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Gender quotas, firm performance and firm value

The Norwegian example[1]

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ABSTRACT

The introduction of a gender quota requirement as a means to increase the gender diversity on company boards is a controversial issue that has been widely debated in recent years. In 2003 Norway, as the first country in the world, introduced a gender quota law and in the following years more countries followed suit. In this paper we examine both the long-term and the short-term effects of the implementation of the Norwegian gender quota law in order to thoroughly investigate the relationship between the requirement and, financial performance and firm value. We perform a difference-in-difference estimation between the years 2001 and 2006 with listed Norwegian companies as treatment group and listed Swedish firms as control group, as well as an event study examining the event dates of the 22nd of February 2002 and the 19th of December 2003. The difference-in-difference estimation finds no statistically significant effects on financial performance whereas the event study concludes that the quota had a significantly negative impact on the stock market for the 22nd of February 2002, when it was first publicly announced. However, the abnormal returns for the 19th of December 2003, when the law was formally introduced, show no clear results.

Keywords: Norwegian gender quota, board diversity, financial performance, difference-in-difference estimation, event study

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Introduction

Today, an extensive debate regarding the gender diversity on corporate boards is taking place across Europe (Storwall, 2011). Even though approximately 60 percent of all university degrees in the European Union are taken by women (Ohlsson, 2011) only 10 percent of board members in the companies of the European Union are women (Dagens Nyheter, 2011). It seems that there are too few women present on corporate boards in comparison to the amount of women graduating from higher educations, and that there should be more women that are actually eligible for board work. One controversial solution that would increase the number of female board members, and thereby increase board diversity, is to introduce a gender quota requirement. There are a variety of opinions regarding whether a gender quota would be appropriate to implement or not and what the potential effects of an introduction would be. Even though a quota requirement probably would be successful in solving the diversity issue on corporate boards, one might wonder what the financial implications would be for the affected companies.

At this date, Norway, Iceland and Spain have implemented and, France has committed to implement a gender quota regulation for company boards, and more countries as well as the European Union are currently engaged in the same discussion (Storwall, 2011). In December 2003 Norway was the first country to implement a gender quota law for publicly listed firms and achieved the requirement of 40 percent gender equality on company boards in 2008. One of the Norwegian government's central arguments for implementing the regulation was that an enhanced gender balance on corporate boards would positively affect company profitability. However, in previous research there has been no consensus on the relationship between firm financial performance and gender diversity on company boards. (Storvik and Teigen, 2010).

In our thesis we investigate the financial effects of introducing a gender quota requirement for company boards by studying the implementation of the Norwegian gender quota law in December 2003 and its effects on Norwegian companies listed on the Oslo Børs. We apply two different methodologies in order to investigate the effects of the gender quota requirement. First, we execute a natural experiment, using the introduction of the Norwegian gender quota law, where the Norwegian firms represent the treatment group and Swedish firms listed on the Stockholm Stock Exchange represent the control group. In order to do this we perform a difference-in-difference estimation, investigating the effect of the gender quota law on four financial measures, including the profit margin, the return on equity, the return on assets and Tobin's q. We study these performance measures during the time period of 2001 to 2006, which represents three years before and three years after the implementation of the gender quota requirement. Furthermore, we include observations for the years 2007 till 2009 in order to investigate whether there are any lagged effects related to the introduction. Second, we perform an event study on two different event dates in order to investigate the market's immediate reaction to the introduction of the gender quota law. The first event date that we study is the 22nd of February 2002, when the public first heard about the

gender quota regulation and the second event date is December 19th 2003 when the law was formally included into Norwegian corporate law.

Several studies have been undertaken within the field of gender diversity and its effects on firm value and performance, but with varying results and conclusions. Previous research indicates that the effects of gender quota requirements are not clear or cohesive. A common problem in performing studies on the relationship between board composition and firm value is the issue of causality and the endogeneity problem. As mentioned by Ahern and Dittmar (2009) a major challenge in examining this relationship is to determine whether a certain board characteristic affects the value or if it is the value that impacts the characteristic. By performing a difference-in-difference estimation we try to overcome the endogeneity problem as much as possible in order to obtain more accurate results. We argue that, since the regulation imposed in Norway represents an exogenous event that altered the environment for the Norwegian firms, the endogeneity problem affects our results to a lesser extent. Furthermore, we do not believe there to be a problem of reverse causality that could bias our results since studying the trends of the average financial measures do not indicate any changes in connection with the introduction.

In examining the financial effects of the Norwegian gender quota requirement we aim at answering the question of whether gender diversity on company boards actually affects firm performance and value. We believe that there are several possible scenarios of how these measures will be affected by the introduction of the gender quota law. On the one hand, we argue that if the composition of the board has an impact on firm performance, the shareholders will want to elect a board that maximizes firm value. In introducing a binding legal constraint that affects the composition of the board we believe that the Norwegian companies could decrease in value as the firms comply. This is supported by findings made by Ahern and Dittmar (2009), indicating that the constraint imposed by the regulation resulted in a significantly negative impact on firm value. However, they argue that the negative impact on firm value was caused by the board members' younger age and lack of high level work experience and not by their sex. On the other hand, we believe that there might be a possible positive effect on firm financial measures as a result of the gender quota law in the case that board diversity contributes to a more open-minded debate as well as further knowledge and experience in the board room. In previous research, Erhardt, Werbel and Schrader (2003) and, Carter, Simkins and Simpson (2003) find that board diversity has positive effects on firm performance and firm value respectively. Lastly, there is also a possibility of the gender quota law having no significant effects on firm performance and value. We argue that this lack of significant results could be due to lagged effects in the measures, as it might take a considerable amount of time for the boards' decisions to show in the financial figures. Another explanation is that the gender quota requirement will not affect firm performance or value to a large extent since there is not a great difference between male and female board membership. Rose (2007) and, Roula and Stånge (2010) do not find any significant relationship between gender diversity on company boards and firm performance.

The first difference-in-difference regression results show that the Norwegian gender quota law has a statistically significant and positive effect on the profit margin of Norwegian firms. However, this statistically significant result disappears when controlling for firm size. The effects on the return on equity, the return on assets and Tobin's q are not statistically significant. After controlling for all factors in our regressions none of the financial measures are significant and we are not able to present any statistically significant results. We believe that one explanation to these results could be that there exists a time lag between the new board members' contribution and the effect in the financial figures. In order to examine this theory, we created two lagged measures, one with an average measure for this year's results and the results for the two following years and one measure with the average of the next three years' results, to investigate if the law had any lagged effect on financial performance. Our results from these regressions do not lead to any statistically significant results and we can conclude that there are no clear effects of the gender quota regulation present after taking into account lagged effects.

In our event study, for the event date of the 22nd of February 2002, we find a statistically significant negative three day cumulative abnormal return for the Norwegian firms, indicating a negative reaction from the market in connection with the gender quota law. The results from the event date of the 19th of December 2003 do not indicate any clear direction in the abnormal return or the cumulative abnormal returns respectively. We find a statistically significant and positive abnormal return on the event date and a statistically significant and negative three day cumulative abnormal return. An explanation for these different abnormal and cumulative abnormal returns in December 2003 could be that the market already had incorporated the information into the market prices in February 2002, suggesting that the abnormal returns observed in 2003 are attributable to other, external circumstances. Another explanation for the fluctuations in abnormal and cumulative abnormal returns could be that the market participants were not certain of which effects the implementation of the gender quota regulation would actually have on firm value.

We believe that our study contributes to current research in the sense that we examine the relationship between gender diversity and firm value and performance through studying the introduction of the Norwegian gender quota law in new and different ways. We perform a difference-in-difference estimation with Swedish firms as control group in order to investigate the effects of the Norwegian gender quota law from a new perspective. Compared to the work made by Ahern and Dittmar (2009), who execute a difference-in-difference estimation by comparing Norwegian firms that have experienced a relatively high increase in the proportion of women on the boards with Norwegian firms that have experienced a relatively low or no increase, our study displays the result that the law has had on all Norwegian firms combined. Furthermore, in performing the event study we have used industry indices as benchmarks in order to compute the abnormal returns. In previous research, such as in the papers by Ahern and Dittmar (2009) and, Nygaard (2011), other methods have been used in order to calculate the abnormal returns. We believe that the use of industry indices will lead to our results being more accurate and will thus contribute

to existing research. Furthermore, we contribute to current research by investigating the market's reaction to the introduction of the gender quota law on the day of the formal inclusion, the 19th of December 2003. We include this event date in our study since we believe it to be interesting to investigate the market's reaction in connection to the actual introduction. We argue that the reaction communicates the investors' anticipations about the implications of the gender quota law.

Background

In October 1999 the Norwegian government, through the Ministry of Children and Family Affairs, undertook a major revision of the Gender Equality Act from 1978 and as part of that work it examined the possibility of further regulation of the gender composition on corporate boards (Storvik and Teigen, 2010). The Gender Equality Act already specified that a minimum of 40 percent of both genders should be present on boards and committees appointed by a public body, that is, by a government ministry (Norwegian government, 2003). The overhaul resulted in three proposals on extending the gender quota requirement to cover other company forms than strictly governmental; in partly government owned enterprises, in all corporate boards and in businesses listed on the Oslo Stock Exchange. The government proposed that both genders should be represented on the boards of all listed firms and that on boards with four or more members, each gender should represent at least 25 percent. (Norwegian government, 1999).

It was suggested, in July 2001, that the proposed extension of the gender quota regulation should be part of the Company's Act rather than the Gender Equality Act and that the quota requirement should be increased to 40 percent from 25 percent (Storvik and Teigen, 2010). On February 22nd 2002 Verdens Gang[4] published an interview with then minister for Trade and Industry, Ansgar Gabrielsen (Verdens Gang, 2002), with the title "Sick and Tired of the Old Men's Club!" (Toomey, 2008). In the article Gabrielsen called for improvement of the gender equality on corporate boards, where he stated that if no significant changes were made, the government would have no other choice than to amend a gender quota requirement to the Company's Act (Verdens Gang, 2002). Gabrielsen made this public announcement without the knowledge or support of his own party or the rest of the Parliament, creating a great debate in the Parliament, the business community and the public (Sidea, 2010).

On March 8th 2002, the Norwegian government launched a campaign in order to get more women on company boards and announced that it would continue to work towards a proposal to ensure that at least 40 percent of the board members of public limited companies were women (Norwegian government, 2002). In association with the gender quota requirement proposal the government and the business community initiated several programs with the aim of increasing the number of women eligible for board membership. These programs both educated women and made it easier for companies to find competent women with the help of databases. (Storvik and Teigen, 2010).

[4] Norway's biggest-selling daily newspaper (Nationalencyklopedin, 2011)

A law proposal stating that government owned and public limited companies, ASA-companies, should have at least 40 percent[5] of each gender represented on corporate boards, was promoted to the council on the 13th of June 2003. On the 27th of November 2003 the proposal was passed in Odelstinget[6], on the 9th of December it was passed in Lagtinget[7] and on the 19th of December 2003 the new law was formally included into Norwegian corporate law as an amendment to the Public Limited Companies Act. (Stortinget, 2003). The gender quota requirement came into force on January 1st 2004 for state-owned and inter-municipal companies with a transitional period of two years. The law affecting public limited companies was enforced on January 1st 2006, also with a transitional period of two years. Companies registered after January 1st 2006 had to fulfill the gender quota requirements to be registered. The rules applying to privately owned public limited companies was under a voluntary compliance deadline, that is, if the desired gender representation was achieved voluntarily by the 1st of July 2005 the law would not be mandated. On the 1st of July 2005 only 68 percent of privately owned public limited companies had complied with the gender quota requirement and 16 percent of the board members were women. (Norwegian government, 2003). On the 9th of December 2005 the government put the gender quota law into effect and added the sanction of forced liquidation for non-compliance (Nygaard, 2011).

In January 2008, 77 companies had not yet complied with the gender quota requirement. These companies were given four additional weeks to fulfill the quota requirement and by April 2008 all firms had managed to comply. None of the public limited companies were forced into liquidation. (Storvik and Teigen, 2010).

Since the law was introduced there has been a major change in the gender composition of corporate boards in Norway. In 2002, 6 percent of the directors were women and before that as little as 2-3 percent (Teigen, 2008), which is a major difference to the 39 percent achieved in February 2008 (Norwegian government, 2003). Even though the law has been successful in increasing board diversity, the gender hierarchy within boards still exists in that only 5 percent of corporate board chairmen are women (Storvik and Teigen, 2010).

Previous literature

There have been several papers written about board diversity and its effect on firm accounting measures and firm value but with different results and conclusions. Adams and Ferreira (2008) study American firms and find that directors in more gender diverse boards have better attendance records, put more effort into monitoring, their CEO turnover is more sensitive to stock performance and the directors receive more equity based compensation. However, they find that on average gender diversity reduces

[5] '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 but there are special requirements for employee representatives.' (Norwegian government, 2003).
[6] The Norwegian Parliament's lower chamber
[7] The Norwegian Parliament's upper chamber

firm value and that gender quotas for directors can reduce firm value in well-governed firms. Terjesen, Sealy and Singh (2009) argue that gender diversity on corporate boards contributes to more effective corporate governance. However, they state that research performed on the impact of female directors on firm level financial performance reports mixed results.

Erhardt, Werbel and Schrader (2003) investigate the effect of board diversity, represented by ethnicity and gender, on the return on assets and return on investment. They find that board diversity affects these measures positively. Carter, Simkins and Simpson (2003) perform a study on Fortune 500 firms in order to examine whether board diversity has an effect on firm value. By looking at the fraction of women and minorities on corporate boards they find a significant positive relationship between board diversity and firm value, as measured by Tobin's Q. Rose (2007) studies Danish listed companies and he does not find any significant relationship between female board representation and Tobin's Q, used as a measure for firm performance. He argues that this may be the result of a socialization process, where the board members with an unconventional background, females, adapt their actions to the conventional board members, males, which causes the potential performance effect not to materialize.

Haslam, Ryan, Kulich, Trojanowski and Atkins (2010) look at FTSE 100 companies and examine the effect of female board membership on both accounting and stock based performance measures. They find no significant relationship between women's presence on company boards and accounting measures, measured by return on assets and return on equity. However, they find a negative relationship between female board membership and stock performance as company boards without female members had a 37 percent valuation premium. Ahern and Dittmar (2009) study the Norwegian gender quota regulation and investigate whether board structure affects firm value. They find that the constraint imposed by the regulation resulted in a significantly negative impact on firm value. Moreover, they state that the average board size in Norwegian firms only increased slightly between the years 2001 and 2007, indicating that male directors have had to give room for female directors. However, they argue that the negative impact on firm value was caused by the board members' younger age and lack of high level work experience and not by their sex.

Roula and Stånge (2010) examine the relationship between board gender diversity and firm performance as well as risk taking. Studying the Norwegian gender quota law they find that the law had no effect on the performance, risk or cost of equity of the Norwegian companies. Nygaard (2011) also studies the Norwegian gender quota law. He uses the law to investigate in what way changes in corporate governance, due to forced increases in gender diversity, affect firm performance. By examining the cumulative abnormal returns at the time the government formalized the law with sanctions in July 2005, he finds positive and significant cumulative abnormal returns for companies with low information asymmetry.

Data and methodology

In order to extensively analyze the impact of the introduction of the Norwegian gender quota law in December 2003 on financial measures in Norwegian companies we have decided to use two different methodologies. First, we perform a difference-in-difference estimation with the purpose of studying the long-term effects on four financial measures over the time period 2001-2006. We also include observations for 2007 to 2009 in order to investigate lagged effects of the gender quota requirement. Second, we execute an event study, on two event dates, investigating the short-term effects on the abnormal returns of company stock in conjunction with the event dates. We argue that these two methodologies complement each other in the sense that they examine different effects of the gender quota law. The difference-in-difference estimation reveals the actual company results that are formally presented in the annual reports and available to everyone while the event study displays the market participants' expectations of the impact of the new law on company performance.

In conducting our study we look at Norwegian companies listed on the Oslo Børs, as we believe them to be representative of all firms subject under the Norwegian gender quota regulation. We argue that this is appropriate since all Norwegian companies listed on the Oslo Børs have to be publicly limited. This means that all Norwegian companies that are listed on the Oslo Børs are subject under the gender quota law. Therefore, we believe that these companies' reaction to the law is representative for the entire population. Furthermore, we have decided not to make any distinction between state-owned and publicly limited companies in our study. We argue that even though state-owned and publicly limited companies had to comply with the gender quota law at different points in time the law was formally introduced at the same time for both types of companies. Since we use the introduction date in December 2003 as reform date in our difference-in-difference estimation it is not important to make any distinction between state-owned and publicly limited firms. Moreover, in the event study we examine specified event dates in connection to the introduction where we believe the companies' specifications to be of no significant importance for our study.

Difference-in-difference estimation

Treatment group and control group

In the difference-in-difference estimation we study the time period 2001-2006, which represents three years prior to and three years after the introduction of the Norwegian gender quota law. In performing the estimation we use Norwegian firms listed on the Oslo Børs as treatment group and Swedish firms listed on the Stockholm Stock Exchange as control group. We believe Swedish firms to be an appropriate control group for Norwegian firms since Norway and Sweden in large share the same history and culture, the two countries were the same entity for many years, the languages are alike and the geographies are closely related. The fraction of female board members was also similar before the introduction of the gender quota law in Norway, at 6 percent in 2002 for both countries respectively (Andra AP-fonden (2005), Storvik and Teigen (2010)). However, there are some significant differences between the two

countries. The industry climate in Sweden, with a comprehensive engineering industry, is different to that in Norway, where a major part of the listed companies are operating within the oil and shipping sector. Moreover, Norway is more secluded than Sweden in that it is not a member of the European Union while Sweden is. Furthermore, the company composition on the Oslo Børs is quite different to that on the Stockholm Stock Exchange as a single company, Statoil, represents 25 percent of the total market capitalization of the Oslo Børs[8] whereas the distribution on the Stockholm Stock Exchange is more spread out. Conclusively, we believe Swedish firms to be an appropriate control group for Norwegian firms and we argue that the similarities are more and that they outweigh the differences.

The data

We have restricted our study to only include firms that have been listed on the respective exchanges during the whole time period and thus, we exclude firms that have been delisted or listed within this period. This means that we study the same firms over time and we are therefore able to compare the firms' reactions to the new regulation and to more easily isolate the effect of the law introduction. Information regarding which firms that were listed during the entire time period was collected from the NASDAQ OMX Nordic website (http://nordic.nasdaqomxtrader.com/newsstatistics/) for Swedish firms and from correspondence with Truls Evensen, product specialist statistics and mutual funds on the Oslo Børs, for Norwegian firms. We collected yearly data on listed firms for the complete time period, for the two exchanges respectively. Thereafter, we compared the firms listed in 2001 with the firms listed in 2006 on the respective exchanges, only keeping those firms present in both years, in order to obtain the set of firms that were listed during the entire time period.

We collected the accounting data from the Orbis Neo database on a yearly basis for the time period 2001-2009, denominated in SEK. The accounting data for the three years after the observation period, 2007-2009, is collected in order to be able to control for lagged effects. In the Orbis Neo database, the data for year t include companies with fiscal year ends through March 31st of year t+1. The accounting data comprises of the profit margin measure, the return on equity measure, the return on assets measure, the book value of equity[9] and the book value of assets[10] for each company and each year as well as total assets and number of employees in the year 2001.

The measures

The profit margin is examined, which is defined as a company's profit before tax divided by its operating revenue. The profit margin measures how much of a company's sales it actually keeps in its earnings. The measure gives us a good overview of how cost efficient the company is. We believe this measure to be interesting since it allows us to investigate the impact on profitability in relation to sales and thereby

[8] Statoil's market capitalization was approximately 442 billion NOK per December 31st 2010, whereas the market capitalization of the entire Oslo Børs was 1737 billion NOK for the corresponding period (Oslo Børs, 2011)
[9] Used for calculating the Tobin's q measure, as defined by the company's market value of assets divided by its book value of assets
[10] Used for calculating the Tobin's q measure, as defined by the company's market value of assets divided by its book value of assets

examine the income statement effects of the regulation. An increased profit margin indicates an increased profitability relative to the revenue generated within the company. This measure allows us to examine the company's profit in relation to the size of its revenue. A high profit margin indicates a large value for the investors for every unit of revenue generated by the company.

We study the return on equity, which is defined as profit before tax divided by total equity. This measure reveals a company's profitability by measuring how much profit it generates with the money the shareholders have invested. This measure displays the value the company is generating to its shareholders and reveals whether the management is growing the company's value at an acceptable rate. We argue that this measure is of interest in our study since we examine in which way a change in the gender composition on corporate boards affects a company's efficiency in generating profits from the capital invested by its shareholders. As the shareholders participate in selecting the members on the board it is in their interest to elect a board that maximizes their return. A high value on return on equity represents a profitable and efficient company that generates a good return on the capital invested by the company's shareholders.

The return on assets, which is defined as the company's profit before tax divided by its total assets, is studied. The measure describes the total return the company generates on its assets. Return on assets puts the company's income in proportion to the capital used in order to generate it. We believe this measure to be of interest since it provides an overview of how effectively the company is converting its capital to income. Furthermore, the measure displays the company's financial success in revealing whether the capital is allocated effectively within the company.

We analyze the Tobin's q measure, defined as the market value of the company's assets divided by the book value of the company's assets. The market value of the company's assets is calculated as the book value of assets minus the book value of equity plus the market value of equity. The data on the market value of equity is collected from Datastream and is denominated in the companies' local currencies. We convert the Norwegian market values of equity into SEK using the Reuters closing SEK/USD and NOK/USD spot exchange rates by first converting NOK into USD and then USD into SEK. A value of Tobin's q less than one suggests that the costs of replacing a company's assets are greater than the value of the company's stock, which implies that the stock is undervalued. Conversely, a Tobin's q value over one implies that a company's stock is more expensive than the replacement cost of its assets. A scenario where a company's stock is valued higher than its assets can be if the company has future growth opportunities or high value of non-monetary assets. We argue that the Tobin's q measure is interesting to examine since it measures the value that the company has above its assets as well as its future growth opportunities. By studying this measure we are able to investigate the company's ability to generate value and whether this ability has changed after the introduction of the gender quota law.

Conclusively, we believe that these four measures will give us an extensive overview of the impact of the gender quota law on financial measures in Norwegian companies. In order to comprehensively analyze the

effect on the four measures we use different control factors in the difference-in-difference estimation. These factors are further described below in the difference-in difference section, where we describe and discuss the specifications used.

Data issues

The raw data collected from the two stock exchanges, the Orbis Neo database and Datastream comprises of 2,571 observations. In order to "clean" the data set we exclude all observations with ISIN-codes other than NO or SE[11], so as to exclude foreign companies listed on the respective exchanges and thus only include Norwegian and Swedish companies in our sample. Thereafter, in order to avoid extreme outliers affecting our results, we perform the difference-in-difference estimation both with and without outliers. We define outliers as observations where the absolute value of the profit margin, the return of assets and return on equity exceed 100 respectively and observations where the absolute value of the Tobin's q measure surpasses 20. This results in 322, 7, 85 and 636 observations being excluded respectively for each measure. After excluding foreign companies from the respective exchanges and eliminating outliers we are left with 1,521 observations. The data set does not contain full information on all accounting measures in all time periods.

Pre-trends

Prior to performing the difference-in-difference estimation we study the control and treatment group respectively, examining the pre-trends present in the sample. The examination is executed in STATA, for each of the four measures respectively. We begin by constructing a variable corresponding to the average value of each measure for the control and treatment group respectively, for each year. Thereafter, we plot the average values in four separate graphs with the relevant measure on the vertical axis and time on the horizontal axis. When plotting both the average values for Norwegian firms and the average values for Swedish firms in the same graph we are able to study whether the two groups have similar pre-trends. It is essential that the pre-trends of the two groups are somewhat similar. Without similar pre-trends we are not able to successfully perform a difference-in-difference estimation since the study will show incorrect results. This leads us to not being able to make any valid statements about the significance of the difference-in-difference estimator.

Regressions

In performing the difference-in-difference estimation we use a step-by-step approach where we begin with a very simplistic specification and then gradually enhance it in order to provide a clear overview of the effects on the different financial measures. This approach allows us to increasingly control for time invariant, unobservable industry characteristics as well as time fixed effects in order to provide as clear an analysis as possible.

We measure the dependent variables in three different ways for each financial measure respectively. First, we use the financial measure of the current year. Second, we employ an average of the financial measure

[11] Companies that are not registered in Sweden or Norway respectively

of the current year, the following year and the third year. Third, we use an average of the financial measure of the following year, the third year and the fourth year. The specifications below are only given for the financial measure of the current year but the results are reported for each of the three measures in the result section as well as in the appendix.

In the first step, we begin by creating a country dummy[12] and a time dummy[13]. The country dummy takes on the value of 1 if a certain firm is Norwegian and the value of 0 otherwise. We have chosen to study the time period three years after and three years before the implementation of the quota law in December 2003. Therefore, the time dummy takes on the value of 1 if the year is 2004-2006 and the value of 0 if the year is 2001-2003. The relevant specification is then given by

$$y = \alpha_0 + \alpha_1 \times Norway + \alpha_2 \times after \times Norway + \alpha_3 \times after + \varepsilon \quad (1)$$

where $\propto_0$ represents the intercept for Swedish firms, $\propto_1$ estimates the additional intercept effect for Norwegian firms, $\propto_2$ is the difference-in-difference effect of the gender quota regulation and $\propto_3$ displays the additional effect of the time after the introduction. The dependent variable y is given by the different accounting measures; profit margin, return on equity, return on assets and Tobin's q respectively. The variable ε is an error term. The difference-in-difference estimate can be defined as

$$\alpha_2 = \left(\bar{y}_{Norwegian,after} - \bar{y}_{Norwegian,prior}\right) - \left(\bar{y}_{Swedish,after} - \bar{y}_{Swedish,prior}\right)$$

In the second step, we add year dummies to our specification in order to control for time specific effects. The year dummies are generated for each year respectively and take on the value of 1 for the current year and 0 otherwise. The specification can then be defined as

$$y = \alpha_0 + \alpha_1 \times Norway + \alpha_2 \times after \times Norway + Y + \varepsilon \quad (2)$$

where the variable Y represents the year dummies.

In the third step we improve on our specification even more by adding industry specific effects. We use four figure NACE[14] codes, a pan-European classification system that groups organizations according to their business activities, as proxy. The industry classification data is collected from the Orbis Neo database and comprises of number specifications, where each industry is assigned a different number combination. In our dataset we have approximately 40 different industry classifications. The relevant specification is then given as

$$y = \alpha_0 + \alpha_1 \times Norway + \alpha_2 \times after \times Norway + Y + I + \varepsilon \quad (3)$$

where I denotes the industry specific effects.

[12] "Norway"
[13] "after"
[14] Nomenclature génerale des Activités économiques dans les Communautés Européennes

In the fourth step we add a size variable in order to control for effects due to differences in size between the companies. We use total assets in the year 2001 for each company as a proxy for size. We chose to use a fixed measure for the total assets variable since we wanted to ascertain that the change in total assets after the introduction of the quota would not be captured by this measure. The data is collected from the Orbis Neo database and is denominated in SEK. The specification is then given as

$$y = \alpha_0 + \alpha_1 \times Norway + \alpha_2 \times after \times Norway + Y + I + S + \varepsilon \quad (4)$$

where S represents the size variable.

In the fifth and final step we add a variable that takes into account the number of employees in the year 2001. We use this variable as a further proxy for company size. We have used a fixed measure for the number of employees for the same reason as when adding the total assets variable. The employee figures are collected from the Orbis Neo database. The final specification is then given as

$$y = \alpha_0 + \alpha_1 \times Norway + \alpha_2 \times after \times Norway + Y + I + S + E + \varepsilon \quad (5)$$

where E represents number of employees.

Event study

Assumptions

In order to be able to perform the event study we have to make some critical assumptions as argued by McWilliams and Siegel (1997). First, we assume that the efficient market hypothesis holds. This means that the information made public on the event date is new information to the market and that the information is immediately incorporated into share prices. This assumption permits us to interpret the observed abnormal returns as a result of the event and reflecting the true value effect of the event. Even though the efficient market hypothesis has been widely criticized, we assume that most major capital markets are at least moderately efficient and that this should apply to the Norwegian stock market as well. Second, we assume that future event expectations are ex ante incorporated into market prices. This means that only unanticipated events result in major market reactions, that is, the observed abnormal returns only contain the unanticipated information part of a specific event. We argue that this assumption holds in the sense that the effects of the gender quota regulation were not included in the market prices prior to the event dates since the events themselves were unanticipated. Prior to the two event dates, the public could not have anticipated the actual implications of the introduction of the law. Third, if other new information is released or events occur simultaneously as or near the specific event, the observed abnormal returns cannot be attributed to a specific event. We do not believe this to be a problem in our event study since information released on the specified event dates has not lead to any confounding effects.

Event dates

In conducting the event study we examine two event dates, both representing an important occurrence in the process of implementing the Norwegian gender quota law.

First, we study February 22nd 2002, when Ansgar Gabrielsen, then minister for Trade and Industry, publicly announced that unless the fraction of female board members drastically increased, the government would amend a gender quota requirement to the Company's Act. Prior to this date the Norwegian public had not considered the inclusion of a gender quota law in corporate legislation (Sidea, 2010), therefore the information can be considered new and should immediately be incorporated into market prices according to the efficient market hypothesis. Since Gabrielsen made this statement without the knowledge of his own party or the rest of the government the information can also be seen as unanticipated. Furthermore, since no other major information was released during the same day we can assume that the observed abnormal returns are related to the event alone.

Second, we look at December 19th 2003, the date that the law was formally included into Norwegian corporate law as an amendment to the Public Limited Companies Act. Before this date the introduction of a gender quota regulation had only been verbalized and not formalized, and we believe that the actual inclusion of the law may be seen as new information at that point in time. We argue that the market participants may not have believed that the law was to be introduced until it was actually included into Norwegian corporate law and might therefore not have reacted until then. Moreover, we believe that the information can be seen as unanticipated since no action actually had been taken prior to this date. Additionally, the observed abnormal returns can be assumed to be related to the event alone since no other major information was released during that day.

Abnormal and cumulative abnormal returns

For each of the two event dates we examine the market's reaction to the gender quota reform by generating abnormal returns on and around the event dates, and two separate cumulative abnormal returns for the event window of the event date$\pm$1 day and the event date$\pm$3 days respectively for each stock[15]. We study the cumulative abnormal returns in order to be able to capture the information that may have been acquired prior to the official announcement as well as the market reactions after the closing of the market on the announcement date. The measures are defined as

$$AR_{i,\tau} = R_{i,\tau} - E\left(R_{i,\tau}\middle|X_{\tau}\right)$$

$$CAR_i(\tau_{-1}, \tau_1) = \sum_{\tau=\tau_{-1}}^{\tau_1} AR_{i,\tau}$$

[15] Some companies have several different stocks listed on exchanges, such as A and B stocks, we have chosen to look at all stocks listed for each company

$$CAR_i(\tau_{-3}, \tau_3) = \sum_{\tau=\tau_{-3}}^{\tau_3} AR_{i,\tau}$$

where $AR_{i\tau}$ is the abnormal return for stock i at time period τ, $R_{i\tau}$ is the actual return for stock i at time period τ and $E(R_{i\tau}|X_\tau)$ is the estimated return for stock i at time period τ given the benchmark return X_τ. $CAR_i(\tau_{-1}, \tau_1)$ is the cumulative abnormal return for stock i between time period τ_{-1} and τ_1, and $CAR_i(\tau_{-3}, \tau_3)$ is the cumulative abnormal return for stock i between time period τ_{-3} and τ_3.

We use daily stock price data for all Norwegian stocks listed on the Oslo Børs in order to generate the actual returns for all stocks. The daily stock price data is downloaded from Datastream and is defined as the official closing price of each trading day, adjusted for subsequent capital actions, and denominated in NOK.

We compute the actual returns as

$$R_{i,\tau} = \frac{P_{i,\tau}}{P_{i,\tau-1}} - 1$$

where $P_{i,t}$ is the stock price of firm i at time τ and $P_{i,\tau-1}$ is the stock price of firm i at time $\tau - 1$.

There are several ways in which one can estimate a stock's estimated, or expected return (MacKinlay, 1997). In our study, we use industry indices as benchmarks. We argue that this is appropriate since the event window in our study is sufficiently short to allow for the assumption that the individual stocks' returns in expectation have an alpha of 0 and a beta of 1. This means that the individual stocks' returns are the same as for their respective benchmarks, in expectation which is defined as

$$E(R_{i,\tau}|X_\tau) = R_{m,\tau}$$

As briefly mentioned above, we use different benchmark indices for each stock depending on which industry the respective companies belong to. The stocks are categorized into different industries according to their GICS [16] code. The GICS is an industry taxonomy developed by Morgan Stanley Capital International, MSCI, and Standard & Poor's, S&P. The GICS are structured in four levels; (1) 10 sectors, (2) 24 industry groups, (3) 68 industries and (4) 154 sub-industries. We download the six-digit GICS code for each stock from COMPUSTAT, which corresponds to the industry-level categorization and is the second-most specific industry classification available. The GICS is used as a basis for MSCI and S&P financial market indices, where each company is assigned to a sub-industry, a corresponding industry, industry group and sector according to the definition of its principal business activity. We therefore use the GICS in order to choose an appropriate MSCI benchmark index for each stock. However, we were not able to download the GICS codes for banks or financial institutions and we therefore used the MSCI

[16] Global Industry Classification Standard

benchmark we believed to be the most appropriate for these firms' stocks according to the industry they operate in. The indices that we use are all country world indices, ACWI, which include companies from the whole world. We believe that these indices appropriately reflect the benchmark returns in the respective industries. The relevant indices and their prices for the respective time periods are downloaded from Datastream and denominated in USD. We use the same formula as for the individual stocks in order to calculate the returns of the respective benchmark indices.

By deducting the benchmark returns from the actual returns respectively we are able to generate abnormal returns for each stock. We subsequently aggregate the abnormal returns into the two different cumulative abnormal returns for each stock for the given time period; the event date±1 day and the event date±3 days. In order to be able to aggregate the abnormal returns into cumulative abnormal returns we have to assume that there is not any clustering (MacKinlay, 1997). That is, that there is not any overlap in the event windows of the included securities. In our study this assumption is satisfied since all securities have the same event date, resulting in the problem of clustering to disappear. The absence of an overlap in the event windows combined with the assumption of the abnormal returns and cumulative abnormal returns being normally distributed suggest that the abnormal returns and the cumulative abnormal returns will be independent across securities, that is, the covariance terms will be zero.

Thereafter, we weigh the abnormal returns and the two different cumulative abnormal returns together respectively in order to get one measure for all stocks combined, that is, one measure for the entire Oslo Børs. In order to compute the abnormal return and the two cumulative abnormal returns for each event date we employ an equally-weighted approach. In the equally-weighted approach we assign each stock the weight of 1/n where n is the total amount of stocks. In order to calculate the abnormal return for each event date we sum the abnormal returns for each date respectively and then divide the sum by n. We are able to calculate the cumulative abnormal returns by summing the abnormal returns for the given time period and then dividing by n. When using an equally-weighted approach, all stocks will affect the combined measure by an equal amount; resulting in small stocks having an equal impact to large stocks.

Exchange rate effects and outliers

We apply two different approaches in handling the benchmark indices when calculating the abnormal returns and the two cumulative abnormal returns. In the first approach we perform the event study by deducting the USD denominated benchmark indices from the actual returns when calculating the abnormal returns and cumulative abnormal returns. This approach does not take into account any exchange rate effects. The second approach takes into account the exchange rate effects by converting the benchmark indices into NOK from USD. In order to do this we use the Reuter closing NOK/USD spot rate, downloaded on a daily basis from Datastream for the relevant time period.

Thereafter, we control for outliers in the abnormal returns and the two cumulative abnormal returns by eliminating the observations with absolute values exceeding 10 percent. In doing this, we exclude 14 stocks on February 22nd 2002 and 9 stocks on December 19th 2003.

We report the results from the event study in three steps; (1) without any adjustments being made, (2) adjusting for exchange rate effects and (3) adjusting for exchange rate effects and outliers.

Testing for statistical significance

In testing for statistical significance in our results we have used methods discussed by MacKinlay (1997).

We commence by setting the null hypothesis as the event having no impact on the behavior of returns, that is, that the abnormal returns are zero and thus the alternative hypothesis is that the event has an impact on the behavior of returns. Furthermore, we restate our assumption that the abnormal returns and the cumulative abnormal returns are normally distributed. Under the null hypothesis we are able to use the distributional assumption of the abnormal return and cumulative abnormal returns and its properties to draw inferences over any time period in the event window. Inferences about the abnormal return and the cumulative abnormal returns can therefore be drawn from using

$$\overline{AR}_{i,\tau} \sim N(0, \sigma^2(\overline{AR}_{i,\tau}))$$

$$\overline{CAR}_i(\tau_{-1}, \tau_1) \sim N(0, \sigma^2(\overline{CAR}_i(\tau_{-1}, \tau_1)))$$

$$\overline{CAR}_i(\tau_{-3}, \tau_3) \sim N(0, \sigma^2(\overline{CAR}_i(\tau_{-3}, \tau_3)))$$

Given the normal distributions of the abnormal return and the cumulative abnormal return, statistical tests of the null hypothesis can be undertaken. In order to be able to test the statistical significance of our results we have to calculate the variances of the different abnormal return measures respectively as

$$Var(\overline{AR}(\tau_0)) = \frac{1}{n^2}\sum_{i=1}^{N}(AR_i(\tau_0) - \overline{AR}(\tau_0))^2 \quad (1)$$

$$Var(\overline{CAR}(\tau_{-1}, \tau_1)) = \frac{1}{n^2}\sum_{i=1}^{N}(CAR_i(\tau_{-1}, \tau_1) - \overline{CAR}(\tau_{-1}, \tau_1))^2 \quad (2)$$

$$Var(\overline{CAR}(\tau_{-3}, \tau_3)) = \frac{1}{n^2}\sum_{i=1}^{N}(CAR_i(\tau_{-3}, \tau_3) - \overline{CAR}(\tau_{-3}, \tau_3))^2 \quad (3)$$

where (τ_0) is the event date, (τ_{-1}, τ_1) is the event date$\pm$1 day and (τ_{-3}, τ_3) is the event date$\pm$3 days. The variable n is the number of observations, that is, the total number of stocks observed. AR denotes the abnormal return whereas CAR stands for the cumulative abnormal return. $\overline{AR}$ is the average abnormal return whereas $\overline{CAR}$ is the average cumulative abnormal return. The two measures represent the mean of AR and CAR respectively and are calculated as AR/n and CAR/n. Equation (1) calculates the variance of the abnormal return on the event date, equation (2) calculates the variance of the cumulative abnormal return on the event date$\pm$1 day and equation (3) calculates the variance of the cumulative abnormal return on the event date$\pm$3 days. In order to be able to use equation (1)-(3) to calculate the variances we have to

assume that the event windows of the n securities do not overlap, so that we can set the covariance terms to zero. This assumption is fulfilled in our study since all observations have the same event date, as discussed above.

Testing for statistical significance is thereafter performed by testing the null hypothesis that the abnormal return and cumulative abnormal return measures are zero, that is, that the event has no impact on the behavior of returns. This is done by dividing the average abnormal return measures with the respective variances

$$\emptyset = \frac{\overline{AR}(\tau_0)}{Var(\overline{AR}(\tau_0))^{1/2}} \sim N(0,1) \quad (4)$$

$$\emptyset = \frac{\overline{CAR}(\tau_{-1},\tau_1)}{Var(\overline{CAR}(\tau_{-1},\tau_1))^{1/2}} \sim N(0,1) \quad (5)$$

$$\emptyset = \frac{\overline{CAR}(\tau_{-3},\tau_3)}{Var(\overline{CAR}(\tau_{-3},\tau_3))^{1/2}} \sim N(0,1) \quad (6)$$

where $\emptyset$ is the test statistic.

Results

Results difference-in-difference estimation

Pre-trends

In order for the difference-in-difference estimation to give accurate results the trends in the accounting measures for the treatment group and the control group must be similar for the time period before the introduction of the regulation. Differences in pre-trends between the control and treatment group can give misleading results that would make the difference-in-difference estimation incorrect. Therefore, we must be careful where eventual differences might occur, when analyzing our results.

In Figure 1 through Figure 12 in the appendix, the averages of the four financial measures are plotted respectively for both countries in order to get a good overview of the measures' trends over time. In Figure 1 through Figure 4 the dependent variable is defined as the financial measure of the current year. In Figure 5 through Figure 8 the dependent variable is defined as an average of the financial measure of the current year, following year and the third year. In Figure 9 through 12 the dependent variable is defined as an average of the following year, the third year and the fourth year.

In Figure 1 we can conclude that the overall trend of the profit margin looks somewhat similar between the two groups. In the year 2001 the Swedish firms have generally higher profit margins than the Norwegian firms but between the years 2002 and 2003 the profit margin increases to a greater extent for

the Norwegian firms. This difference in trends between 2002 and 2003 for the two countries must be taken into consideration since it might cause a bias in our results. The overall trend of the return on equity measure is displayed in Figure 2, where we can see that the Norwegian firms have consistently higher return on equity than the Swedish firms. Between the years 2001 and 2002 the return on equity is increasing slightly more for the Norwegian firms than for the Swedish firms but after 2002 the two trends look very similar. In Figure 3 we observe the overall trends of the return on assets measure, where the average return on assets for the Norwegian firms is higher than that of the Swedish firms. The return on assets for the two groups starts out similarly in 2001. Between the years 2001 and 2002 the trends are moving in somewhat different directions but after 2002 the trends of the two groups look rather similar. The overall trend of the Tobin's q measure is presented in Figure 4, where we can see that the Swedish firms have a consistently higher Tobin's q than the Norwegian firms. The trends look very similar between the two groups in the years 2001 to 2003.

In Figure 5 we observe the overall trends of the average three year profit margin starting in the current year and we are able to conclude that the trends look quite similar between the two groups. The profit margin of the Norwegian firms is consistently higher than that of the Swedish firms. The spread between the two groups increases somewhat between the years 2002 and 2003 as the profit margin of the Norwegian firms increase to a slightly greater extent than that of the Swedish firms. In looking at Figure 6 we can conclude that the average three year return on equity starting in the current year is constantly higher for the Norwegian firms than for the Swedish firms. Between the years 2001 and 2003 the trends of the two groups are very alike. The overall trend of the of the average three year return on assets starting in the current year is displayed in Figure 7, where we can see that the Norwegian firms have consistently higher return on assets than the Swedish firms. The pre-trends of the two groups look very similar. In Figure 8 we observe the trend of the average three year Tobin's q starting in the current year and we can conclude that the Swedish firms have constantly higher Tobin's q than the Norwegian firms. The pre-trends look very similar between the two groups.

In Figure 9 we observe the average three year profit margin starting in the following year and we are able to conclude that the Norwegian firms have consistently higher profit margin than the Swedish firms. Between the years 2001 and 2003 the trends for the two groups look very similar. In Figure 10 the average three year return on equity starting in the following year is displayed. Looking at the figure we can conclude that the return on equity of the Norwegian firms is consistently higher than that of the Swedish firms and that the trends of the two groups look similar between the years 2001 and 2002. Between the years 2002 and 2003 the return on equity of the Norwegian firms decreases slightly. The overall trend of the average three year return on assets starting in the following year is presented in Figure 11 where the return on assets is consistently higher for the Norwegian firms than the Swedish firms. We observe that the trends for the two groups are very similar during the entire period 2001 to 2003. Looking at Figure 12 where the average three year Tobin's q starting in the following year is presented we observe that the pre-

trends of the two groups are very similar. The Tobin's q of the Swedish firms is constantly higher than that of the Norwegian firms.

In looking at all figures we are able to conclude that the pre-trends between the two groups look rather similar for all measures which reduce the problem of biased results due to differences in trends before the gender quota regulation. However, the trends differ slightly between the two groups in Figure 1, for the profit margin of the current year, and in Figure 10, for the average three year return on equity starting in the following year, which could bias the results.

Graphical illustrations

Looking at Figure 1 through Figure 12 in the appendix we suspect there to be a lack of significant changes in the financial measures after the introduction of the gender quota requirement since we do not observe any clear deviation from the trends between the two groups after the introduction.

Regression results

We present the results of the difference-in-difference estimation in using the financial measure of the current year in Table 2 Panel A through Panel E. In Table 2 Panel A in the appendix we observe the results of the first difference-in-difference specification. We can see that there is a positive impact on the profit margin that is statistically significant on the five percent level. The other financial measures are negative and not statistically significant. When taking into account year dummies in Table 2 Panel B the profit margin coefficient is still positive at 6.30 and statistically significant at the five percent level. In Table 2 Panel C the results of adding industry fixed effects in the specification are presented. We observe that the coefficient of the profit margin measures 5.25 and that it is still statistically significant at the five percent level. The coefficients of the other three measures are small and not statistically significant. Looking at Table 2 Panel D, where we control for effects due to differences in size as defined by total assets in 2001 we find that no financial measure is statistically significant at the generally acceptable levels of significance. The results are similar when adding the number of employees in 2001 as an additional control variable for size effects.

After taking into account all control variables in our regression and performing the fifth specification we observe positive coefficients of the profit margin, the return on equity and the Tobin's q in Table 2 Panel E. However, none of the coefficients are statistically significant at the generally acceptable levels of significance with t-statistics ranging from 0.19 to 0.83. The coefficient of the return on assets is negative and not statistically significant with a t-statistic of -0.12.

Table 3 Panel A through Panel E displays the results of the difference-in-difference estimation in using the average three year financial measures, starting in the current year. In Table 3 Panel A we can see that none of the measures are statistically significant at the generally acceptable levels of significance. The coefficient of the profit margin and Tobin's q are positive whereas the coefficients of the return on equity and return on assets are negative. In Table 3 Panel B, where we have added year dummies to our

specification, we observe similar results. Adding industry fixed effects in Table 3 Panel C the coefficient of Tobin's q becomes negative but none of the financial measures are statistically significant. Looking at Table 3 Panel D and Panel E where we add total assets and number of employees respectively the results does not change substantially with none of the measures being statistically significant.

In taking into account all control variables in Table 3 Panel E we can conclude that the coefficient of the profit margin is positive and the coefficients of the return on equity, the return on assets and Tobin's q are negative. None of the coefficients are statistically significant at the generally acceptable levels of significance with t-statistics ranging from -1.10 to 0.02.

In Table 4 Panel A through Panel E the results of the difference-in-difference estimation using the average three year financial measures, starting in the following year is presented. In Table 4 Panel A we can see that the coefficients of the profit margin and Tobin's q are positive and the coefficients of the return on equity and the return on assets are negative. None of the coefficients are statistically significant. In Table 4 Panel B, where year dummies are added, the results are alike. Moving from Table 4 Panel B to Panel E more control variables are added but the results are still similar, with none of the financial measures being statistically significant.

Looking at Table 4 Panel E, where all control variables are accounted for, the coefficient of the profit margin is positive whereas the coefficients of the return on equity, the return on assets and Tobin's q are negative. None of the measures have statistically significant coefficients the generally acceptable levels of significance, with t-statistics ranging from -1.27 to 0.28.

Our regressions show similar results when removing outliers. We therefore believe the adjustments for outliers to be unnecessary for our analysis and choose to present the results for the complete data set.

Eventual biases

In performing the difference-in-difference estimation we chose to study firms that were listed on the respective exchanges during the entire time period 2001-2006. By excluding companies that were delisted during the sample period a survivorship bias could occur. However, since no companies were forced into liquidation by the introduction of the law, we argue that the bias caused by not including delisted firms has a minor effect on the results. In excluding delisted companies from our sample we might also give rise to a selection bias where firms that voluntarily chose to delist themselves as a result of the law have been excluded. We believe this bias to be of minor significance for the results since Nygaard (2011) finds no correlation between the decision to delist and the share of female directors for listed firms in Norway.

Furthermore, in 2005 both Norway and Sweden changed their accounting standards from local GAAP to IFRS (Deloitte, 2011), which could have an effect on our results. However, since both countries changed their standards at the same time and the change was introduced one year after the implementation of the gender quota law we believe this to have a negligible impact on our results. In comparing the trends of the

two countries in Figure 1 through Figure 12 we can conclude that they do not deviate notably between the years 2004 and 2005 for any of the financial measures. This indicates that the change in accounting standards had no significant impact on the financial measures and the overall trends between the two countries. Moreover, Ahern and Dittmar (2010) concludes that their results are not qualitatively changed when including firms using local GAAP prior to 2005 in their sample instead of only studying IFRS firms. Therefore, we argue that the change in accounting standards will not have a great effect on our results or cause any significant bias to them.

Sweden as control group

We use Swedish firms listed on the Stockholm Stock Exchange as control group in our difference-in-difference estimation. We argue that Swedish firms are appropriate to use as control group since Sweden and Norway share many characteristics; the two countries are geographically close and, they share the same history, culture and climate. As mentioned above, the percentage of female directors prior to the introduction of the gender quota regulation was similar in the two countries. However, there are some differences between the two countries, such as overall industry focus and company composition on the exchanges which could give rise to doubts regarding the appropriateness of Sweden as control group. Conclusively, we argue that the similarities between the two countries are more and outweigh the differences and thus we believe Sweden to be an appropriate control group.

Endogeneity

In examining a reform change such as the introduction of the gender quota law in Norway one must consider whether there exists an endogeneity problem that might bias the potential results. Endogeneity may be caused by measurement error, simultaneity and omitted variables (Wooldridge 2009). By performing a difference-in-difference estimation we attempt to minimize the potential endogeneity problem. We argue that, since the regulation imposed in Norway represents an exogenous event that altered the environment for the Norwegian firms, the endogeneity problem is reduced.

There is, however, still a risk for reverse causality being present. Reverse causality implies that for example, company performance may in fact be the reason for introducing the gender quota law in the first place. It might be so that the law was introduced in Norway as a result of Norwegian companies having experienced worsened financial performance in recent years and that the Norwegian government therefore decided to implement the quota requirement as a means to improve financial performance. If this is true, it would be misleading to consider changes in financial performance as an effect of the gender quota law since the opposite relationship holds. In studying Figure 1 through Figure 12 in the appendix we do not observe any deviations in the trends for any financial measure in comparing the Norwegian firms to the Swedish firms at the time of the introduction of the gender quota requirement. Therefore, we do not believe the reverse causality to be a problem of great importance or that it will bias our results.

Results event study

Results

Looking at Table 7 in the appendix we observe the abnormal returns and cumulative abnormal returns of the two event dates, February 22nd 2002 and December 19th 2003, gradually adjusting for exchange rate effects and outliers.

In observing the results from the event date of the 22nd of February 2002 not adjusting for exchange rate effects or outliers we see quite exceptional abnormal return and cumulative abnormal returns, ranging from -2.71 to -0.56 percent. In adjusting for exchange rate effects the abnormal return and cumulative abnormal returns are in the range from -2.43 to -0.20 percent. When taking into account exchange rate effects the abnormal return and the cumulative abnormal return ± 1 day increase slightly whereas the cumulative abnormal return ± 3 days decreases slightly. However, these results are affected by outliers that have extreme abnormal returns and cumulative abnormal returns. Looking at Table 5 we can see that, for example, Goodtech has a three day cumulative abnormal return of -51.90 percent, which will have a significant impact on our results. In adjusting for both exchange rate effects and outliers the range in which we observe the abnormal return and cumulative abnormal returns tightens, ranging from -1.40 to 0.12 percent. After taking into account both exchange rate effects and outliers all measures increase slightly compared to when not making any adjustments at all.

Studying the results from the event date of the 19th of December 2003, not adjusting for exchange rate effects or outliers we observe the abnormal return and cumulative abnormal returns in the range from -0.87 to 1.22 percent. After controlling for exchange rate effects the abnormal return and cumulative abnormal returns are ranging from -0.92 to 1.06 percent. In taking into account exchange rate effects the abnormal return increases slightly whereas the cumulative abnormal return ± 1 day and the cumulative abnormal return ± 3 days decrease slightly. When adjusting for both exchange rate effects and outliers, the abnormal returns and cumulative abnormal returns range from -1.01 to 0.77 percent. In taking into account both exchange rate effects and outliers the abnormal return and cumulative abnormal return measures decrease slightly compared to when not making any adjustments at all.

In Table 8 the results of the statistical significance testing of the abnormal return and cumulative abnormal returns is presented. On the event date of the 22nd of February 2002 we find that the cumulative abnormal return ± 1 day is negative and statistically significant on the 0.1 percent level, regardless of which adjustments are made. For the event date of the 19th December 2003 the abnormal return and the cumulative abnormal return ± 1 day are statistically significant in adjusting for both exchange rate effects and outliers at the 0.1 percent level and the 1 percent level respectively. However, the abnormal return is positive whereas the cumulative abnormal return ± 1 day is negative.

External factors influencing the share price

When studying market returns there is a risk that other factors specific to Norway or the Norwegian market could affect the returns on the event date. For example, if there are other major news released on or surrounding the event date it is difficult to determine whether the abnormal returns are attributable to the event or to other news released. Not being able to ascertain that the abnormal returns are a result of the specific event would bias our results. We have performed an extensive news search in conjunction with the event study and we have not been able to find any major news being released on or surrounding the event dates that would bias our results. Therefore, we do not believe there to be any such bias affecting our results.

Moreover, we have assumed that the information released on the event date is new information to the market and that this information immediately is incorporated into the share prices. If some investors had insider information or knowledge regarding the implementation of the gender quota law and its effects before the event dates, or if there was a time lag for the investors to include the effects in their valuation, the results of our event study would not take into account the market's reaction in total. In the event study section above we have argued that the information released on the respective event dates can be considered as new and that the efficient market hypothesis should hold to some extent. Therefore, we do not believe that these assumptions will cause any considerable bias in our results. Furthermore, we have included cumulative abnormal returns in the event study in order to capture pre-mature reactions or lags in the market's reaction surrounding the event dates. Consequently, we do not believe that these factors will cause any bias in our results.

Inferences with event-date uncertainty

There is always some uncertainty regarding the "correctness" of the event date itself. For example, in the case that the market has been informed prior to the announcement date, the prior date is the actual event date and should be used in the event study. Since we are examining abnormal return as well as cumulative abnormal returns ± 1 day and ± 3 days we are able to circumvent this problem to some degree. By studying cumulative abnormal returns we are expanding the event window and reducing the risk to miss reactions that are related to the event. However, there are consequences related to this expansion as well, such as decreasing the certainty of the abnormal returns being attributable to the event alone.

Sample discussion

The daily stock price and market value for some companies were not possible to find neither in Datastream nor on the Oslo Børs since the companies have been privatized, acquired or left the market in some other way. This could cause a selection bias in our results since we only study the companies that still exist in the databases today. However, since we study abnormal returns during a time period of only one week we do not believe that the fact that we are only examining companies with available share prices will have a major impact on our results. Moreover, we argue that our sample consists of a sufficient number of observations that will allow us to observe a possible market reaction.

We use daily stock prices in the event study, which is the most frequent data we find useable for our analysis. Less frequent data would not isolate the returns on the specific event day and thereby include other "noise", in the form of other market events. It might be possible to use data with intervals shorter than one day to isolate the effect further. However, it would be problematic to find the price and the exact hour that the market received the information and choose to trade on it. The event study would then not be able to take into account lagged market reactions, which could have a significant impact on the results.

Moreover, we have chosen an event window up to seven days. The event window could be extended further since there might be a risk of omitting late reactions to the event. There is also a risk when extending the event window since other market events will be included in the returns causing more "noise" in the abnormal returns. We believe an event window of seven days to be sufficiently long for the market to take the new information into account without causing uncertainty to the validity of the results.

Benchmark indices

In computing abnormal returns the estimated return of a stock is subtracted from its actual return. There are numerous approaches to computing the estimated return (MacKinlay, 1997). In our event study we have chosen to use MSCI industry indices as benchmark indices, where we argue that the event window is sufficiently short to allow for the assumption that the individual stocks' returns have an alpha of zero and a beta of 1 in expectation. In using benchmarks to compute estimated return, no benchmark can be said to be completely correct since we cannot adjust for firm specific effects. However, we believe that the MSCI industry indices are good proxies since they reflect the return of companies operating in the same industry, taking into account industry specific effects.

Nonsynchronous trading

'The nontrading or nonsynchronous trading effect arises when prices, are taken to be recorded at time intervals of one length when in fact they are recorded at time intervals of other possibly irregular lengths' (MacKinlay, 1997 pp.35). In the event study we use daily stock prices in the form of official closing prices of each trading day, adjusted for subsequent capital actions. On stock exchanges trading is performed throughout the day and the closing stock prices will probably not occur at the same time every day. Since we implicitly assume that the time interval between two closing prices is of the same length every day we will give rise to a non-synchronous trading bias in the moments and co-moments of returns. However, this is a problem that is experienced by all event studies that use closing prices as daily prices. We do not believe this bias to have any major effects on our results since we have a relatively short event window, which means that there are not many time intervals that can vary in length as there would be with a longer event window.

Implications and conclusions

Difference-in-difference estimation

In looking at the regression results of the difference-in-difference estimation, we find a positive and statistically significant change in the profit margin of the Norwegian firms before adjusting for firm size in our regressions. The fact that the significance disappears when we add total assets to the regression indicates that the change in the profit margin is affected by firm size and is not explained by the regulation. The return on equity, the return on assets and the Tobin's q coefficients are not statistically significant in any regression. In performing the regressions with the lagged dependent variables we find that none of the financial measures' coefficients are statistically significant.

From studying the regression results we can conclude that there are no statistically significant changes in the financial measures for Norwegian firms after the introduction of the gender quota requirement. At the same time, the implementation of the gender quota law has lead to more women having, under a considerably short time period, entered the corporate boards of public limited companies in Norway, as seen in Figure 13. This indicates that even though the gender composition on corporate boards has changed considerably since the introduction of the gender quota law it has not had any significant impact on firm financial measures.

This result is in line with previous research from Rose (2007) and, Roula and Stånge (2010) who do not find any significant relationship between female board membership and firm performance. Haslam, Ryan, Kulich, Trojanowski and Atkins (2010) do not find any significant relationship between women's presence on company boards and accounting measures, measured by return on assets and return on equity.

We believe there to be several possible explanations to these results. First, we have to consider that even though the law was implemented in the end of 2003, the companies were given a significant time period to comply with the new requirement. Therefore, the financial implications of the gender quota law could be lagged and start to show at a later time than observed in this study. As seen in Figure 13, the gender quota regulation has contributed to an increase in female board membership that stretches over a time period longer than one year, which makes the results a bit smoothed.

Second, we argue that it will probably take quite some time for the new board members to actually affect the firms' operations and for their performance to show in the companies' financial figures. The decision-making on corporate boards often involves considering the companies' performance and competitive situation over long periods of time, indicating that the financial implications of the decisions made in the board room will be seen several years after the actual decisions are made. However, we tested for three year lagged effects in our regressions but we were still not able to find that the Norwegian gender quota law had any effect on the Norwegian companies' financial measures, which opposes the theory of lagged effects. A further possibility is to perform the difference-in-difference estimation in observing an even

longer time period, but in that case one could not be certain of whether the effects on the financial measures would be attributable to the introduction of the gender quota law.

Third, we believe that it is possible that there is not a great difference between female and male board member performance and their effect on firm financial performance. This does not necessarily indicate that the gender quota law is unnecessary to introduce since it might have other, non-financial effects on firms that are not studied in this thesis.

Fourth, the insignificant results could be due to the socialization process argued by Rose (2007), where the new female board members have adopted the same behavior as the old board members. As a result of this adoptive behavior the companies will not experience any changes in the work of corporate boards and therefore no significant changes will be shown in the financial measures.

Fifth, it might be the case that the supply of eligible women for corporate boards was significantly less than the demand. All Norwegian state-owned and publicly limited companies had to comply with the gender quota law on a relatively short time period. If there were not enough competent women in Norway at that time, directors that would not otherwise have been qualified might have been elected into the boards of Norwegian companies. Additionally, according to Ahern and Dittmar (2009) the average board size in Norwegian firms only increases slightly between the years 2001 and 2007, which indicates that male directors have had to give room for female directors. This would in turn result in the company boards consisting of less experienced members that are not able to affect the decision-making or the financial performance to as large extent as the old board members, indicating no change in board decisions.

Finally, one could discuss the actual significance and importance of the board's work for firm performance. Does the board really have a major impact on the performance of the firm or is it the CEO, shareholders or employees that have the largest impact?

Event study

In studying the results for the event date of the 22nd of February 2002 we observe a negative cumulative abnormal return with an event window of one day before and one day after the event date that is statistically significant, regardless of which adjustments are made. This means that the introduction of the gender quota law was followed by a negative market reaction, indicating a value decrease for the companies affected by the new regulation. These cumulative abnormal returns are rather big, reaching -2.71 percent without any adjustments, -2.43 percent adjusting for exchange rate effects and -1.40 percent when excluding outliers. This result is in line with the research by Ahern and Dittmar (2009) who obtained a mean three day cumulative abnormal return of -2.6 percent in performing an event study using the MSCI Norway Index as benchmark.

The results for the event date of the 19th of December 2003 show no clear direction for the market reactions to the gender quota requirement. With a positive and statistically significant abnormal return of

0.77 percent and a negative and statistically significant three day cumulative abnormal return of -1.01 percent when adjusting for outliers and exchange rate effects is confusing. Moreover, the significance is only present after making adjustments for exchange rate effects and outliers, indicating no clear significant reaction for the whole sample. The fact that the reactions are not coherent could be due to the fact that all information had already been taken into account on the first event date on February 22nd 2002 when the public first heard about the gender quota law. This will then leave out any effect on the 19th of December 2003 when the law was formally introduced, since the information already had been incorporated in market prices on February 22nd 2002. The different reactions could also be a result of the market not knowing what the effect of the quota would imply for the firms affected by the new regulation. Since Norway was the first country to introduce such a law, there were no previous examples to refer to.

Further research

When studying the effect of introducing a gender quota law for company boards we have chosen to look at Norway. Today Spain and Iceland have also introduced and France has committed to introduce a gender quota, and the discussion is taking place in more countries as well as in the European Union. This opens up the possibility to perform a more extensive study including more countries and thus expanding the sample. By performing a staggered introduction regression study, including all countries that have implemented a gender quota requirement, the findings could be more general and less country specific.

It would be possible to perform event studies in other countries that have implemented gender quota requirements in order to investigate their market reactions.

We have studied the effect of the Norwegian gender quota regulation on accounting measures and market values of Norwegian companies. Apart from these measures the quota might have other, non-monetary, effects that are not accounted for in this thesis but never the less are important to take into account when considering the overall effects of introducing a gender quota. These effects, such as employee and customer satisfaction, product and service quality and ethical issues might be interesting to investigate further.

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Appendix

Table 1 Panel A: Summary Statistics Difference in Difference Estimation Sample for Norway, the treatment group.

Norway	All mean/sd/ count	min/max	Post Law mean/sd/ count	min/max	Pre Law mean/sd/ count	min/max
Profit margin	10.21898 25.66092 677	-97.61 92	14.87468 23.52277 442	-83.6 92	1.462298 27.23119 235	-97.61 48.6
ROE	8.091327 51.62332 716	-442.23 530.52	15.5117 50.604 471	-442.23 530.52	-6.173959 50.65557 245	-245.41 102.78
ROA	2.941508 15.61281 723	-83.1 66.38	5.77519 13.22008 474	-49.24 66.38	-2.452731 18.21429 249	-83.1 44.3
Tobin's Q	1.491766 .8638887 417	.3963439 8.69155	1.581999 .8977804 276	.4983217 8.69155	1.315139 .7660831 141	.3963439 6.669517
Total Equity tsek	8840679 2.79e+07 417	-86970.01 2.44e+08	1.03e+07 3.21e+07 276	20340.99 2.44e+08	5886679 1.66e+07 141	-86970.01 9.11e+07
Total Assets tsek	2.28e+07 7.38e+07 427	53858.96 6.93e+08	2.55e+07 8.29e+07 286	57325.8 6.93e+08	1.74e+07 5.04e+07 141	53858.96 2.59e+08
Market cap tsek	1.57e+07 5.71e+07 537	5735.248 6.41e+08	1.92e+07 6.71e+07 357	43723.71 6.41e+08	8786325 2.76e+07 180	5735.248 1.77e+08
Year	2004.809 2.529537 764	2001 2009	2006.344 1.689664 494	2004 2009	2002 .8180128 270	2001 2003
Industry	4564.441 2149.62 764	321 8291	4568.302 2149.119 494	321 8291	4557.378 2154.509 270	321 8291
Assets 2001 tsek	2.23e+07 8.82e+07 663	25369.04 6.95e+08	- - -	- -	- - -	- -
Employees 2001	2623.73 6619.606 619	1 36867	- - -	- -	- - -	- -

Table 1 Panel B: Summary Statistics Difference in Difference Estimation Sample for Sweden, the control group

Sweden	All mean/sd/ count	min/max	Post Law mean/sd/ count	min/max	Pre Law mean/sd/ count	min/max
Profit margin	5.984097 24.44592 1572	-98.09 97.72	8.102195 24.43423 1075	-98.09 97.72	1.402696 23.85982 497	-95.14 96.38
ROE	-.4345245 64.75357 1724	-905.33 370.24	7.569337 50.4862 1162	-640.24 370.24	-16.98343 84.82976 562	-905.33 124.91
ROA	.866258 19.85021 1713	-97.02 62.06	3.697682 16.96414 1156	-90.24 54.38	-5.01009 23.75273 557	-97.02 62.06
Tobin's Q	2.072665 3.12619 1324	.4012343 48.46058	2.13039 2.940703 896	.4012343 45.47028	1.95182 3.483252 428	.4963675 48.46058
Total Equity tsek	6451700 1.84e+07 1347	-74027 1.59e+08	7209361 2.02e+07 909	-74027 1.59e+08	4879295 1.36e+07 438	-12578 1.12e+08
Total Assets tsek	2.00e+07 1.15e+08 1369	6571 2.51e+09	2.37e+07 1.38e+08 925	8538 2.51e+09	1.23e+07 3.41e+07 444	6571 2.61e+08
Market cap tsek	1.58e+07 4.40e+07 1447	10100 4.61e+08	1.78e+07 4.79e+07 966	14030 4.46e+08	1.17e+07 3.47e+07 481	10100 4.61e+08
Year	2004.884 2.549574 1807	2001 2009	2006.405 1.695283 1183	2004 2009	2002 .8171516 624	2001 2003
Industry	4694.727 2115.664 1798	729 9329	4685.206 2118.351 1177	729 9329	4712.773 2112.148 621	729 9329
Assets 2001 tsek	4.33e+07 2.22e+08 1514	18276 2.23e+09	- - -	- -	- - -	- -
Employees 2001	6278.3 20408.83 1451	4 207799	- - -	- -	- - -	- -

For Figures 1-12 below, the yearly data is presented for fiscal year ends each year and include companies with fiscal year ends through March 31st of year t+1.

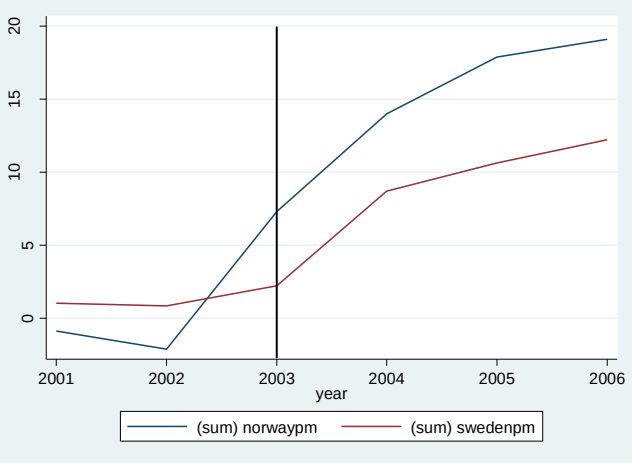

Figure 1: Average profit margin for Norwegian and Swedish firms

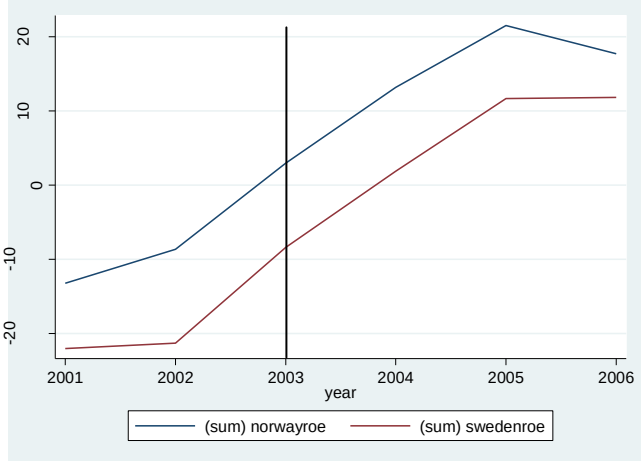

Figure 2: Average return on equity for Norwegian and Swedish firms

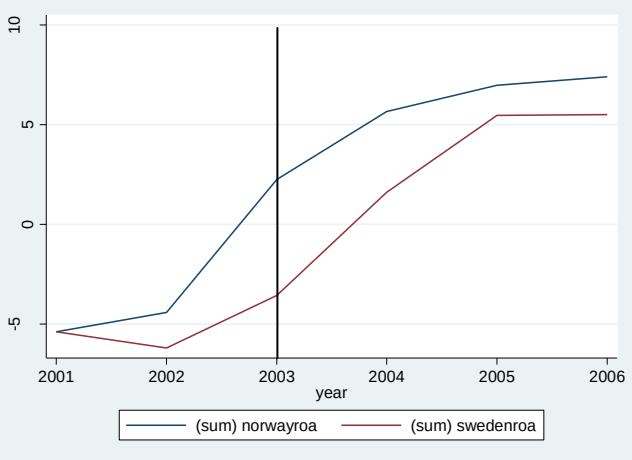

Figure 3: Average return on assets for Norwegian and Swedish firms

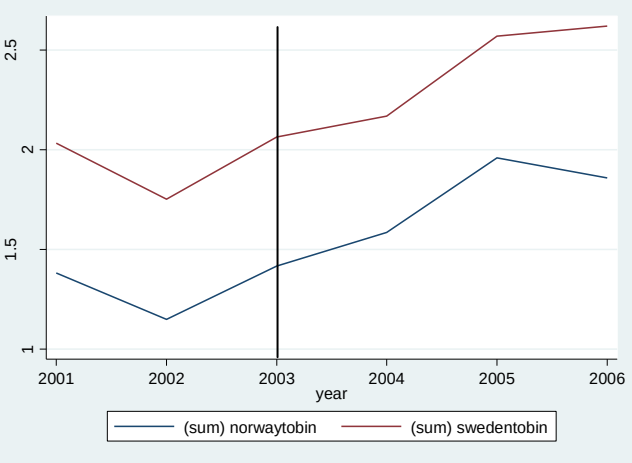

Figure 4: Average Tobin's Q for Norwegian and Swedish firms

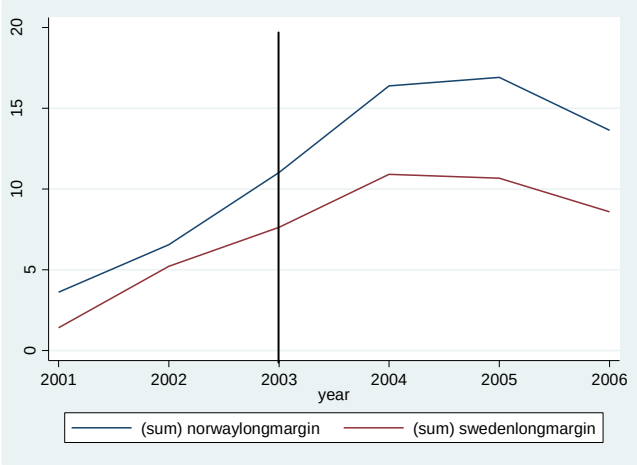

Figure 5: Three year average profit margin starting year t for Norwegian and Swedish firms

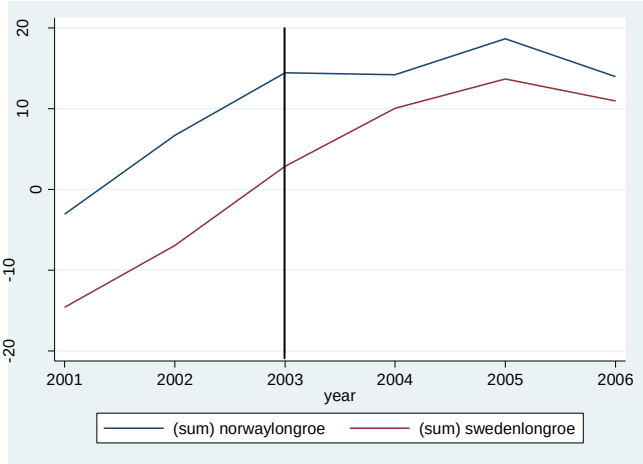

Figure 6: Three year average return on equity starting year t for Norwegian and Swedish firms

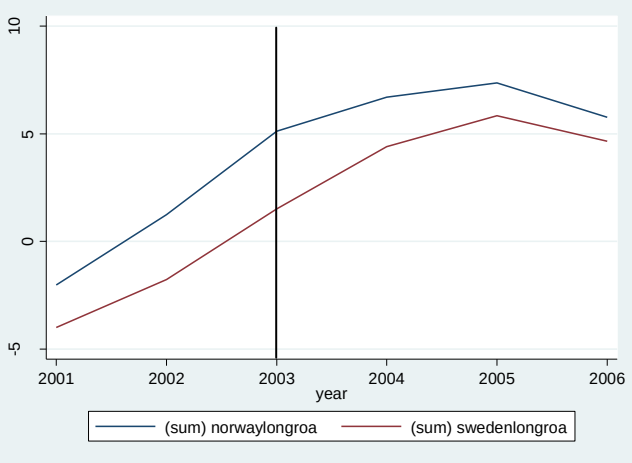

Figure 7: Three year average return on assets starting year t for Norwegian and Swedish firms

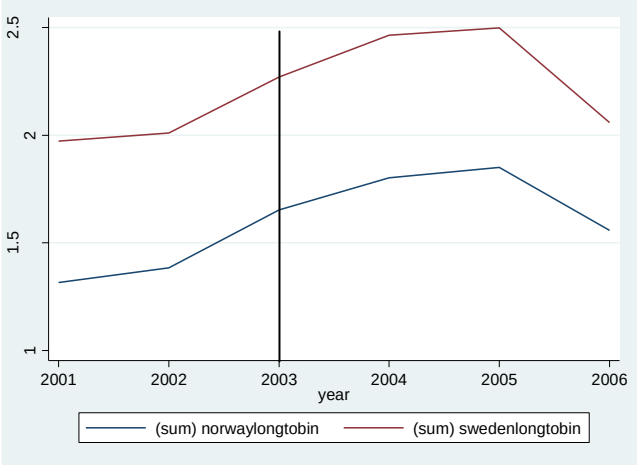

Figure 8: Three years average Tobin's q starting year t for Norwegian and Swedish firms

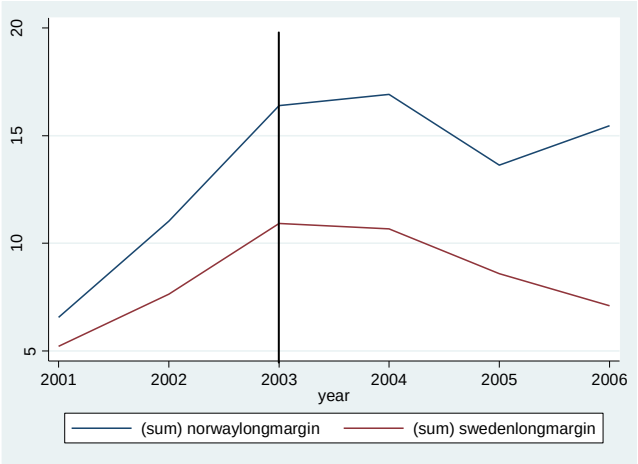

Figure 9: Three year average profit margin starting year t+1 for Norwegian and Swedish firms

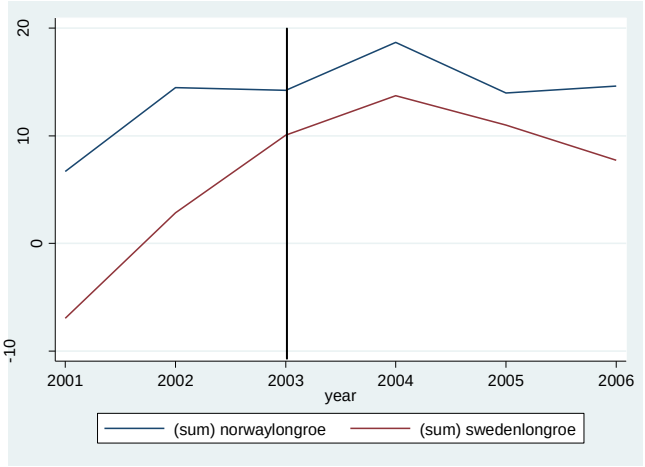

Figure 10: Three year average return on equity starting year t+1 for Norwegian and Swedish firms

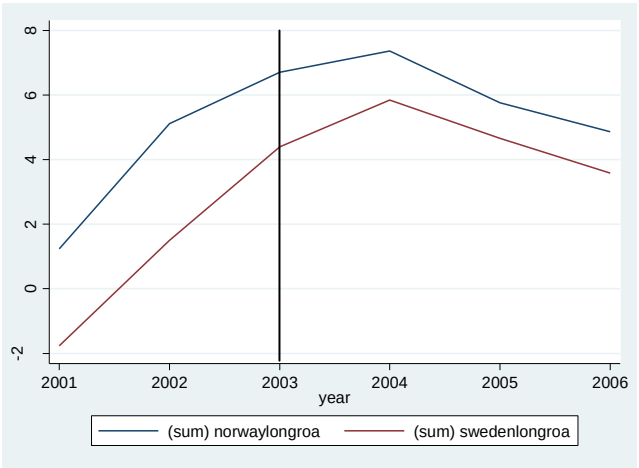

Figure 11: Three year average return on assets starting year t+1 for Norwegian and Swedish firms

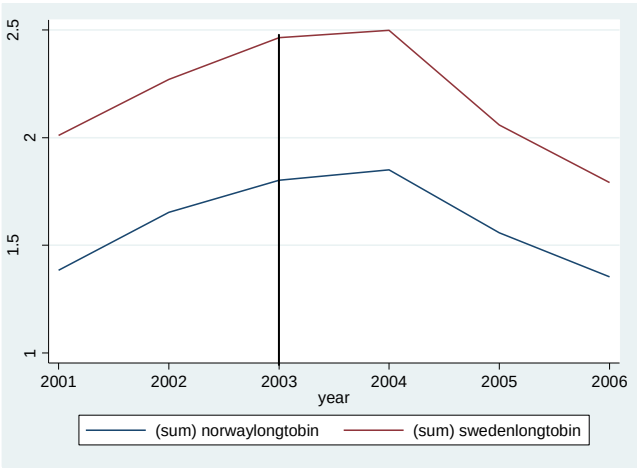

Figure 12: Three year average Tobin's q starting year t+1 for Norwegian and Swedish firms

Table 2 Panel A: Effect of the Norwegian gender quota regulation for different posts excluding year dummies.

	(1) Profit margin %	(2) ROE %	(1) ROA %	(4) Tobin's Q
after*Norway	6.347* (2.22)	-2.004 (-0.31)	-0.155 (-0.08)	-0.016 (-0.10)
Year dummies	No	No	No	No
r^2	0.0566	0.0426	0.0577	0.0142
N	1533	1674	1672	1168

Table 2 Panel B: Effect of the Norwegian gender quota regulation for different posts including year dummies.

	(1) Profit margin %	(2) ROE %	(3) ROA %	(4) Tobin's Q
after*Norway	6.298* (2.20)	-2.148 (-0.33)	-0.206 (-0.11)	-0.016 (-0.10)
Year dummies	Yes	Yes	Yes	Yes
r^2	0.0613	0.0497	0.0647	0.0170
N	1533	1674	1672	1168

Table 2 Panel C: Effect of the Norwegian gender quota regulation for different posts including year dummies and industry fixed effects.

	(1) Profit margin %	(2) ROE %	(3) ROA %	(4) Tobin's Q
after*Norway	5.248* (1.99)	-1.168 (-0.18)	0.112 (0.06)	-0.040 (-0.25)
Year dummies	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
r^2	0.0839	0.0531	0.0830	0.0168
N	1533	1674	1672	1168

Table 2 Panel D: Effect of the Norwegian gender quota regulation for different posts adjusting for total assets including year dummies and industry fixed effects.

	(1) Profit margin %	(2) ROE %	(3) ROA %	(3) Tobin's Q
after*Norway	5.479 (1.82)	0.827 (0.11)	-0.046 (-0.02)	-0.027 (-0.18)
Year dummies	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
r^2	0.0932	0.0512	0.0811	0.0165
N	1339	1469	1471	1104

Table 2 Panel E: Effect of the Norwegian gender quota regulation for different posts adjusting for total assets and number of employees including year dummies and industry fixed effects.

	(1) Profit margin %	(2) ROE %	(3) ROA %	(4) Tobin's Q
after*Norway	1.982 (0.83)	4.247 (0.58)	-0.247 (-0.12)	0.032 (0.19)
Year dummies	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
r^2	0.1023	0.0818	0.1076	0.0135
N	1223	1337	1338	1007

t statistics in parentheses. $^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

These tables reports coefficient estimates of different effects of the new quota regulation. The dependent variable is the different posts: Profit margin, ROE, ROA and Tobin's Q. The columns report results from the specification $y = \alpha_0 + \alpha_1 Norway + \alpha_2 after \times Norway + X + \varepsilon$ where the y variable is the different measures in columns (1)-(4), $Norway$ is a dummy variable that takes the value of one if it is a Norwegian firm and zero otherwise and, $after$ is a dummy variable that takes the value of one if the time period is after the new regulation and zero otherwise. X represents additional control factors, which vary depending on which panel is presented. The results in Panel E includes year and industry fixed effects as well as controls for total assets in year 2001 and number of employees in 2001. ε is the error term.

Table 3 Panel A: Effect of the Norwegian gender quota regulation for different posts defined by a three year average starting year t.

	(1) Profit margin %	(2) ROE %	(1) ROA %	(4) Tobin's Q
after*Norway	3.421 (1.62)	-8.098 (-1.70)	-1.127 (-0.67)	0.036 (0.20)
Year dummies	No	No	No	No
r^2	0.0391	0.0402	0.0427	0.0106
N	1405	1591	1602	1148

Table 3 Panel B: Effect of the Norwegian gender quota regulation for different posts defined by a three year average starting year t, including year dummies.

	(1) Profit margin %	(2) ROE %	(3) ROA %	(4) Tobin's Q
after*Norway	3.241 (1.52)	-8.255 (-1.71)	-1.234 (-0.74)	0.029 (0.16)
Year dummies	Yes	Yes	Yes	Yes
r^2	0.0512	0.0546	0.0563	0.0137
N	1405	1591	1602	1148

Table 3 Panel C: Effect of the Norwegian gender quota regulation for different posts defined by a three year average starting year t, including year dummies and industry fixed effects.

	(1) Profit margin %	(2) ROE %	(3) ROA %	(4) Tobin's Q
after*Norway	1.458 (0.75)	-7.634 (-1.71)	-1.131 (-0.69)	-0.065 (-0.51)
Year dummies	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
r^2	0.0766	0.0638	0.0831	0.0121
N	1405	1591	1602	1148

Table 3 Panel D: Effect of the Norwegian gender quota regulation for different posts defined by a three year average starting year t, adjusting for total assets including year dummies and industry fixed effects.

	(1) Profit margin %	(2) ROE %	(3) ROA %	(3) Tobin's Q
after*Norway	1.508 (0.73)	-5.858 (-1.19)	-0.907 (-0.55)	-0.077 (-0.60)
Year dummies	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
r^2	0.1043	0.0626	0.0862	0.0134
N	1244	1412	1427	1088

Table 3 Panel E: Effect of the Norwegian gender quota regulation for different posts defined by a three year average starting year t, adjusting for total assets and number of employees including year dummies and industry fixed effects.

	(1) Profit margin %	(2) ROE %	(3) ROA %	(4) Tobin's Q
after*Norway	0.027 (0.02)	-3.259 (-0.66)	-1.600 (-1.10)	-0.057 (-0.39)
Year dummies	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
r^2	0.1280	0.1064	0.1218	0.0106
N	1143	1288	1299	991

t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

These tables reports coefficient estimates of different effects of the new quota regulation. The dependent variable is the three year average for this year, next year and the third year for the different posts: Profit margin, ROE, ROA and Tobin's Q. The columns report results from the specification $y = \alpha_0 + \alpha_1 Norway + \alpha_2 after \times Norway + X + \varepsilon$ where the y variable is the different measures in columns (1)-(4), $Norway$ is a dummy variable that takes the value of one if it is a Norwegian firm and zero otherwise and, $after$ is a dummy variable that takes the value of one if the time period is after the new regulation and zero otherwise. X represents additional control factors, which vary depending on which panel is presented. The results in Panel E includes year and industry fixed effects as well as controls for total assets in year 2001 and number of employees in 2001. ε is the error term.

Table 4 Panel A: Effect of the Norwegian gender quota regulation for different posts defined by a three year average starting year t+1.

	(1) Profit margin %	(2) ROE %	(1) ROA %	(4) Tobin's Q
after*Norway	3.106 (1.42)	-4.782 (-0.90)	-1.598 (-1.11)	0.113 (0.50)
Year dummies	No	No	No	No
r^2	0.0187	0.0172	0.0159	0.0086
N	1387	1569	1580	1156

Table 4 Panel B: Effect of the Norwegian gender quota regulation for different posts defined by a three year average starting year t+1, including year dummies.

	(1) Profit margin %	(2) ROE %	(3) ROA %	(4) Tobin's Q
after*Norway	2.940 (1.33)	-4.995 (-0.93)	-1.729 (-1.20)	0.107 (0.47)
Year dummies	Yes	Yes	Yes	Yes
r^2	0.0343	0.0305	0.0337	0.0164
N	1387	1569	1580	1156

Table 4 Panel C: Effect of the Norwegian gender quota regulation for different posts defined by a three year average starting year t+1, including year dummies and industry fixed effects.

	(1) Profit margin %	(2) ROE %	(3) ROA %	(4) Tobin's Q
after*Norway	0.967 (0.52)	-4.644 (-0.90)	-1.448 (-1.03)	-0.010 (-0.08)
Year dummies	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
r^2	0.0374	0.0341	0.0486	0.0144
N	1387	1569	1580	1156

Table 4 Panel D: Effect of the Norwegian gender quota regulation for different posts defined by a three year average starting year t+1, adjusting for total assets including year dummies and industry fixed effects.

	(1) Profit margin %	(2) ROE %	(3) ROA %	(3) Tobin's Q
after*Norway	1.598 (0.79)	-2.984 (-0.56)	-1.178 (-0.82)	-0.033 (-0.23)
Year dummies	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
r^2	0.0587	0.0316	0.0494	0.0155
N	1217	1379	1393	1082

Table 4 Panel E: Effect of the Norwegian gender quota regulation for different posts defined by a three year average starting year t+1, adjusting for total assets and number of employees including year dummies and industry fixed effects.

	(1) Profit margin %	(2) ROE %	(3) ROA %	(4) Tobin's Q
after*Norway	0.483 (0.28)	-2.703 (-0.55)	-1.527 (-1.27)	-0.050 (-0.32)
Year dummies	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
r^2	0.0838	0.0647	0.845	0.0124
N	1118	1255	1265	984

t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

These tables reports coefficient estimates of different effects of the new quota regulation. The dependent variable is the three year average for the following year, third year and fourth year for the different posts: Profit margin, ROE, ROA and Tobin's Q. The columns report results from the specification $y = \alpha_0 + \alpha_1 Norway + \alpha_2 after \times Norway + X + \varepsilon$ where the y variable is the different measures in columns (1)-(4), $Norway$ is a dummy variable that takes the value of one if it is a Norwegian firm and zero otherwise and, $after$ is a dummy variable that takes the value of one if the time period is after the new regulation and zero otherwise. X represents additional control factors, which vary depending on which panel is presented. The results in Panel E includes year and industry fixed effects as well as controls for total assets in year 2001 and number of employees in 2001. ε is the error term.

Table 5: Abnormal and cumulative abnormal returns for the event date 22nd of February 2002

SHARE	INDEX	AR	CAR±1	CAR±3
ABG SUNDAL CLI.HLDG.	BANKS	-3.82%	-1.27%	2.83%
ACTA HOLDING	FINANCIALS	0.24%	3.14%	13.14%
AF GRUPPEN 'A'	CON & ENG	0.10%	-1.00%	-0.75%
AKER BIOMARINE	BIOTEC	-0.32%	-0.34%	-10.42%
AKTIV KAPITAL	FINANCIALS	1.01%	-0.88%	0.26%
ARENDALS FOSSEKOMPANI	UTILITIES	-0.38%	7.30%	2.72%
ATEA	IT SERVICES	6.45%	3.79%	8.45%
AURSKOG SPAREBANK	BANKS	-0.17%	-1.82%	-0.01%
BELSHIPS	MARINE	-0.92%	-2.07%	-3.22%
BIONOR PHARMA	H/C PROV/SVS	4.70%	0.60%	-1.29%
BLOM	IT SERVICES	1.23%	-2.48%	-1.55%
BONHEUR	OIL,GAS&C.FUEL	-4.10%	-1.57%	-0.75%
BORGESTAD 'A'	REAL ESTATE	0.22%	1.20%	3.36%
BYGGMA	PAP/FOR PRD	-0.95%	-1.68%	-2.70%
DATA RESPONS	IT SERVICES	2.15%	2.46%	-1.15%
DNB NOR	BANKS	-1.08%	-1.56%	4.14%
DNO INTERNATIONAL	OIL,GAS&C.FUEL	-1.70%	-3.72%	-1.84%
DOF	EN EQ & SVS	-2.91%	-8.84%	-4.02%
DOMSTEIN	FD PRD	-0.94%	-1.20%	-0.23%
EDB ERGOGROUP	IT SERVICES	0.26%	-0.03%	0.77%
EITZEN MARITIME SERVICES	TRANSPT INF	0.18%	-1.30%	8.79%
EKORNES	HH DUR	0.87%	-6.59%	-2.41%
ELTEK	COMMS EQ	1.47%	1.77%	15.25%
FARSTAD SHIPPING	EN EQ & SVS	-2.54%	-7.29%	-0.32%
FRED OLSEN ENERGY	EN EQ & SVS	-1.71%	-6.85%	1.84%
GANGER ROLF	OIL,GAS&C.FUEL	-2.93%	-4.94%	-8.19%
GOODTECH	MACHINERY	-17.40%	-51.90%	-41.85%
GREEN REEFERS	MARINE	-7.59%	-8.74%	-2.74%
GYLDENDAL	MEDIA	-0.43%	-1.71%	-0.40%
HAFSLUND 'A'	ELEC UTIL	5.14%	2.43%	10.35%
HAFSLUND 'B'	ELEC UTIL	-0.42%	-0.43%	1.47%
HELGELAND SPAREBANK	BANKS	-0.17%	-1.82%	-11.29%
HEXAGON COMPOSITES	MACHINERY	-4.73%	3.54%	-8.99%
HOL SPAREBANK	BANKS	-0.17%	-1.82%	1.66%
HOLAND OG SETSKOG SPB.	BANKS	-0.17%	-1.82%	-0.01%
IGNIS	HH DUR	1.73%	-9.06%	-7.89%
IM SKAUGEN	OIL,GAS&C.FUEL	-1.70%	0.08%	2.90%
INDRE SOGN SPAREBANK	BANKS	-0.17%	-1.82%	1.69%
INMETA CRAYON	IT SERVICES	1.23%	2.34%	-9.56%
ITERA	IT SERVICES	1.23%	-1.33%	7.74%
KITRON	ELT/EQ/INS/CM	0.24%	-4.57%	3.80%
KOMPLETT	INT/CAT RTL	1.85%	-0.57%	8.70%
KONGSBERG GRUPPEN	AERO/DEFENSE	1.28%	5.18%	6.97%
KVERNELAND	MACHINERY	-3.53%	-2.65%	-2.71%

LEROY SEAFOOD GROUP	FD PRD	-0.37%	-5.17%	-11.05%
MARINE HARVEST	FD PRD	1.69%	-0.87%	2.80%
MELHUS SPAREBANK	BANKS	-13.62%	-12.95%	-14.10%
NES PRESTEGJELDS SPB.	BANKS	-0.17%	-6.82%	-0.41%
NORDIC SEMICONDUCTOR	S/CON EQ	0.16%	0.96%	19.18%
NORSE ENERGY CORP.	OIL,GAS&C.FUEL	0.79%	-3.66%	0.47%
NORSK HYDRO	MET & MIN	-0.42%	-1.19%	0.06%
NORSKE SKOGINDUSTRIER	PAP/FOR PRD	0.31%	0.22%	-0.47%
NORWEGIAN CAR CARRIERS	MARINE	-0.92%	-2.07%	-3.22%
ODFJELL 'A'	MARINE	-0.92%	-2.07%	-3.20%
ODFJELL 'B'	MARINE	-0.92%	-0.96%	-1.70%
OLAV THON EIEP.	REAL ESTATE	0.22%	2.32%	6.15%
ORKLA	INDS CONG	-0.98%	-2.55%	-2.03%
PETROLEUM GEO SERVICES	EN EQ & SVS	-1.58%	-6.30%	-6.29%
PETROLIA	EN EQ & SVS	-4.43%	-17.44%	-22.03%
PHOTOCURE	PHARM	-0.88%	-1.41%	-1.37%
PSI GROUP	ELT/EQ/INS/CM	0.24%	-19.41%	-73.27%
RIEBER & SON	FD PRD	-0.94%	-0.37%	-1.22%
ROCKSOURCE	OIL,GAS&C.FUEL	-1.70%	-17.90%	-17.49%
SANDNES SPAREBANK	BANKS	-0.17%	-2.57%	-0.72%
SCANA INDUSTRIER	MET & MIN	-13.90%	-11.36%	-1.30%
SCHIBSTED	MEDIA	-0.43%	-0.48%	2.62%
SINOCEANIC SHIPPING	EN EQ & SVS	2.58%	-4.56%	-19.51%
SKIENS AKTIEMOLLE	FINANCIALS	0.24%	-0.89%	0.64%
SOLSTAD OFFSHORE	EN EQ & SVS	-2.54%	-8.23%	-2.11%
SOLVANG	MARINE	-0.92%	-2.07%	-3.22%
SPAREBANK 1 NORD-NORGE	BANKS	0.97%	-0.97%	0.60%
SPAREBANK 1 SMN	BANKS	1.16%	-1.80%	4.04%
SPAREBANK 1 SR BANK	BANKS	-0.17%	-2.17%	1.72%
SPAREBANKEN MORE	BANKS	2.00%	0.45%	2.29%
SPAREBANKEN OST	BANKS	-0.17%	-1.82%	1.06%
SPAREBANKEN PLUSS	BANKS	-0.17%	-1.82%	-1.34%
SPAREBANKEN VEST	BANKS	-0.17%	-1.82%	-3.20%
SPB.1 BUSKR.VESTFOLD	BANKS	-3.29%	-4.94%	-3.13%
SPB.1 RINGERIKE HADELAND	BANKS	-0.17%	-1.82%	-0.01%
STATOIL	OIL,GAS&C.FUEL	0.78%	1.25%	1.58%
STOREBRAND	FINANCIALS	-0.76%	4.19%	7.55%
TELENOR	DIV T/CM SVS	0.62%	0.66%	1.93%
TGS-NOPEC GEOPHS.	EN EQ & SVS	-2.93%	-6.74%	-0.25%
TIDE	ROAD & RAIL	-0.15%	-2.99%	4.70%
TOMRA SYSTEMS	COML SVS/SUP	23.85%	18.50%	17.60%
TOTENS SPAREBANK	BANKS	-0.17%	1.53%	-1.93%
TTS GROUP	MACHINERY	2.41%	-0.94%	-0.69%
VEIDEKKE	CON & ENG	-2.48%	-3.58%	1.43%
WILHS.WILHELMSEN HDG.'A'	MARINE	-1.67%	-0.56%	1.89%
WILHS.WILHELMSEN HDG.'B'	MARINE	-0.92%	-2.07%	-2.45%

VOSS VEKSEL-OG LMDBK.	BANKS	-0.17%	-1.82%	-0.01%
NUMBER OF SHARES				**91**

Table 6: Abnormal and cumulative abnormal returns for the event date 19th of December 2003

SHARE	**INDEX**	**AR**	**CAR±1**	**CAR±3**
ABG SUNDAL CLI.HLDG.	BANKS	0.92%	-2.21%	1.27%
ACTA HOLDING	FINANCIALS	-2.09%	-2.54%	-7.86%
AF GRUPPEN 'A'	CON & ENG	1.84%	-5.33%	-4.14%
AKER BIOMARINE	BIOTEC	-1.37%	-3.85%	-6.18%
AKTIV KAPITAL	FINANCIALS	0.48%	3.45%	6.49%
APPTIX	IT SERVICES	-1.51%	-4.95%	-5.07%
ARENDALS FOSSEKOMPANI	UTILITIES	0.20%	0.88%	1.98%
ATEA	IT SERVICES	0.16%	-4.11%	-4.86%
AURSKOG SPAREBANK	BANKS	-0.18%	-1.15%	-2.04%
BELSHIPS	MARINE	1.04%	0.74%	3.70%
BIONOR PHARMA	H/C PROV/SVS	-14.17%	-15.66%	40.58%
BIRDSTEP TECHNOLOGY	SOFTWARE	-0.65%	-4.98%	-7.65%
BLOM	IT SERVICES	2.60%	-4.01%	3.28%
BONHEUR	OIL,GAS&C.FUEL	0.19%	2.66%	8.81%
BORGESTAD 'A'	REAL ESTATE	26.73%	26.39%	27.99%
BYGGMA	PAP/FOR PRD	-0.25%	-1.35%	-1.23%
DATA RESPONS	IT SERVICES	2.48%	1.81%	-0.02%
DNB NOR	BANKS	-0.39%	0.67%	-4.65%
DNO INTERNATIONAL	OIL,GAS&C.FUEL	-0.37%	-3.31%	-4.24%
DOF	EN EQ & SVS	1.20%	-3.03%	-3.46%
DOMSTEIN	FD PRD	-0.25%	1.02%	16.37%
EDB ERGOGROUP	IT SERVICES	0.65%	0.31%	2.15%
EITZEN MARITIME SERVICES	TRANSPT INF	-7.62%	-16.43%	-4.10%
EKORNES	HH DUR	0.25%	-1.19%	3.34%
ELTEK	COMMS EQ	2.36%	-2.12%	-3.38%
FARSTAD SHIPPING	EN EQ & SVS	2.11%	-1.08%	1.18%
FRED OLSEN ENERGY	EN EQ & SVS	-1.60%	-5.28%	0.21%
GANGER ROLF	OIL,GAS&C.FUEL	-0.37%	-1.18%	4.77%
GOODTECH	MACHINERY	-1.99%	-8.19%	-3.78%
GREEN REEFERS	MARINE	0.08%	-5.88%	0.47%
GYLDENDAL	MEDIA	-0.30%	-2.78%	-3.53%
HAFSLUND 'A'	ELEC UTIL	1.10%	0.10%	0.45%
HAFSLUND 'B'	ELEC UTIL	-1.53%	0.17%	-1.23%
HELGELAND SPAREBANK	BANKS	8.42%	5.46%	-1.03%
HEXAGON COMPOSITES	MACHINERY	2.71%	-4.88%	-2.18%
HOL SPAREBANK	BANKS	-0.18%	-2.09%	-4.81%
HOLAND OG SETSKOG SPB.	BANKS	-0.18%	-1.15%	-1.66%
HURTIGRUTEN	HT/REST/LEIS	1.12%	2.27%	10.45%
IGNIS	HH DUR	-3.06%	-2.05%	-2.56%
IM SKAUGEN	OIL,GAS&C.FUEL	2.42%	0.21%	-5.30%

INDRE SOGN SPAREBANK	BANKS	-0.60%	-0.32%	-0.78%
INMETA CRAYON	IT SERVICES	-2.47%	-7.52%	-7.11%
ITERA	IT SERVICES	-0.40%	-3.92%	-8.31%
KITRON	ELT/EQ/INS/CM	-1.51%	-0.80%	0.52%
KOMPLETT	INT/CAT RTL	-1.81%	-3.31%	-5.39%
KONGSBERG GRUPPEN	AERO/DEFENSE	0.45%	0.06%	-3.11%
KVERNELAND	MACHINERY	-0.20%	-3.27%	5.39%
LEROY SEAFOOD GROUP	FD PRD	-1.14%	1.25%	1.36%
MARINE HARVEST	FD PRD	-19.71%	4.58%	8.36%
MELHUS SPAREBANK	BANKS	-0.90%	-1.15%	-1.99%
NAMSOS TRAFIKKSELSKAP	MARINE	-1.92%	-7.19%	-1.75%
NES PRESTEGJELDS SPB.	BANKS	-0.18%	-1.14%	-1.02%
NORDIC SEMICONDUCTOR	S/CON EQ	2.49%	2.29%	-1.87%
NORSE ENERGY CORP.	OIL,GAS&C.FUEL	10.67%	2.46%	-6.08%
NORSK HYDRO	MET & MIN	1.49%	1.51%	0.91%
NORSKE SKOGINDUSTRIER	PAP/FOR PRD	-1.64%	-4.90%	-3.65%
NORWEGIAN CAR CARRIERS	MARINE	36.98%	6.93%	20.17%
ODFJELL 'A'	MARINE	0.21%	-0.09%	2.71%
ODFJELL 'B'	MARINE	2.52%	2.70%	4.96%
OLAV THON EIEP.	REAL ESTATE	-2.09%	-3.78%	-0.89%
ORKLA	INDS CONG	-0.31%	-2.43%	-0.96%
PETROLEUM GEO SERVICES	EN EQ & SVS	-0.46%	-9.44%	-7.98%
PETROLIA	EN EQ & SVS	0.47%	2.96%	35.84%
PHOTOCURE	PHARM	2.53%	4.31%	4.74%
PSI GROUP	ELT/EQ/INS/CM	1.57%	0.92%	5.72%
Q-FREE	ELT/EQ/INS/CM	-1.13%	-0.17%	12.47%
RIEBER & SON	FD PRD	0.08%	-1.31%	-3.41%
ROCKSOURCE	OIL,GAS&C.FUEL	-1.98%	-12.91%	-22.19%
SANDNES SPAREBANK	BANKS	2.91%	4.32%	4.44%
SCANA INDUSTRIER	MET & MIN	-0.63%	3.59%	17.10%
SCHIBSTED	MEDIA	1.01%	-1.56%	-2.63%
SINOCEANIC SHIPPING	EN EQ & SVS	3.47%	-5.57%	-5.53%
SKIENS AKTIEMOLLE	FINANCIALS	-0.79%	-1.76%	-1.22%
SOLSTAD OFFSHORE	EN EQ & SVS	0.47%	-5.33%	-2.32%
SOLVANG	MARINE	-0.61%	-0.65%	1.45%
SPAREBANK 1 NORD-NORGE	BANKS	0.37%	-0.05%	0.17%
SPAREBANK 1 SMN	BANKS	0.23%	1.18%	0.51%
SPAREBANK 1 SR BANK	BANKS	0.11%	0.43%	0.35%
SPAREBANKEN MORE	BANKS	-0.18%	0.53%	1.94%
SPAREBANKEN OST	BANKS	2.62%	5.96%	6.32%
SPAREBANKEN PLUSS	BANKS	4.26%	2.28%	1.40%
SPAREBANKEN VEST	BANKS	1.71%	4.01%	4.95%
SPB.1 BUSKR.VESTFOLD	BANKS	1.77%	2.80%	2.57%
SPB.1 RINGERIKE HADELAND	BANKS	-2.18%	-3.15%	-2.00%
STATOIL	OIL,GAS&C.FUEL	-1.40%	2.36%	0.99%
STOREBRAND	FINANCIALS	-0.55%	-1.98%	-3.37%

TELENOR	DIV T/CM SVS	-0.41%	-0.23%	-1.18%
TGS-NOPEC GEOPHS.	EN EQ & SVS	0.78%	-2.45%	-0.61%
TIDE	ROAD & RAIL	-0.53%	-1.95%	-1.55%
TOMRA SYSTEMS	COML SVS/SUP	-1.18%	-2.82%	-1.46%
TOTENS SPAREBANK	BANKS	1.93%	6.56%	5.68%
TTS GROUP	MACHINERY	-0.20%	2.91%	3.68%
VEIDEKKE	CON & ENG	-0.66%	0.80%	-1.42%
WILHS.WILHELMSEN HDG.'A'	MARINE	2.49%	3.59%	8.13%
WILHS.WILHELMSEN HDG.'B'	MARINE	2.77%	1.78%	7.66%
VOSS VEKSEL-OG LMDBK.	BANKS	-0.18%	-1.15%	-2.04%
NUMBER OF SHARES				**96**

Table 7: Abnormal and cumulative abnormal results event study

	22nd of February 2002			**19th of December 2003**		
	AR	**CAR±1**	**CAR±3**	**AR**	**CAR±1**	**CAR±3**
Not adjusting for exchange rate effects including outliers	-0.56%	**-2.71%**	-1.50%	0.62%	-0.87%	1.22%
Adjusting for exchange rate effects including outliers	-0.20%	**-2.43%**	-1.76%	1.06%	-0.92%	0.16%
Adjusting for exchange rate effects excluding outliers	-0.06%	**-1.40%**	0.12%	**0.77%**	**-1.01%**	-0.84%

Table 8: Test statistics for the abnormal returns (an absolute value over 1.96 is statistically significant on a five percentage significance level)

	22nd of February 2002			**19th of December 2003**		
	AR	**CAR±1**	**CAR±3**	**AR**	**CAR±1**	**CAR±3**
Not adjusting for exchange rate effects including outliers	-1.27	**-3.60**	-1.31	1.07	-1.72	1.43
Adjusting for exchange rate effects including outliers	-0.45	**-3.23**	-1.53	1.82	-1.81	0.19
Adjusting for exchange rate effects excluding outliers	-0.27	**-3.90**	0.25	**4.12**	**-2.92**	-1.38

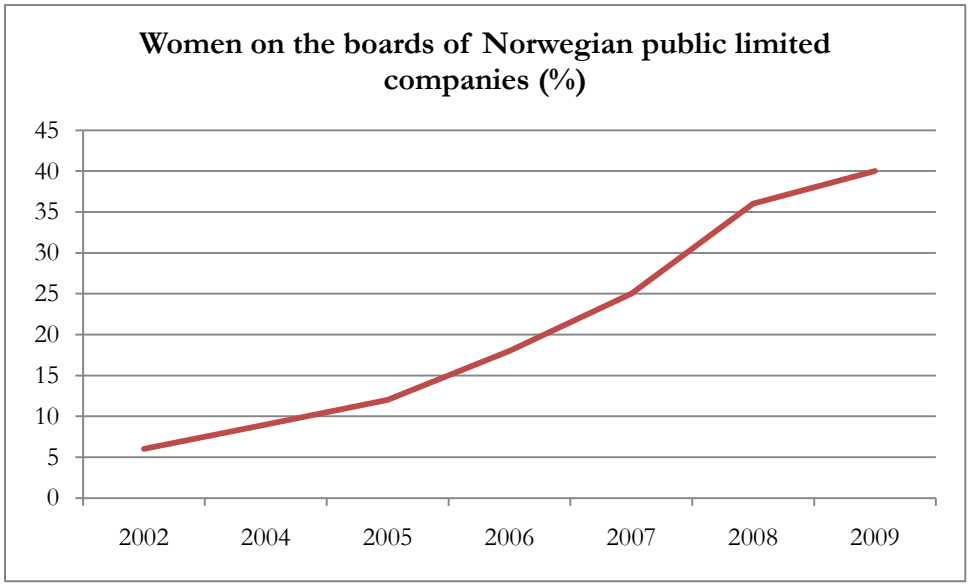

Figure 13: Percentage of female board members in Norwegian public limited companies (Storvik and Teigen, 2010)