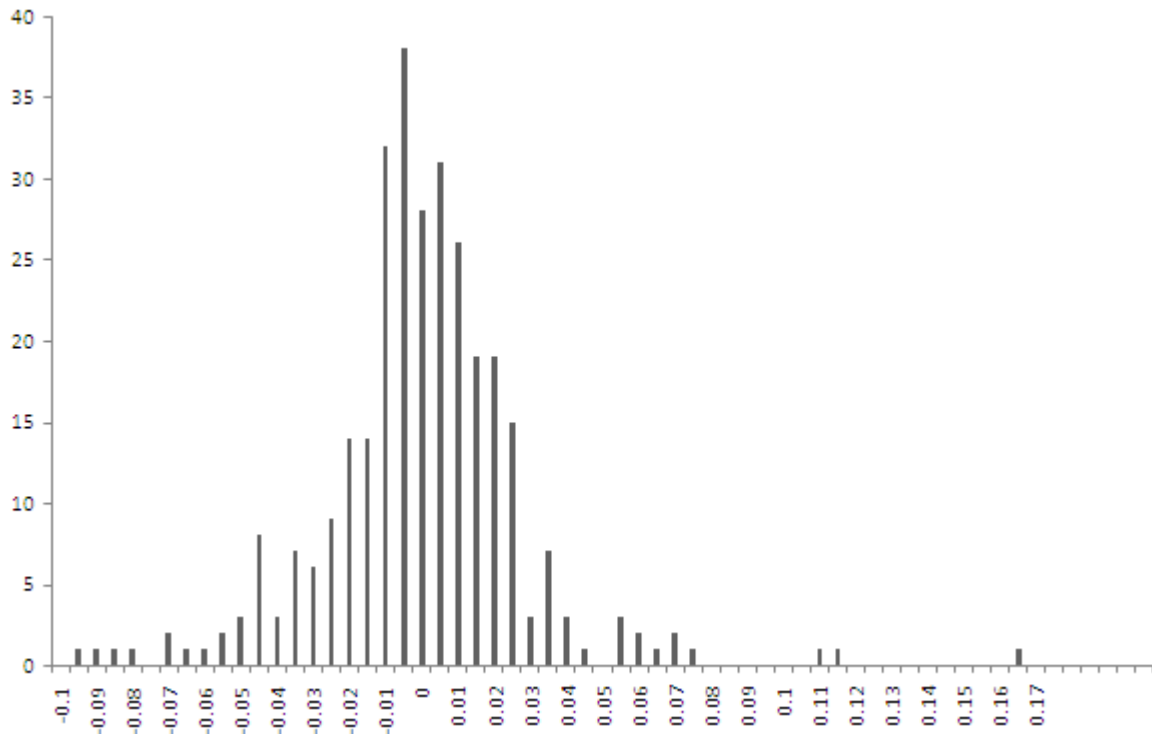


Figure 3: Distribution of CAR in (-1,5) window

Figure 3 presents the distribution of the *CARs* for a *synthetic* increase in the number of female board members. The distribution is close to normally distributed with a skewness to the left and a long, right-side tail.

6.2.3 Strength of test

The strength of the test is defined as one minus the probability of type II error. In other words, it is the probability of rejecting the null-hypothesis for a given *CAR*. The strength of an event study increases when; the number of days in the event window decreases (MacKinlay 1997), number of events in the sample increases and when the size of the *CAR* increases (Bhagat and Romano 2002). This should suggest that by using a (-1,5) event window the strengths of the tests is reduced. However, we make the same conclusion in the (-1,1) window. The explanation may lie in the increasing *CAR* over the event period, which strengthens the test.

In terms of the sample size, the variance is important as it determines the t-values. This reduction in variance is significant when increasing the sample size for few events, but the variance converges to zero in a sample of fifty events. The probability of including other events increases the fewer events there is. However, we feel that despite the low number of events gathered, our data gives a fair representation of the population. Our strict data selection criteria, may have had a positive effect on our t-values since there is little else going on i.e. the variance is low. This strengthens our tests.

7. Limitations to our study

Several criticisms can be raised. According to MacKinlay (1997) there are several factors that determine the success of an event study. In this section we discuss some of these factors as well as general critiques that either limit our findings or bias our results. Some of the ideas picked up during the study will be presented in *section 9. Proposals for further research*.

First, the determination of the exact date at which *The Act* was priced into the market is not completely correct. In our study, the events are grouped into sub-samples of *before the law being passed* and *after the law being passed*. To account for the fact that a different date may have been chosen as the date at which *The Act* was passed, we re-grouped the events using January 1st of January 2006 (date of the enactment) instead of 13th of July 2003 (date of the enactment including a trial period of two years) as shown in *Panel B*. However, this change had no effect on the results as the data still produced a large drop in stock prices *before-*, and no change *after* passing the law.

Second, despite that our study found insignificant drops in stock prices, the experience and expertise of the female candidates are unaccounted for. Therefore, a lack of experience by many of the female board members may explain some of the negative *CAR* (for instance, Kathrine Fredriksen, an inexperienced board member at Frontline, replaced Tor Olav Trøim, a man with extensive experience and a long track record of creating value).

Third, with respect to the lack of statistical significance, our sample size is not sufficiently large. According to MacKinlay (1997) a larger sample size is necessary when abnormal returns are small to increase the power of the analysis. For instance, even with a 2% abnormal return, the power of a five percent test with 20 firms is 0.99. The relatively low number of events, as mentioned in *section 6.2.3*, for a change in the number of female board directors may lead to an absence of statistical power (43 events for a synthetic increase, 32 and 11 respectively for an increase and a decrease).

Fourth, although we followed the MacKinlay (1997) methodology for our study; we did not include all events with an increase in the number of female board members. The sample size argument can further be related to inferences with event-date uncertainty. In this report we have ignored collecting events from secondary sources e.g. newspapers based on the desire to only include events where the exact date of the event can be determined to strengthen our

findings. In the MacKinlay (1997) paper the author suggests that the costs from including such not clean events are worth bearing rather than taking the risk to miss possible events⁴⁹. Based on the small publicity many of the new female directors have received in the media we felt did not include their announcements in our analysis. This argument is also based on the fact that there are many relatively small public limited companies in operation in the Norwegian market as mentioned already. However, including such events may have increased the power of our findings.

Fifth, it is important that the market does not anticipate the event. Our events were not completely unanticipated; henceforth it is not possible to determine the full value of an increase in the number of female board member. The market prices expectations gradually given that there is some degree of uncertainty involved. Since the quota is a regulatory change, the initial political debate regarding the topic was started years before the law was passed. Hence stock prices will already at this time (at least to some degree) shift in order to accommodate an expectation of a change in the future. In addition several companies in our study conveyed in their annual reports that they aimed at having a gender neutral board even before *The Act* was passed. Furthermore, due to the wide media coverage, the market gradually priced stock prices that were adjusted for the effects of *The Act*. Similarly, the announcements in our study have been the first news of a new board member issued to the market; henceforth the news has been in many different forms: a sudden resignation as in the case of StatoilHydro's Maurey Devine, a nomination committee's proposal, an election at an annual general meeting and a resignation after a long, publically known dispute internally as seen in the aftermath of the Iran-scandal in StatoilHydro. These forms have different degrees of anticipation and thereby different *CARs* measured around the dates of those events.

Finally, there is a risk of contamination of announcements. Subsequent to a resignation from the board, a new member is often nominated quickly. What is more, such a resignation is often due to strategic or organizational changes.

⁴⁹ MacKinlay argues that one should always sacrifice preciseness (no noise) in order to maximize the sample size, by including events that are noisy i.e. difficult to determine the exact date of the event or there are other events close to the event being analyzed. Since our sample size would be small even if these events were included, we decided to increase events with as little noise as possible

8. Conclusion

We have presented evidence that the market may interpret the announcement of a new female board director as destructive for shareholders' value measured by a *CAR* of -1.96%. However, few of our results were statistically significant. When looking at when the companies reach the 40% bound set by the government, the data seems to be similar with a *CAR* of -0.83%.

Rosa Parks' perseverance led to the fall of segregation in the United States. In retrospect, it was a small, but an important step that changed the American society for the better. Our results do not show, as yet, that *The Act* has had any similar impact on the Norwegian society and investors. However, our results indicate that the market response of an increase in the number of female board members has developed *positively* from a *CAR* of -4.45% prior to *The Act* to a *CAR* of -1.14% after *The Act*. This finding may highlight that the *attitude* of investors and the society as a whole towards female directors, has improved. However, the *CAR* is still insignificant, which may indicate that the market does not value corporate board diversity.

When comparing companies of different sizes i.e. *small-* and *semi-small* versus *large* companies, there seems to be a small difference in *CAR*. Although insignificant, the smallest companies yield a *CAR* of -2.07% while the largest achieves a negative *CAR* of -1.70%. The results may indicate that the criticism by the small companies towards imposing *The Act* is justified *ex-ante*. However, when dividing the sample *prior to* and *after The Act* the *CAR* changed from -5.78% to -1.46% for *small-* and *semi-small companies* and -3.47% to 0.22% for *large* companies.

Juxtaposing the *CARs* for the industries reveal no differences statistically. However, *Energy* and *IT* seem to underperform compared to *Finance*. *Energy* and *IT* have *CARs* of -3.25% and -2.85%, respectively compared to an increase of 1.04% for *Finance* companies. The results may be explained by the high number of *large* firms represented in *Finance*. Another possible reason may be the differences in the pool of competent women as found by Harrigan (1981). In recent years this has increased through government initiatives, but industry differences may well exist.

So, has *The Act* proved to be the “Rosa Parks case” of Norway? In brief, adjusting for differences in date relative to *The Act* and *size*, does indicate an improved *attitude* towards women despite not showing any significant results. Having said that, segregation in the United States took many years to be fully removed, even after the Supreme Court ruling. Therefore, we feel it is still too early to conclude whether *The Act* has been a success or not.

9. Proposals for further research

During the course of the study several ideas to further studies and alternative methods have arisen. In this final section, we will be sharing some of these thoughts with the reader.

A study based on *the competence of new female board members* would be an interesting study. Using variables in an OLS regression as proxies for experience and competence e.g. years of board directorship, number of board positions held in total and years of experience in the management, we suspect that some of the *CAR* found in our study could be explained by differences in experience and expertise.

Expanding the sample size by *gathering more events* over a longer window or across countries would ensure an increase in statistical power. Although the latter amendment would make a comparison of data *before* and *after The Act* inapplicable, one could find a statistically significant result for a general increase or decrease in the number of female board members. An interesting addition to the study would be to gather more events and perform *a cross-sectional regression* with the percentage change in the female board ratio as a factor.

In order to adjust for variances due to the choice of model, one could also have *tested the data on various models* e.g. the *Fama-French three factor model*. This may have strengthened the analysis as a robustness test. Note that if the markets are perfectly efficient, one can expect to find no difference between the *market-model* and the *Fama-French three factor model*.

There are a number of studies done that indicate that women lead to increased sales (Catalyst 2001 and Bernardi 2006). Therefore, an interesting study would be to analyze the *long-term effects* of increasing the female corporate, board ratio i.e. to look at the change in *CAR* over a 1 month, 1 year and possible longer, event windows – both prior to and following the act.

Finally, one could have performed a study of the changes in certain accounting measure prior to and following *The Act* by doing a similar study as Shrader et al. 1997. This would require a longer horizon than we have used as the fundamental effects of the increased female, corporate board ratio may take time to show in the financials of companies.

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<http://www.oslobors.no/ob/aksjeindeks_kursutvikling?menu2show=1.6.2.1.=p_instrid=ticker.ose.OSEBX=p_period=1D> (16th of April.2008)

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<<http://www.oslobors.no/servlet/BlobServer?blobtable=Document&blobheader=application%2Fvnd.ms-excel&blobwhere=1198213654617&blobcol=urlblob&blobkey=id&1198213654617.vnd.ms-excel>> (19th of December 2007)

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11. Appendix

11.1 The Norwegian Public Limited Liability Companies Act §Section 6-11a

- The requirement of the gender representation law is that both sexes shall be represented on company boards as follows:
 - If the board has two or three members, both sexes must be represented
 - If the board has four or five members, each sex shall be represented by at least two representatives
 - If the board has six to eight members, each sex shall be represented by at least three representatives
 - If the board has nine members, each sex shall be represented by at least four representatives, and if the board has more than nine members, each sex must make up at least 40 per cent of the representatives.
- These rules also apply to the election of alternates.
- There are special requirements for employee representatives:
 - Where two or more board members are elected from among the employees, both sexes must be represented. This also applies to alternates.
 - This rule will not be applicable in companies where one of the genders represents less than twenty per cent of the total number of employees on the date of the election.
- The rules regarding representation of both sexes is to be applied separately to employee-elected and shareholder-elected representatives in order to ensure independent election processes.

This is The Norwegian Public Limited Liability Companies Act §Section 6-11a Requirement regarding both sexes on the board of directors

11.2 Table of complete events and changes

Event No.	Ticker	Date		Event	Prior to event		After		Industry
					Board member including chairman		Board member including chairman		
					M	W	M	W	
1	AKD	0303	2006	Nomination committee's recommendations	4	1	4	2	Energy
2	AKD	0301	2007	Change on the Boards of Directors	4	2	3	2	Energy
3	APP	1501	2008	Board changes	3	2	3	1	IT
4	APP	0102	2008	Board changes	3	1	3	-	IT
5	ASC	1805	2006	AGM	4	2	3	2	Finance
6	DNBNOR	1406	2005	The board of DnB NOR ASA	6	2	5	3	Finance
7	DNBNOR	2406	2005	Baastad resigns from the board in DnB NOR ASA	5	3	4	3	Finance
8	DNBNOR	0511	2007	Change in the board of directors in DnB NOR ASA	4	3	4	2	Finance
9	DNBNOR	1112	2007	New member of the board in DnB NOR ASA	4	2	4	3	Finance
10	DNO	0811	2007	Minutes EGM	5	-	3	2	Energy
11	FRO	2502	2008	FRO - Appointment of new director	3	1	2	2	Energy
12	PGS	2201	2007	Board member resigns	4	3	3	3	Energy
13	PGS	1805	2007	Notice of AGM	3	3	4	3	Energy
14	REC	2212	2006	Rune Bjerke resigns as member of the board	5	3	4	3	Industry
15	REC	3004	2007	Nomination committee's recommendations	4	3	5	3	Industry
16	STB	1110	2000	Jon R. Gundersen resigns as chairmen of Storebrand	6	2	5	2	Finance
17	STB	2005	2003	Election of board members in Storebrand Group	5	1	4	2	Finance
18	STB	2505	2005	Election of board members	3	2	3	3	Finance
19	STL	2811	2001	Chairman Ole Lund asks to leave board of Statoil	5	2	4	2	Energy
20	STL	0508	2002	Devine-exit from board of Statoil	3	3	3	2	Energy
21	STL	0409	2002	STL - New member of the board in Statoil	3	2	3	3	Energy
22	STL	2109	2003	Statoils chairman resigns	3	3	2	3	Energy
23	STL	0111	2003	New chairman in Statoil	2	3	3	3	Energy
24	STL	1306	2005	New members of the board in Statoil	3	3	4	3	Energy
25	STL	2312	2005	Lars Thunell resigns from the Statoil board	4	3	3	3	Energy
26	STL	2605	2006	New chairman nominated in Statoil	3	3	3	4	Energy
27	STL	3105	2006	Oddjell withdraws his candidacy as chairman of Statoil	3	4	2	4	Energy
28	STL	0206	2006	Jannik Lindbæk nominated for position as chairman	2	4	3	4	Energy
29	STL	0510	2007	Reiten resigns as chairman of StatoilHydro ASA	4	3	3	3	Energy
30	STL	1601	2008	Svein Rennemo proposed as new chair of StatoilHydro	3	3	4	3	Energy
31	TAA	1004	2003	AGM	3	-	3	1	IT
32	TAA	1006	2003	Amund Skarholt proposed as new member of board	3	1	4	1	IT
33	TEL	0110	2001	New board members in Telenor	2	4	4	3	Telecom
34	TEL	0312	2002	Tom Vidar Fygh resigns as chairman	4	3	3	3	Telecom
35	TEL	0705	2003	New members of the board	3	3	4	3	Telecom
36	TEL	2709	2005	Dagbladet - Einar Førde passed away	4	3	3	3	Telecom
37	TEL	0804	2005	Paul Berquist to the board of telenor	3	3	4	3	Telecom
38	TEL	2504	2007	Proposals for new board chairman and board members	3	3	4	3	Telecom
39	TOM	0204	2003	Tharald Brøvig resigns from board	6	1	5	1	Industry
40	PGS	1610	2003	Change in board of directors	5	1	5	2	Energy
41	NSG	404	2008	Members leave	6	3	4	3	Material
42	NEC	1605	2008	New members to board of directors proposed	3	1	3	2	Energy
43	STB	2105	2008	New member of the board	5	4	5	5	Finance
44	DNBNOR	2905	2008	Recommendation of new Board of directors	6	5	3	3	Finance
45	LSG	505	2008	Nomination committee recommendations	4	2	3	2	Consumer goods
46	AKY	1505	2008	Recommend three new board members	3	2	3	3	Industry

47	NORMAN	1404	2008	Nomination committee's recommendations	3	2	2	2	IT
48	APP	1504	2008	Board member nomination	3	1	2	1	IT
49	ASC	1704	2008	Proposed board changes	2	2	2	3	Finance
50	APP	102	2008	Board changes, Ms Willumsen steps down	3	1	3	-	IT
51	HJE	1202	2008	Board changes, Mr Paulsen steps down	5	3	4	3	Consumer goods
52	APP	1302	2008	Board changes, Mr Sandland steps down	3	1	2	1	IT
53	APP	1501	2008	Board changes, Ms Armitage steps down	3	2	3	1	IT
54	VEI	905	2006	Women percentage in the board, Ms Knudsen ass.	4	3	4	4	Industry
55	TTS	906	2005	Board at TTS	5	-	3	2	Industry
56	SFM	2105	2007	New Chair and proposals	6	3	7	3	Consumer goods
57	SFM	2603	2003	New board member, Ms Worsøe appointed	6	-	5	1	Consumer goods
58	SFM	2906	2006	New board	5	1	3	3	Consumer goods
59	SUD	1202	2002	New female board member	3	1	3	2	IT
60	SUD	1206	2002	New board member, MS Lydersen	3	2	3	3	IT
61	SUD	1809	2002	Board member steps down, Mr Munthe	3	3	3	2	IT
62	SUD	1710	2007	Changes at the board	3	2	2	2	IT
63	SCH	2802	2002	Mr Nagell-Erichsen resigns	7	4	6	4	Consumer goods
64	SCI	2204	2005	Board of directors	3	1	2	2	Material
65	RIE	3004	2003	Change in board composition	6	3	5	3	Consumer goods
66	RIE	104	2007	Mr Midttun new board member	3	3	4	3	Consumer goods
67	REVUS	2702	2008	New board member at Revus Energy ASA	3	4	3	5	Energy
68	REVUS	2410	2007	New board member elected at AGM	3	3	3	4	Energy
69	QFR	1610	2007	Board member steps down, Mr Goli	5	2	4	2	IT
70	PHD	1210	2002	Ms Michelet steps down from the board of directors	7	1	7	-	Health
71	PHD	2001	2006	Change in the board of directors	4	1	3	1	Health
72	PAR	305	2006	New board members to PAR board	6	1	7	2	Energy
73	ODIM	1105	2006	New directors for ODIM ASA	5	2	5	3	Industry
74	ODF	611	2003	Mrs Moschou elected to Odjell's board	4	-	4	1	Industry
75	NAS	3011	2004	Changes at the board	4	1	3	1	Industry
76	LSG	505	2008	Nomination committee's recommendations	3	1	3	2	Consumer goods
77	ITE	303	2003	Board changes	2	1	4	1	IT
78	IGE	805	2008	IGE appoints two new members of the Board	3	-	4	1	Material
79	MED	2604	2002	New board members	5	-	3	2	IT
80	EME	2008	2003	Changes in Ementor's Board of Directors	3	2	2	2	IT
81	DAT	1004	2006	Nomination committee's recommendations	3	1	3	2	IT
82	DAT	1604	2008	Nomination committee's recommendations	3	2	4	2	IT
83	BWO	1708	2007	New board member, Mr William Smith	5	1	6	1	Energy
84	AIK	2410	2007	Change of boards of dir., Ms Merethe Haugli steps down	4	3	4	2	Finance
85	AKS	303	2006	Nomination committee's recommendations	5	1	6	2	Consumer goods
86	AKS	2303	2007	Nomination committee's recommendations	5	1	4	1	Consumer goods
87	ASC	2410	2005	New Board members, Ms Haugli and Ms Ovesen	5	-	3	2	Finance

Note: The number of board members includes the chairman, but not employee representatives and deputy board members
Number of men (M) and number of women (W)

11.3 Data sources employed for the identification of the board composition *prior to* and *after* an event

Dun & Bradstreet required a significant commission in order to provide us with the sought after data. The same goes for *The Brønnøysund Register Centre* - although their data would not be exact as they do not record the date of an announcement, but only the date the announcement is registered in their database. Companies have a deadline of four weeks after making an announced change in the board, before the announcement must be reported to *The Brønnøysund Register Centre*. In addition, this deadline may not be met if there are errors in the initial report; then the announcement is instead sent back to the company for corrections before being returned later on again.

<http://www.newsweb.no/>

<http://www.huginonline.no/>

<http://www.dn.no/>

<http://www.hegnar.no/>

<http://www.orapp.no/>

<http://www.aftenposten.no/>

<http://www.brreg.no/>

<http://www.dbnorway.dnb.com/>

<http://www.oslobors.no/ob>

The annual reports of companies were actively used to determine the composition prior to an announcement and after whenever this information was inconclusive in a press release. The annual reports not listed in Hugin, were either found on the companies' respective web pages, through investor relations or via journalists in various papers. Marit Hoel, the researcher was inquired about data on gender composition changes in Norwegian boards without success.

11.4 CARs for a *synthetic* increase in the number of male board members prior to and following *The Act*

Companies' CARs and associated statistics. The CAR for each company is calculated by summing the difference between the firm's stock return and the return of the Oslo Stock Exchange Benchmark Index (OSEBX) over the interval beginning one day prior to the press release of a changes to the board of directors and ending one, three or five trading days after the event.

Panel C: Stocks with synthetic increase in no. of male board members prior- and following the enactment of *The Act*

	N. of Obs.	Mean CAR <i>p</i> -value					
		(-1,1)		(-1,3)		(-1,5)	
Before passing the law	14	-0.30%	0.94	0.21%	0.96	1.15%	0.75
After passing the law	44	0.45%	0.90	-0.62%	0.86	-0.39%	0.91

Asterisks indicate CARs that are statistically different from 0 at the 10%, 5% and 1% level of significance.

11.5 Robustness test: CARs for an increase in the number of female board members (not *synthetic*)

Companies' CARs and associated statistics. The CAR for each company is calculated by summing the difference between the firm's stock return and the return of the Oslo Stock Exchange Benchmark Index (OSEBX) over the interval beginning one day prior to the press release of a changes to the board of directors and ending one, three or five trading days after the event. *Market cap* is the market capitalization for firms listed on the Oslo Stock Exchange (OSE) and the stocks are separated based on their market capitalization compared to the mean market capitalization of OSEBX stocks. *The law* is the act of gender equality in the board room that was passed on the 13th July 2003 and the stocks are subsequently divided into two sub-groups: prior or after this date. *Industry* are the industries that the stocks in our sample are categorized in, according to the industry category codes used by Dagens Næringsliv.

Panel A: Results with increase in no. of female board members in sub-samples							
	N. of Obs.	Mean CAR		p-value			
		(-1,1)		(-1,3)		(-1,5)	
Before passing the law	7	-2.32%	0.65	-2.52%	0.59	-4.36%	0.36
After passing the law	26	0.61%	0.84	-0.09%	0.98	-1.31%	0.64
Market cap > mean	10	-0.75%	0.75	-1.06%	0.63	-1.35%	0.54
Market cap ≤ mean	23	0.31%	0.94	-0.41%	0.91	-2.23%	0.55

Asterisks indicate CARs that are statistically different from 0 at the 10%, 5% and 1% level of significance.

11.6 Robustness test: CARs for a *synthetic* increase in the number of female board members using a different date for *The Act* (1st of January 2006)

Companies' CARs and associated statistics. The CAR for each company is calculated by summing the difference between the firm's stock return and the return of the Oslo Stock Exchange Benchmark Index (OSEBX) over the interval beginning one day prior to the press release of a changes to the board of directors and ending one, three or five trading days after the event. *The law* is the act of gender equality in the board room and its corresponding date is 1st January 2006. The stocks are subsequently divided into two sub-groups: prior or after this date.

Panel A: Results with increase in no. of female board members in sub-samples							
	N. of Obs.	Mean CAR		p-value			
		(-1,1)		(-1,3)		(-1,5)	
Before passing the law	18	-2.06%	0.62	-2.98%	0.45	-3.39%	0.38
After passing the law	26	-3.55%	0.02 **	-2.32%	0.01 **	-2.11%	0.01 ***

Asterisks indicate CARs that are statistically different from 0 at the 10%, 5% and 1% level of significance.

11.7 Robustness test: *CARs* for *pure* events with a *single* change in the number of women (multiple events removed)

Companies' *CARs* and associated statistics. The *CAR* for each company is calculated by summing the difference between the firm's stock return and the return of the Oslo Stock Exchange Benchmark Index (OSEBX) over the interval beginning one day prior to the press release of a changes to the board of directors and ending one, three or five trading days after the event.

Panel A: Pure events with change of one female increase or decrease					
	N. of Obs.	Event window:	(-1,1)	(-1,3)	(-1,5)
Increase no. of females:	20				
Mean <i>CAR</i>			-0.25%	-0.71%	-1.01%
<i>p-value</i>			0.94	0.82	0.75
Decrease no. of females:	9				
Mean <i>CAR</i>			1.31%	1.71%	1.68%
<i>p-value</i>			0.91	0.88	0.88

Asterisks indicate *CARs* that are statistically different from 0 at the 10%, 5% and 1% level of significance.