

THE CHANGING OF THE BOARDS: THE VALUE EFFECT OF A MASSIVE EXOGENOUS SHOCK*

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Abstract

In 2003, the Norwegian Parliament passed a law requiring that women comprise at least 40 percent of the board of directors of all public limited firms – at the time women only accounted for 9 percent of directors. We exploit this exogenous transformation of corporate boards to investigate if board structure affects firm value and if so, what board characteristics have the largest impact. We find that the constraint imposed by the law resulted in a significantly negative impact on firm value, consistent with the idea that firms choose boards to maximize value. The value loss was not, however, caused by the sex of the new board members, but rather by their younger age and lack of high-level work experience. This is consistent with an advisory and monitoring role for the board.

1. Introduction

In December of 2003 the Norwegian Parliament passed a first-of-its-kind law requiring all public-limited firms to have at least 40 percent representation of women on their boards of directors by July of 2005; at the time women held only 9 percent of board seats. After voluntary compliance failed, the law became effective January 1, 2006, with a two year transition period. Firms that did not comply by January of 2008 would be forced to dissolve. Notices to comply were given to 77 delinquent firms in January 2008, and by April all public limited firms were in compliance with the law. Figure 1 presents the time series of this dramatic transformation in the composition of Norwegian boards of directors. Though more women were elected to boards, the numbers of women serving as chairman and CEO remained steadfast at less than five percent, consistent with press reports of the unpopularity of the law among existing board members and executives (Goldsmith, 2002).

In this paper we exploit the exogenous nature of this forced change to Norwegian boards to address two fundamental questions of corporate governance: 1) Does board structure impact firm value? and 2) If so, what characteristics of boards have positive versus negative effects on firm value? Though an extensive literature exists on the relation between board structure and value, this research is plagued with endogeneity (Hermalin and Weisbach, 2003). For instance, in equilibrium it is difficult to distinguish if knowledgeable board members increase firm value through their actions, or alternatively, highly valued firms simply attract knowledgeable board members. The challenge to understanding the relation between boards and value is that just as a particular board characteristic may impact value, value may also impact this characteristic.

The massive scale and exogenous nature of the Norwegian law provides an opportunity to overcome this endogeneity problem because board characteristics are changed substantially and independently from other firm choices. The changes are substantial because the law requires that approximately 30 percent of the members of an average board must change to be in compliance with the 40 percent quota. The changes are independent because they are not motivated by a desire to improve performance but rather to increase “equality between the sexes,” in order to create a “fairer society” (Øie, 2007). Since the changes we observe are exogenous for the most part, our tests are not prone to the reverse causality criticisms of prior

studies, which depend upon instrumental variables to address endogeneity, if it is addressed at all (Coles, Lemmon, and Meschke, 2007).

The first question we ask is whether firm values improve or decline as a result of the new board structure mandated by the law. If board structure matters, we expect that a firm's value will change as it alters its board to comply with the new law. In particular, if firms choose their board structures to maximize firm value, imposing binding legal constraints on their choices will lead to a decline in firm value (Demsetz and Lehn, 1985). In contrast, if firms choose their board structures to maximize the private benefits of management as suggested by Lipton and Lorsch (1992) and Bebchuk and Fried (2005), then a legal constraint may improve firm value. To the extent that the addition of women to the boardroom reduces a CEO's influence over the board, we expect an increase in firm value if the 'captured-board' hypothesis is valid. Others have argued that gender diversity by itself will increase firm value (Higgs, 2003). Alternatively, if boards are merely 'window-dressing,' the forced change in board characteristics will have no effect on firm value.

Using a panel of 130 publicly listed Norwegian firms from 2001 to 2007, we find a negative impact of the mandated board changes on firm value.¹ We show this in two ways: 1) an examination of the change in Tobin's Q in the year that the change in the board is implemented and 2) an event study around the announcement of the new law. Because firms implemented their board changes at different times, we are able to separate firm-years into control and treatment groups when we examine the change in Q . Specifically, we classify a firm-year into the 'regime shift' treatment group if a firm experienced a 25 percentage point increase in the proportion of women on its board. We compute a difference-in-difference test between the treatment and control groups, before and after the regime shift and find that value decreases significantly. In the year of the shift, the percentage of women increases 28 percent for the treatment group and Q drops by 0.45 compared to a 5 percent increase in women and a drop of only 0.04 for the control group. We then regress the change in industry-adjusted Tobin's Q on a dummy variable for the regime shift and control for changes in firm size, capital expenditures,

¹Firms had until January 2008 to comply with the law. We will update the results of the paper with 2008 data as soon as the reports become publicly available.

research and development costs, leverage, durable assets, and lagged return on assets. We find a significant decline in Q associated with the regime shift.

In a second test, we calculate the cumulative abnormal return (CAR) for the three days surrounding the date of the first announcement of the new law (February 22, 2002). We show that the average (median) firm had a significantly negative abnormal stock price reaction of -2.6 (-0.9) percent at the announcement. In comparison, we find that firms with no women on their boards at the announcement had a mean (median) abnormal return of -5.0 (-2.3) percent, which is significantly less than zero and significantly less than those firms that had at least one woman on their board. These results confirm that constraint imposed by the law had a negative effect on firm value. The firms that were required to make the most drastic change to their boards suffered the largest negative returns. In general, our results indicate that boards do matter and that constraining the selection of board members had a large negative impact on value.

The second question we ask is why does the change in the board decrease firm value, i.e., what characteristics of board structure affect firm value? Fama and Jensen (1983) propose that boards add value by monitoring and advising the CEO. Thus, a firm will lose value if its board structure is less able to fulfill either role. Jensen (1993) proposes that large boards do not monitor as well as small boards. Yermack (1996) and Eisenberg, Sundgren, and Wells (1998) find supporting evidence of this. The proportion of insiders on a board may also affect its effectiveness as a monitor and advisor. Theoretical research posits that inside directors monitor the CEO less effectively than outside directors (Hermalin and Weisbach, 1991). Consistent with this argument, empirical studies document a positive effect on firm value at the exit of an inside director (Rosenstein and Wyatt, 1990; Shivdasani and Yermack, 1999). Alternatively, recent theoretical research proposes that inside directors are better suited to advise the CEO, and so increase firm value (Raheja, 2005; Adams and Ferreira, 2007; Harris and Raviv, 2008). Consistent with this idea, Klein (1998), Bøhren and Strøm (2006), and Schmidt (2008) present evidence that inside directors may add value if a firm's advising needs are more important than

its monitoring needs. Following this line of research, we use our unique quasi-experimental setting to test whether board size and the proportion of insiders affects firm value.²

In addition to size and independence, we also investigate several characteristics of boards that have been less examined in the literature, but are likely to affect its ability to monitor and advise the CEO, including age, gender, education, and professional employment. Though the law only imposed gender quotas on boards, these other characteristics were forced to change as well. There were few women who had prior board experience or prior CEO experience at the time when firms needed women board members. Because the labor supply of qualified women directors could not match the sudden increase in demand, there was a significant shortage. The shortage was so severe that the government of Norway in conjunction with NHO, a large employers' organization, established an online database of women candidates. As further evidence of the shortage, by 2006, only one in four firms had met the requirements during the voluntary stage of the implementation. We therefore argue that the characteristics of the new women directors are likely to be different than existing men directors. Consequently, we can regard these changes as exogenous as well.

Summary statistics and correlations between the change in women board members and the change in average board characteristics reveal that new women directors are in fact, substantially different than the existing men directors. We find that compared to men, women directors have significantly less CEO experience, are significantly younger, are significantly more likely to have an MBA, are significantly less likely to sit on other boards, and are significantly more likely to be a non-executive manager. At the firm level, we find that CEO experience, share ownership, and insider board members are decreasing over 2001 to 2007 for the average firm.

To examine how board structure impacts value, we run first-difference regressions of board characteristics on Tobin's Q , controlling for a number of other factors. If these characteristics explain the drop in value, then we expect the coefficient on the regime shift dummy to no longer be significant. This is precisely what we find. Boards that have directors whose primary occupation is a CEO, a full-time board member, or a professor have higher Q s, while boards with

²Research shows that affiliated directors also affect firm value (Fich and Shivdasani, 2006; Boone, Field, Karpoff, and Raheja, 2007; Dahya, Dimitrov, and McConnell, 2008). Our data does not allow us to separately identify affiliated from outside directors.

directors that work as consultants, non-executive managers, CFOs, or as a partner or principal have lower Qs . In addition, the average age of the board has a positive but diminishing effect on value. These results are consistent with a board that adds value through advising the CEO: older boards with more high-level experience and knowledge provide value to a firm.

We also find that board size matters. Even as the composition of the board is undergoing a massive change, the average size of the board only slightly increases from 2001 to 2007. Since board size is not dictated by the new law, a constant board size indicates that for each woman ‘hired,’ a man was ‘fired,’ rather than simply adding new women. This in itself is interesting because it confirms that board size is an important choice for a firm. Furthermore, in our panel regressions, we document a hump-shaped relation peaking at about seven board members. This is consistent with arguments that boards that are too large decrease firm value but also that boards must be large enough to have sufficient breadth of knowledge to advise a CEO (Lipton and Lorsch, 1992; Coles, Daniel, and Naveen, 2008).

Also of interest is that the percentage of women directors on a board has no marginal effect on firm value. This contradicts the argument that gender diversity increases firm value as reported in Carter, Simkins, and Simpson (2003) and the negative relation reported in Adams and Ferreira (2008). Our unique setting also provides evidence that insiders increase firm value, consistent with the recent results of Raheja (2005), Adams and Ferreira (2007), and Harris and Raviv (2008).

The findings in this study show that boards matter and that characteristics such as age and career experience impact firm value, consistent with a monitoring and advisory role for boards. Only a few other papers have examined board member characteristics and none of these papers looks at as many characteristics as we do. Fich (2005) finds that directors with CEO experience increase firm value. Agrawal and Knoeber (2001) and Helland and Sykuta (2004) find that directors with legal or political backgrounds benefit firms that are subject to government regulation. Kroszner and Strahan (2001), Byrd and Mizruchi (2005), and DeFond, Hann, and Hu (2005), examine the effect of board members with financial backgrounds. Adams and Ferreira (2008) investigate gender diversity in U.S. boards. Bøhren and Strøm (2006) examines value implications of Norwegian boards from 1989 to 2002, before the law change.

The key difference between our study and these other papers is that their variables of interest are freely chosen, whereas ours change as the result of government regulation and are therefore exogenous.

Though the regime shift in Norway offers a unique opportunity to investigate the impact of board structure on value, one possible concern is that Norwegian firms are different than firms in other countries. Norwegian boards are small, they include employee representatives, and they tend to have few inside executives. However, smaller and more independent boards (potentially) improve the overall governance of a board and thus, if anything, the boards may be better monitors thus making Norway an interesting setting to study the influence of boards. Despite not being a common law country, Norway's anti-director index is at the average for English-origin countries and only one point lower than the U.S. and the U.K. (La Porta, de Silanes, and Shleifer, 1998). Further, measures of the the law and order traditions, political risk, and takeover rules are similar in Norway and in the U.K. (Nenova, 2003). Norway does have higher insider ownership than the U.S., but it is lower than any other country in Europe other than the U.K. (Bøhren and Ødegaard, 2001).

Finally, this paper is related to two other lines of research on corporate governance. First, a number of recent papers show that since board structure is an endogenous choice, the optimal structure will vary by firm according to its needs (Lehn, Patro, and Zhao, 2003; Boone, Field, Karpoff, and Raheja, 2007; Linck, Netter, and Yang, 2008). In some firms, boards with more insiders are optimal compared to other firms. In contrast, our results are general and apply to the average firm. Thus we do not claim, for example, that it is optimal for *all* firms to hire older directors with CEO experience. Second, our paper is related to studies on the relation between value and governance law changes. Chhaochharia and Grinstein (2007) and Duchin, Matsusaka, and Ozbas (2009) study value implications from the Sarbanes-Oxley Act of 2002. Dahya and McConnell (2007) studies value changes surrounding the Cadbury Committee Report in the UK. Similarly, Choi, Park, and Yoo (2007) studies value effects on firms subject to a 1999 Korean law change requiring more outside board members and an independent audit committee. Our study is unique because the scale and exogeneity of the regulatory change provides a massive change across multiple dimensions.

The paper proceeds as follows. Section 2 describes the board and governance structures in Norway. Section 3 describes the data and methods. Section 4 presents results that examine if board structure impacts value. Section 5 presents results as to why board structure impacts value. Section 6 concludes the paper.

2. Corporate Governance in Norway

In December 2003, the Norwegian Parliament passed a law stating that all public limited companies should have gender equality on their boards of directors. The law allowed companies to voluntarily comply but stated that if the desired gender representation did not occur by July 2005, the law would be mandated for all firms. As of July 2005, only 13.1 percent of the firms complied. The parliament therefore passed a law that forced compliance by January 2006 allowing for a 2 year transition period, with the threat of dissolving firms that did not comply. The law specifically states the number of board members by gender and effectively imposes a requirement that firms achieve approximately 40 percent board representation by women.³

The stated and primary purpose of this law was to reach a balanced participation for democracy and equality. Except that diversity may impact firm performance and value, the purpose of the law was not to improve or change the performance of the firms. Therefore, both the language of the law and press reports indicate that the change is exogenous to firm performance. In the stated law, the government acknowledges that there may be less information about potential women directors and thus board choice may be constrained. In response, it created a database of women interested in being a board member “to make women’s competence more visible.” The language of the law makes it clear that there were potential constraints in filling these seats given such a massive change.

Norwegian boards are small and predominantly independent (Bøhren and Ødegaard, 2001; Bøhren and Strøm, 2006). This is seen in Table 1 which shows that the average board has between 6 or 7 members with only 6 percent insiders. Based on the previous evidence on boards, small and independent boards may serve as better monitors (Adams, Hermalin, and

³Specifically, if you have 2-3 members both sexes should be represented; 4-5 members both sexes must have 2 representatives from each sex; 6-8 members both sexes must have 3 representatives from each sex; 9 members must of 4 representatives of each sex; and more than 9 members must have 40 percent of each sex. Rules on gender representation at www.regjeringen.no

Weisbach, 2008). Thus, defined by these characteristics, Norwegian board are comparable to the ‘better’ boards in the U.S. and other countries. Additionally, though higher than the U.S., the concentration of ownership in Norway is lower than any other country in Europe with the exception of the U.K.. If anything, this makes it less likely to find that boards matter.

One difference between Norwegian and U.S. boards is that if a Norwegian firm has over 200 employees, the employees have the right by law to elect one-third of the board. Since the average board is six-members, this essentially amounts to two of six board members being employee-rather than shareholder-elected. The gender equality law stipulates that where two or more board members are elected by the employees, both genders must be represented.

In addition to these firm specific characteristics, country measures also indicate that Norway has strong corporate governance. Despite not being a common law country, Norway’s anti-director index is 4 out of 6 (La Porta, de Silanes, and Shleifer, 1998). This is relative to an average of 4 for English-origin countries and 5 for the U.S. and the U.K. Further, both Norway and the U.S. get a 10 in the Rule of Law index that measures law and order traditions in the country. Political risk is also quite low in Norway, relative to the U.S. and U.K.. Using the risk of expropriation measure of La Porta, de Silanes, and Shleifer (1998), Norway scores a 9.88 (higher is better) compared to 9.98 in the U.S. and 9.71 compared to the U.K.. Using the measures from the International Country Risk Guide, similar to Pinkowitz, Stulz, and Williamson (2006), Norway has less political risk and corruption than both the U.S. and the U.K. with a political risk (corruption) measure of 84.55 (9.58), relative to 79.62 (8.26) in the U.S. and 80.36 (8.31) in the U.K.. In addition, Nenova (2003) presents evidence that the laws governing takeovers in Norway are similar to the laws in the U.K.. In summary, though no two countries are perfectly comparable, Norway is similar to both the U.S. and the U.K. in its governance and thus the results in this paper are generalizable.

3. Data and Methodology

The law requiring 40% representation of women on the boards of companies applied to all public limited firms in Norway. However, to identify the effect of the law on firm value we must have publicly observable share prices. We therefore collect the names of all Norwegian

firms that traded on the Oslo Stock Exchange in 2007 from the CompuStat Global database. From this list of firms we collect accounting and stock price data from CompuStat from 1989 through 2007 and will update this with 2008 data as soon as it is available. Since different firms report data in U.S. dollars, Norwegian Kroner, and Euros, we convert all currencies to U.S. dollars using monthly exchange rates from CompuStat Global Currency and Global Financial Data databases. All dollar amounts are then converted to December 2008 dollars using the monthly Norwegian Consumer Price Index from Statistics Norway. We exclude financial and utility firms from the sample because they may be regulated.

Following prior research on firm value and governance, we compute yearly Tobin's Q as a measure of firm value (Hermalin and Weisbach, 1991; Yermack, 1996; Coles, Daniel, and Naveen, 2008). Tobin's Q is computed as the sum of total assets and market equity less common equity divided by total assets. Market equity is the aggregate market value (price times shares outstanding) for all share classes listed on Compustat Global Securities database.⁴ Following Coles, Daniel, and Naveen (2008), we also compute return on assets (ROA), leverage, free cash flow, durable assets, R&D, and capital expenses over assets as controls in our tests. All variable definitions are reported in the appendix. In 2005, Norwegian firms were required to report financial statements according to International Financial Reporting Standards (IFRS). Before 2005, most firms listed on the OSE followed Norwegian Generally Accepted Accounting Principles (NGAAP). The results we present only use data from firms using IFRS. However, when we remove this restriction, the results of the paper are qualitatively unchanged.⁵

We also calculate industry-adjusted measures by subtracting the industry median value from the observation value. The industry median is calculated as the median measure of all other firms in the same two-digit SIC code if there are at least five other firms in the 2-digit SIC code. If there are less than five other firms, we use firms from the same one-digit SIC code.

We hand-collect board of director and CEO information from annual reports filed by the sample firms starting as early as 2001 and going through 2008, as 2008 data becomes available.

⁴Multiple classes of stock were used to attract foreign investors in Norway. In 1999 the OSE discouraged their use and the number of firms with multiple share classes diminished (Ødegaard, 2007). Only seven firms out of 124 had multiple classes of stock in 2001, decreasing afterwards.

⁵The primary difference in IFRS and NGAAP is that IFRS uses fair value accounting and NGAAP uses cost. In many instances, these will be the same. The primary difference in these methods are in the expensing of intangible assets (Gjerde, Knivsfla, and Sættem, 2008).

For each board member and CEO, we record the person's name, gender, age, board title (e.g., Chair, Deputy-chair, etc.), education, if the person has prior experience as a CEO, current external job and employer, share holdings in the firm, year first elected to the board, and whether the board position is elected by the shareholders or the employees of the firm. These data, when reported, are in the biographical section of the annual report. Shareholdings are reported in the accounting statements.

We identify the gender of the board member and CEO using the following rules. First, we use a photograph of the person in the annual report. If a photo is not available we search whether the biographical information uses identifying pronouns such as 'she' and 'her,' or 'he' and 'his.' If these are not available, we base our gender identification on the first name of the person, using the First Names database from Statistics Norway. For every name recorded in Norway, this database lists how many men and how many women have the first name. We complete our database by backfilling demographic information when available for later dates and from the reports of other firms. We also compare a sub-sample of our hand-collected data to the Boardex database and find that our data is more complete.

The sample consists of 618 firm-year observations over 2001 to 2007 from 130 firms. There are 3,959 person-year observations from 334 women and 1,027 men directors. The requirement that firms use international accounting standards reduces the firm-year observations of Tobin's Q to 327. As stated above, to be conservative in our measurement of financial data we use the smaller sample, but our results are very similar if we use the expanded sample.

Using the board member data, we aggregate to the firm level to calculate the number of board members, the percentage of women board members, the percentage of members with an MBA, a post-baccalaureate degree, prior or current CEO experience, the average age, board tenure, percentage of members in different types of external job roles, shareholdings as a percent of shares outstanding, and the total shareholdings of the board as a percentage of outstanding shares. Because media reports indicate that the shortage of women board members led to women sitting on multiple boards simultaneously, we also calculate the number of board and CEO positions among our sample firms. These are recorded at the personal-level, as the number

of overlapping board members and CEOs and at the firm-level, as the number of firms that share members or a CEO with each sample firm.

Finally, since the law went into effect in stages over more than one year, we wish to identify ‘regime-shifts’: years in which a firm’s board of directors changed dramatically. To do so we record the first year that the percentage of women on the board increased by at least 10%, 15%, 20%, and 25% from the prior year. As mentioned before, our primary interest is not to test whether the number of women board members affects firm value, but rather to use the enforced gender rules in order to identify major exogenous changes to multiple board characteristics.

3.1. Summary Statistics

Table 1 presents cross-sectional mean values of firm and board characteristics from 2001 to 2007. Tobin’s Q ranges from 2.28 to 1.93 over 2005 to 2007. This is slightly higher than the Q reported in Coles, Daniel, and Naveen (2008), but consistent with the smaller average firm size in Norway compared to the larger U.S. firms in the Coles et al. study. Table 1 also presents a time trend coefficient and its corresponding p -value. The average Tobin’s Q is unchanged during the sample period, though leverage, R&D, and durable assets are decreasing, due to the change in accounting standards.

Next, Table 1 reports mean characteristics of the boards of directors of the sample firms. The average size of the board is roughly constant at about 6.5 members, increasing slightly over the sample period. This is slightly less than the 7.5 average board size for the large sample of U.S. firms studied in Linck, Netter, and Yang (2008), and again consistent with the slightly smaller firms in our sample, as well as potentially better governance structures in Norway (Bøhren and Strøm, 2006). Not surprisingly, the proportion of women board members increases dramatically for our sample firms, just as shown in Figure 1 for the sample of all public limited firms. The proportion of board members with MBAs or other post-baccalaureate degrees are roughly 30% each. The average age of the board members in our sample is roughly constant over time at 51 years old. The primary occupations of the outside board members as listed in the annual reports are presented in the final panel of Table 1. CEOs and directors are the most common occupation

of board members in an average firm, accounting for about 18% and 16% of members. Directors whose primary occupation is a principal or partner account for about 14% of board members.

A comparison of the time trends across the characteristics of the board of directors are particularly relevant given the large change in the number of women directors. Since the average board is only slightly increasing in size, firms are not merely adding additional women directors, but rather replacing existing men directors. Many of the other board characteristics remain relatively stable even as this change occurs. However, certain time trends are observed. First, there is a large decrease in the number of shareholder-elected inside board members, from 10% in 2002 to 6% in 2007. CEO experience and share ownership are also decreasing. In addition, the number of board or CEO positions per person is increasing over time. In 2001, the average board member had 1.5 positions either as a director or CEO in a firm in our sample. By 2007, the number of positions increased to 2.2 on average. Finally, the percentage of board members that worked as vice-presidents increased substantially from 3.15% to 7.58% over 2001 to 2007. Outside directors that work as non-executive managers, attorneys, and partners or principals have also increased significantly.

To better understand how the characteristics of boards are changing, Table 2 compares the characteristics of newly elected board members with directors that are retained and with directors that exit the board. Clearly, new directors are more likely to be women compared to exiting directors (40% vs. 13%). However, the new board members differ significantly from the exiting and retained members across many other dimensions. The average new director is less likely to have prior CEO experience, is younger, owns fewer shares and is less likely an insider compared to exiting and retained directors. It is also interesting to note that firms are not randomly choosing which directors will exit the board. Instead, the exiting directors have significantly less tenure on the board, fewer shareholdings, and are more likely to be an insider compared to the directors that remain on the board.

Panel B of Table 2 also reveals that new members are much more likely to be a VP, a non-executive manager, or a CFO, compared to the retained directors. However, when comparing the occupations of exiting and newly appointed directors, fewer differences are noted than when comparing the age, prior CEO experience, and share ownership as reported in Panel

A. We interpret the results in this table to imply that firms are attempting to maintain the occupational background of its board members, but the small supply of women directors leads to boards that have younger directors with less high-level experience.

4. Does the Structure of the Board of Directors Affect Firm Value?

The summary statistics reported in Tables 1 and 2 suggest that though some board characteristics are unchanged, other substantial changes are occurring in boards over the sample time period. Since these changes are likely driven by the exogenous regulatory change, it provides an ideal setting to test whether firm value is changing as well.

4.1. *Difference-In-Difference Tests*

Our first test of the value effect of changing boards is a difference-in-difference test on Tobin's Q . We classify firms into the treatment group, denoted 'Regime Shift,' if the firm experienced any of the regime shifts described above (10%, 15%, 20%, or 25% change in the percentage of women directors in one year) during the sample period. We record the year of the regime shift as our event-year zero. If a firm experiences multiple shifts, we record the event-year as the year of the largest increase in the percentage of women on the board. Firms that did not experience a large shift are placed in the control group, denoted 'No Regime Shift.' To match the No Regime Shift firms to the Regime Shift firms in event time we use the median year zero of all firms in the Regime Shift sample.

Table 3 presents the average Tobin's Q in the years before and after the shift for both treatment and control groups. The paired-difference of Q before and after the shift is presented in the last column of Table 3. The average Q of the regime shift firms drops by 0.45 from 2.55 before to 2.18 after. The control firms' average Q changes insignificantly from 1.96 to 1.85. The final entry in Panel A of the table indicates that the difference-in-difference between the two groups is significantly negative. Panel B presents the same test on the percentage of women directors. The difference-in-difference is significant as expected, indicating that there truly is a difference in the board composition changes between the two samples.

The negative effect of the regime shift supports the hypothesis that board structure affects value. In particular, these results support the hypothesis that boards are chosen in order to maximize shareholder wealth: placing restrictions on the composition of the board reduces value. This is in contrast to the ‘captured board’ and diversity hypotheses which predicts that forcing new outside members onto a board is likely to increase firm value. The magnitude of the difference-in-difference is quite large. Tobin’s Q declines by 0.4 on average, or 20% from the average Q of 2.1.

For subsequent tests, we note that the Q of the Regime Shift firms is statistically higher than the No Regime Shift firms both before and after the regime shift year. This indicates that there is a selection issue between firms that choose to make large changes in the board over one year. To control for this in our tests, we do two things. First, we use industry-adjusted Q as our measure of firm value. This removes any general time trends in Q because the industry-adjusted average firm will have a zero Q regardless of the overall level of Q . Second, we first-difference all our variables in the remaining tests. This removes the selection issue by comparing each firm’s performance and board characteristics to itself, rather than the entire cross-section of firms.

4.2. Regression Tests of the Regime Change on Firm Value

As an alternative to the difference-in-difference univariate tests, we regress the yearly change in industry adjusted Q on a dummy variable for the regime shift and on yearly changes in firm-level accounting ratios and control variables. The results are reported in Table 4. We show that the coefficient on the regime shift dummy is significant after controlling for firm size: the regime shift exhibits a significantly negative effect on firm value. The regime shift dummy variables are interpreted to mean that the change in Tobin’s Q in the year when the regime shift occurred is significantly less than the change in Q in the years in which there was no regime shift, after controlling for firm size.

The negative coefficients on the regime shift dummy variables in Table 4 are consistent with the difference-in-difference results. The forced change to the board of directors destroys firm value on average. Following Coles, Daniel, and Naveen (2008) we include the additional control

variables of R&D, leverage, free cash flow, durable assets, and lagged ROA. These variables are industry-adjusted and first-differenced as well and provide marginal explanatory power. The regime shift dummies remain significant after these controls. The magnitude of the change is large as well, as in the difference-in-difference tests, leading industry-adjusted Q to fall by as much as 20%.

Our research design is based on the premise that the change in the boards that occurs with the passage of the law requiring women to be on the board is exogenous because it is imposed by the government and not related to performance or governance. However, we recognize that, though the firm can not choose to comply or not, it can choose when to comply within a two year window. This degree of choice may allow some firms to voluntarily comply early. In untabulated results, we include year dummy variables and interact the year dummies with our regime shift variable to address the impact this choice has on our results.⁶ The results do not change and the value effect is significant and negative in all years except 2003, when only one firm added women to the board. We also include the percentage of women already on the board at the beginning of each year as an explanatory variable and divide the sample into those that have greater than and less than or equal to 25 percent women on the board at the beginning of the year. All results hold with these additional controls and in these subgroups.

4.3. Event Study of the Announcement of the New Law

To further investigate whether board composition affects firm value, we examine the stock price reaction of sample firms to the first announcement of the new law on February 22, 2002. Specifically, we estimate a three-day CAR as the sum of the realized returns minus the MSCI Norway Index over the period from $t - 1$ to $t + 1$. Due to missing stock price data and because we restrict our attention only to firms listed in 2002, our sample size is reduced to 44 firms. The results of the event study are presented in Table 5.

The first column of Panel A in Table 5 shows that the mean (median) CAR is -2.6 (-0.9) percent and is significantly less than zero. Columns two and three divide the sample into those firms with no women on the board at the time of the law change and those with at least one

⁶When we include the year dummies we relax the requirement that firms use IFRS accounting because most firms did not comply with IFRS until 2005 and this time constraint limits our ability to examine year effects.

woman on the board. We hypothesize that the constraint imposed by the new law will be most binding for those firms that have no women and hence will require a more dramatic change to comply with the law. Panel A illustrates that this is true. Firms with no women directors experience a -5.0 (-2.3) percent mean (median) abnormal return at the announcement of the law. This return is significantly lower than the -0.1 percent abnormal return for firms with at least one woman on the board at the time the law was announced.

In Panel B of Table 5, we regress the announcement CAR on the percentage of women directors as well as firm size and board size controls. In each specification, the constant term is significantly negative, indicating that the average firm had a negative reaction to the announcement of the law change. In addition, the regression results show that the greater was the percentage of women on a firm's board at the time of the announcement, the less negative was its stock price reaction. In the lower half of Panel B, we report estimated coefficients from regressions where the dependent variable is the first year that a firm had at least 20% women board members and the explanatory variables are the announcement CAR, log of assets, and board size. The abnormal returns at the announcement of the new law predicts the year in which the board will have reached a 20% representation by women with high statistical significance. Firms that suffered worse announcement returns reached the 20% threshold significantly later in time than did the firms with better announcement returns. This finding is again consistent with our hypothesis that the law change imposed a binding constraint on a firm's choice of board members, which led to value destruction.

5. Why Does Board Structure Affect Firm Value?

In this section, we attempt to identify the possible explanations for the decrease in Tobin's Q associated with the changes to the board required by the rule change. The time series averages presented in Table 1 indicate that some board characteristics are changing, but others are not. However, since the time series are aggregated over all firms, the firm-level changes may be less obvious. Since women are being added to boards of directors in large numbers, we separately identify changes over time in women versus men board members at the person-level to provide insight into how board structure evolves during our sample period.

5.1. The Time Series of Men and Women Director Characteristics

Table 6 presents person-level data on average characteristics of men and women board members in our sample. In 2001, there were 332 men directors compared to 22 women directors. By 2007, men accounted for 327 directors and women accounted for 200. For each entry in Table 6, we report whether the row variable mean is significantly different between women and men directors. We also include a time trend coefficient, as in previous tables.

Men directors are significantly more likely to have CEO experience, to be older (by about seven years on average), to have a longer tenure as a director in the firm, and to be an inside director. There are no significant differences between the education level of men and women directors. Women have more personal connections to other directors and CEOs in our sample from more board appointments or by sitting on larger boards. There are significant time trends for men and women as well. The percentage of men directors with CEO experience is decreasing from 2001 to 2007, and the average age of men directors is increasing. In contrast, the largest changes to the characteristics of women directors is a decrease in the percentage of inside women directors and women with CEO experience. In 2001, 4.7% of women directors were insiders. In 2007, only 2% were insiders, reflecting the difficulty of finding new women directors to meet the 40% quota, even within a firm. Surprisingly, the number of personal connections that women have with directors is declining. This is in contrast to the media reports of a few women occupying numerous board positions.⁷

The primary occupation of men and women outside directors are also different and change over time. For some of the professions, it appears that the percentage of women and men reverse over time. In 2001, 8.2% of men directors worked as consultants compared to zero women. By 2007, 5.4% of men directors were consultants and 10.9% of women directors were consultants. Likewise, from 2001 to 2007 men became more likely to work as a partner or a principal in a firm and women became less likely to do so. These results suggest that women were replacing men who had the same outside occupation. This may indicate that boards recruited a woman director to replace a set of skills or experience possessed by an exiting men director. Perhaps the largest shift in the occupation of directors is for women who work as non-executive managers.

⁷Women may have directorships on non-traded public limited firms that we do not observe.

In 2001 and 2002, no woman director was employed primarily as a non-executive manager. By 2007, over 11% of women directors were non-executive managers.

It is also interesting to note that men and women directors in 2001 were more similar than they were in 2007. This again suggests that there is a binding restriction on the recruiting of women directors to abide by the 40% quota. When firms were free to choose directors before the rule, they tended to choose women that were similar to men directors. This is consistent with the idea that the large demand and small supply for women directors after the adoption of the 40% quota forced firms to choose directors that they would not have chosen otherwise.

5.2. The Correlation of Changes in Board Characteristics

The time series indicate that multiple characteristics of the board are changing simultaneously. Table 7 presents a correlation matrix of the within-firm changes in board composition. This controls for firm-specific heterogeneity because we calculate the change in one board characteristic compared to another within the same firm.

When the percentage of women board members increases, the percentage of directors with CEO experience, the average age and tenure of directors decreases. In addition, the percentage of directors that work as non-executive managers and vice-presidents increases, while the percentage that work only as board members and partners decreases. Many other correlations are significant as well. Increases in directors that work as CEOs or attorneys are correlated with increases in personal connections, for instance. More non-executive managers and CFOs are associated with boards of directors with less CEO experience.

5.3. Regressions to Identify the Effects of Boards on Firm Value

The correlations of changes in board characteristics suggest that there are multiple and related changes occurring in the board of directors over time. Thus to control for the many possible influences on firm value we run panel regressions of the change in industry-adjusted Tobin's Q on the changes in board composition. As argued in the introduction, and as the results presented so far indicate, the changes in the board are in large part exogenous. Thus using first-differenced variables in regressions controls for selection effects and we rely on the

exogeneity of the setting to yield valid results. Since firms change their board at different times between 2001 and 2007, we are able to identify marginal effects on value through the cross-sectional variation of within-firm differences.

Table 8 presents estimated coefficients from panel regressions of changes in industry-adjusted Tobin's Q on changes in board characteristics. For reference, we include the regime shift dummy variable. Column one adds additional variables and the regime shift dummy becomes insignificant, as it is in all specifications in Table 8. Column two of Table 8 presents regression coefficients when dummy variables for the presence of board members who work in various occupations are included. The presence of a consultant, a non-executive manager, or a CFO decreases firm value, though professors and CEOs increase value. The presence of a director whose primary outside occupation is a board member also increases value though at a significance of 11%.

Since there are almost no inside executive board members on Norwegian boards except the CEO, we use a dummy variable for CEO duality. The regressions indicate that firms where the CEO sits on the board have higher values. Partialling out the age of the chair, makes the average age of the board significant and hump shaped with a maximum at about 46 years old. Board size also becomes significantly related to Tobin's Q in columns three through five. The relation is hump-shaped as well, with a maximum at about seven board members. This is consistent with the assertion that large boards suffer from coordination difficulties, but boards that are too small do not have enough breadth to adequately advise management (Lipton and Lorsch, 1992; Coles, Daniel, and Naveen, 2008).

Also of note are certain variables that do not influence firm value. In particular, the gender of the directors does not affect firm value. In unreported tests the gender of the chair is also insignificant. In addition, the shareholdings of the CEO are also insignificant. This may be because of the presence of large blockholders, common in Norway, which provide a monitoring role. Column four tests whether diversity, measured by the standard deviation in the ages of the directors, adds value. Column five adds the average number of personal connections a board has to address the busy boards theory of Fich and Shivdasani (2006) and Ferris, Jagannathan, and Pritchard (2003). Neither variable is significant. However, as noted previously, we acknowledge

that our personal connections variable may be biased downwards because we do not observe the board appointments of non-listed firms.

In summary, the regression results suggest that boards do affect firm value in ways consistent with an advisory role. Boards that have older members with high-level business experience increase firm value. These results are also consistent with the substantial changes we observe in board characteristics over time. Since these changes are in large part exogenous, we feel more confident that the relations presented in the regressions are not caused by selection or endogeneity between value and board characteristics. The constraint imposed by the 40% women quota led firms to recruit women board members that were younger and had different career experiences than the existing directors. It is reasonable to suggest that these changes led to decreases in firm value because directors did not have the same monitoring or advising capabilities of the directors before the imposed change.

6. Conclusion

In this paper we exploit a natural experiment in corporate board structure to identify which, if any, characteristics of boards affect firm value. Following a law change to Norwegian firms that required the average firm to change 30% of its board members, we document a substantial change in the characteristics of board members, including age, gender, and experience. Arguing that these changes are largely exogenous, we show that the imposed changes decrease firm value. This is consistent with the idea that boards are chosen optimally to maximize firm value. The constraint imposed by the law led to sub-optimal boards, and hence a decrease in firm value.

Next, we identify a number well-known and new board characteristics that may affect firm value. Using first-difference regressions we find that the average age and the size of a board of directors display humped shaped relations to firm value. In particular, an average age of 46 years old and an average board size of 7 members provide the most value in our sample. In addition, the presence of board members who work primarily as CEOs, professors, and directors increase firm value, whereas boards with consultants, non-executive managers, and CFOs decrease firm value. Finally, the gender of the board members and board diversity do not affect value. In summary, we find evidence consistent with advisory and monitoring roles

for the board of directors. Boards that are composed of older members with more high-level experience provide value to a firm.

The results we present are relevant to academics, executives, investors, and also policy makers. This paper presents the first evidence on the effect of the groundbreaking quota rules adopted in Norway. Other countries are considering similar laws. For example, the Parliament of Spain has passed a law requesting that boards meet a 40 percent quota of women by 2015, though the law does not provide substantial enforcement procedures. Our results may provide policymakers guidance on how to maintain value while providing greater gender equality in the boardroom.

Appendix A. Variable Definitions

<i>Accounting ratios</i>	
Tobin's Q	Total assets - common equity + market equity/Total assets
Leverage	Book liabilities/Book assets
R&D/Assets	R&D/Book assets
Durable Assets	Property, Plant, & Equipment/Assets
CAPEX/Assets	Capital expenditures/Assets
Free cash flow	Operating income before depreciation - interest - income tax - CapEx/Total Assets
ROA	Operating income before depreciation/Total Assets
<i>Board of directors variables</i>	
Size	Total number of directors
Female (%)	Percentage of board members that are women
CEO Exp. (%)	Percentage of board members that have work experience as a CEO or owner
MBA (%)	Percentage of board members that have an MBA
Higher Educ. (%)	Percentage of board members that have a post-baccalaureate degree including M.A., M.S., M.D., J.D., and Ph.D. From a university in the U.S.
Age	The age of the board member
Tenure	Number of years since a board member joined the board of directors
% Shares owned	The number of shares of stock owned or owned by a holding company that is controlled by the board member divided by the total number of shares outstanding
Total % shares owned	The sum of all shares owned by a firm's board members divided by the total number of shares outstanding
Insider	A board member of a firm that is employed full-time by the same firm
Board or CEO position/person	Total number of CEO and board positions held in any given year
CEO duality	Dummy variable equal to 1 if the CEO is a board member
% Retained from prior year	Percentage of board members in year t that were board members in the same firm in year $t - 1$
<i>Board of directors external primary occupation</i>	
VP	Vice President of any kind (i.e., Senior VP, Executive VP, etc.)
Consultant	Consultant, advisor, counsellor, bedriftsrådgive
Board member	Member, chair, deputy chair
Professor	Professor
Union rep.	Union representative, convenor, representative
CEO	CEO, President, Managing Director, General manager, Adm. Direktør
Attorney	Attorney, lawyer, advocate
Non-Exec. Manager	Manager, head of (sales, HR, etc.), management, COO, Marketing, General secretary
CFO	CFO, Finance director, Treasurer, financial director, investment manager
Partner/Principal	Partner, Owner, Principal, Self-Employed, Independent, Founder, Investor
Accountant	Accountant, Payroll, Controller, Controlling
Other	Any job position not classified above
<i>Regime shift dummy variables</i>	
Regime Shift $X\%$	Dummy variable equal to 1 the first year that the percentage of women on a firm's board of directors increased by $X\%$

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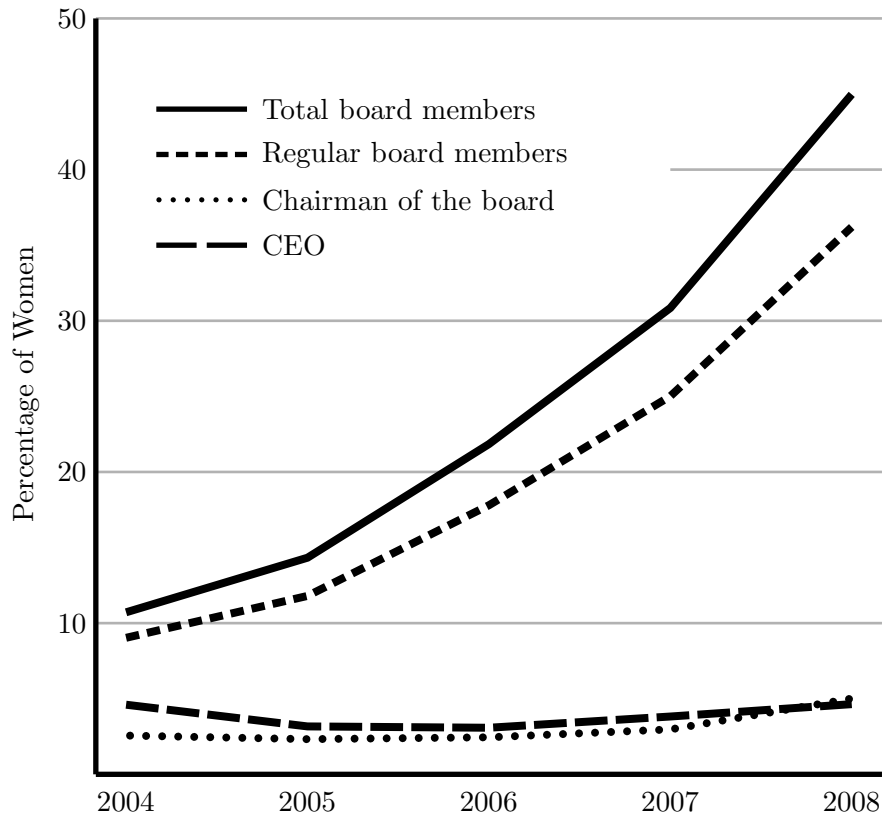


FIGURE 1

Percentage of women on the board of directors of Norwegian public limited firms

This table presents the percentage of women on the board of directors in Norwegian firms from January 1, 2004 to January 1, 2008. In 2004 there were 432 public limited companies with 2,813 individuals on the boards of directors. In 2008, there were 459 companies with 2,486 individuals. Data is from Statistics Norway (Statistisk sentralbyrå)

TABLE 1

Summary statistics by year

This table presents averages of firm characteristics and averages of average board of director characteristics across firms for Norwegian companies that were listed on the Oslo Stock Exchange in 2007. All variable definitions are in the appendix. The trend and p -value columns report the β coefficient and its p -value from the following regression: $Variable = \alpha + \beta(Year - 2000) + \varepsilon$.

	2001	2002	2003	2004	2005	2006	2007	2008	Trend	p -value
<i>Panel A: Firm Characteristics</i>										
Tobin's Q	2.94	1.59	1.79	2.11	2.28	2.12	1.93		0.03	0.24
Sales (billions 2008 USD)	5.19	16.26	17.64	13.98	1.59	1.77	2.06		-0.15	0.24
Leverage	0.67	0.55	0.67	0.56	0.54	0.55	0.55		-0.02***	0.00
R&D/Assets (%)	8.20	3.49	0.50	1.53	0.70	1.20	2.07		-0.94***	0.00
Durable Assets (%)	31.67	25.29	25.12	30.91	28.17	28.03	28.90		-0.90*	0.06
CAPEX/Assets (%)	9.31	7.65	6.74	7.90	8.75	9.78	8.72		0.29	0.21
Observations	4	4	4	6	99	114	111			
<i>Panel B: Board Characteristics</i>										
Size	6.37	6.47	6.51	6.55	6.52	6.72	6.88		0.08*	0.06
Female (%)	6.33	7.76	10.33	14.10	20.34	27.46	36.60		5.17***	0.00
CEO Exp. (%)	74.47	73.13	70.01	69.68	67.74	68.52	66.28		-1.24*	0.07
MBA (%)	25.17	29.82	29.16	28.74	31.74	29.31	30.06		0.49	0.47
Higher educ (%)	32.96	30.87	29.21	31.84	30.05	35.74	37.14		0.98	0.18
Age	51.13	50.72	50.61	51.55	50.87	51.17	51.10		0.04	0.72
Tenure	3.93	2.57	2.26	2.46	2.47	2.45	2.26		-0.13**	0.02
Average % shares owned	2.82	2.91	2.64	2.61	2.33	2.34	2.05		-0.14*	0.08
Total % shares owned	13.34	14.91	13.32	13.96	12.73	12.29	11.38		-0.45	0.26
Insider (%)	7.60	10.40	8.62	8.42	6.76	5.23	6.46		-0.61*	0.09
Std. dev (age)	6.26	6.66	7.80	7.41	7.08	7.41	7.06		0.09	0.36
Std. dev. (tenure)	2.75	2.20	2.03	1.88	2.02	2.07	2.39		-0.01	0.81
Std dev. (% shares held)	5.26	5.48	4.63	4.90	4.59	4.56	4.25		-0.17	0.26
% retained from prior year		78.06	76.50	83.25	79.34	76.40	69.77		-1.50***	0.01
Board or CEO positions/person	1.49	1.58	1.45	1.75	1.74	2.16	2.21		0.13***	0.00
Positions/Board size	0.23	0.24	0.21	0.24	0.23	0.29	0.29		0.01**	0.04
<i>Panel C: Shareholder Elected Directors' Primary Outside Occupation (%)</i>										
VP	3.15	2.77	2.84	3.33	4.04	5.33	7.58		0.77***	0.00
Consultant	7.81	9.29	7.84	5.94	5.94	6.29	6.55		-0.40	0.27
Board member	17.99	17.05	20.35	18.61	16.52	16.93	15.22		-0.51	0.31
Professor	1.11	0.78	0.92	1.35	1.63	1.38	1.07		0.06	0.60
Union rep.	1.54	0.97	1.24	1.35	1.06	0.75	0.74		-0.11	0.51
CEO	25.99	25.53	19.83	19.28	20.25	22.39	17.96		-0.98*	0.05
Attorney	1.55	0.85	1.51	2.87	2.96	3.01	2.86		0.34*	0.09
Manager	2.50	2.02	1.08	1.65	2.70	3.62	4.86		0.49**	0.02
CFO	1.63	3.41	3.81	2.86	3.00	4.53	3.10		0.18	0.41
Partner/Principal	13.35	13.12	14.22	15.61	19.89	17.57	17.01		0.88*	0.07
Accountant	0.00	0.00	0.00	0.32	0.26	0.00	0.15		0.02	0.56
Other	4.93	5.18	4.72	4.30	3.88	4.62	6.49		0.14	0.61
Observations	73	79	84	93	105	116	112			

*** Statistical significance at the 1% level.

** Statistical significance at the 5% level.

* Statistical significance at the 10% level.

TABLE 2

Characteristics of new, retained, and exiting directors

This table presents averages of personal characteristics of the directors of Norwegian firms listed on the Oslo Stock Exchange in 2007 when available. ‘New’ refers to directors that are new hires to a board. ‘Retained’ are directors that were on the board in the prior year. ‘Exiting’ are directors that were on the board in the prior year, but not in the following year. Statistical significance is reported as the p -value from a two-sample t -test assuming unequal variances. All variable are defined in the appendix.

	New	Retained	Exiting	Differences		
	(1)	(2)	(3)	(1)–(2)	(2)–(3)	(1)–(3)
<i>Panel A: Demographics & Background</i>						
Female (%)	40.32	18.03	12.54	22.29*** (0.000)	5.48*** (0.001)	27.78*** (0.000)
CEO Exp. (%)	60.00	71.67	69.00	–11.67*** (0.000)	2.67 (0.385)	–9.00** (0.018)
MBA (%)	30.75	29.58	27.24	1.17 (0.675)	2.34 (0.453)	3.51 (0.352)
Higher Educ. (%)	30.98	32.48	31.91	–1.50 (0.583)	0.57 (0.857)	–0.93 (0.806)
Age	48.58	53.40	52.38	–4.82*** (0.000)	1.02 (0.105)	–3.80*** (0.000)
Tenure	0.00	3.92	2.75	–3.92*** (0.000)	1.17*** (0.000)	–2.75*** (0.000)
Shares owned (%)	0.79	2.96	1.59	–2.17*** (0.000)	1.37*** (0.000)	–0.80** (0.014)
Insider (%)	3.68	7.93	11.70	–4.25*** (0.001)	–3.76* (0.077)	–8.02*** (0.000)
<i>Panel B: Primary Outside Occupation (%)</i>						
VP	7.67	4.96	4.15	2.71* (0.092)	0.81 (0.558)	3.52* (0.067)
Consultant	10.12	7.36	9.06	2.77 (0.132)	–1.70 (0.376)	1.07 (0.661)
Board member	16.26	23.47	20.00	–7.21*** (0.003)	3.47 (0.207)	–3.74 (0.243)
Professor	1.84	1.98	1.51	–0.14 (0.866)	0.47 (0.578)	0.33 (0.754)
CEO	23.93	24.79	24.15	–0.87 (0.746)	0.64 (0.826)	–0.23 (0.949)
Attorney	2.15	2.89	2.26	–0.75 (0.427)	0.63 (0.544)	–0.12 (0.924)
Manager	5.83	2.56	2.64	3.27** (0.018)	–0.08 (0.942)	3.19* (0.051)
CFO	5.52	3.22	4.91	2.30* (0.093)	–1.68 (0.238)	0.62 (0.737)
Partner/Principal	17.18	19.26	15.47	–2.08 (0.383)	3.78 (0.131)	1.71 (0.577)
Accountant	0.00	0.25	0.00	–0.25* (0.083)	0.25* (0.083)	0.00 —
Other	8.59	3.97	5.28	4.62*** (0.005)	–1.32 (0.377)	3.31 (0.112)
Observations	630	2,280	598			

*** Statistical significance at the 1% level.

** Statistical significance at the 5% level.

* Statistical significance at the 10% level.

TABLE 3

Difference-in-difference of board change on Tobin's Q

This table presents mean Tobin's Q for firms that experienced a 10%, 15%, 20%, or 25% point increase in the proportion of women on its board of directors (Regime Shift) versus firms that did not (No Regime Shift). Calendar years are adjusted for event time, with event year zero as the year of the regime shift. The Before group are all years before year zero and the After years are all years after and including year zero. The observations in the No Regime Shift group are matched in event time by using the median event year for the Regime Shift firms. The difference column presents the matched sample difference and p -value from a t -test of equality of means. Tobin's Q is (Total assets - common equity + market equity)/Total assets/ Female board members is the percentage of female directors in a firm's board of directors.

	Observations	Before	After	Difference
<i>Panel A: Tobin's Q</i>				
Regime Shift	45	2.55	2.18	-0.45** (0.023)
No Regime Shift	72	1.96	1.85	-0.04 (0.670)
Difference		0.59** (0.039)	0.33* (0.098)	-0.40* (0.065)
<i>Panel B: Female Board Members (%)</i>				
Regime Shift	51	10.18	37.03	0.28*** (0.000)
No Regime Shift	36	26.58	33.48	0.05*** (0.001)
Difference		-0.16*** (0.000)	0.04* (0.093)	0.23*** (0.000)

*** Statistical significance at the 1% level.

** Statistical significance at the 5% level.

* Statistical significance at the 10% level.

TABLE 4

Panel regression of board regime shift on firm value

This table presents coefficients from first-difference regressions of firm characteristics and a regime shift dummy variable on Tobin's Q . The regime shift 25% (15%) dummy variable equals 1 in the year that a firm experienced a 25 (15) percentage point increase in the proportion of women on its board of directors. Tobin's $Q = \text{Total assets} - \text{common equity} + \text{market equity} / \text{Total assets}$; Leverage = (Book liabilities)/(Book assets); R&D/Assets = R&D/Book assets; Durable Assets = Property, Plant, & Equipment/Assets; Capex = Capital expenditures/Assets; Free cash flow = (Operating income before depreciation - interest - income tax - CapEx)/Total Assets; and ROA = Operating income before depreciation/Total Assets. Sample period is 2001 to 2007 where firms are all firms listed on the Oslo Stock Exchange in 2007 with available data and that use international accounting standards. Heteroskedasticity-robust p -values are reported in parantheses.

	Dependent variable: Δ Industry-adjusted Tobin's Q			
	(1)	(2)	(3)	(4)
Regime shift 25% $_t$	-0.370* (0.074)		-0.582** (0.013)	
Regime shift 15% $_t$		-0.242** (0.045)		-0.343** (0.013)
$\Delta \text{Log}(\text{assets}_t)$	-0.924*** (0.000)	-0.931*** (0.000)	-0.871*** (0.000)	-0.889*** (0.000)
ΔCapex_t			1.138 (0.242)	1.236 (0.195)
$\Delta \text{R\&D}_t$			6.030 (0.223)	6.151 (0.216)
$\Delta \text{Leverage}_t$			0.840 (0.101)	0.818 (0.119)
$\Delta \text{Free cash flow}_t$			0.413 (0.551)	0.427 (0.534)
$\Delta \text{Durable assets}_t$			0.855 (0.141)	0.769 (0.180)
ΔROA_{t-1}			1.149** (0.049)	1.200** (0.039)
Adjusted R^2	0.228	0.222	0.280	0.264
N	207	207	170	170

*** Statistical significance at the 1% level.

** Statistical significance at the 5% level.

* Statistical significance at the 10% level.

TABLE 5

Abnormal returns at the announcement of the 40% quota rule

Panel A presents means and medians of cumulative abnormal returns ($CAR_{-1,+1}$) over the three day window surrounding the date of the first announcement of the new law requiring 40% representation by women (February 22nd, 2002). $CAR_{-1,+1}$ is the three-day sum of the realized return minus the MSCI Norway Index. Statistical significance is reported as p -values in the parantheses (t -tests for the mean and sign and rank-sum tests for the medians). Panel B presents coefficient estimates from ordinary least squares regressions. The sample size is 44 in all regressions. Women Directors (%) is the percentage of a firm's directors that are women in 2002. Year % women $\geq 20\%$ takes on the value 2001 to 2008 to indicate which was the first year that the board of directors of a firm had at least 20% women directors. Statistical significance is reported as p -values from robust standard errors.

	All Firms	No Women Directors	Women Directors > 0	Difference
	(1)	(2)	(3)	(2)-(3)
Mean	-0.026** (0.022)	-0.050*** (0.010)	-0.001 (0.916)	-0.049** (0.022)
Median	-0.009*** (0.003)	-0.023*** (0.003)	-0.003 (0.307)	-0.021** (0.026)
Observations	44	22	22	

Panel B: Multivariate tests

Dependent Variable	Explanatory Variables				R^2
	Constant	Women Directors (%)	Log(assets)	Board size	
$CAR_{-1,+1}$	-0.047*** (0.004)	0.187*** (0.010)			0.126
$CAR_{-1,+1}$	-0.068* (0.070)	0.145* (0.076)	0.005 (0.445)		0.136
$CAR_{-1,+1}$	-0.073** (0.041)	0.141* (0.072)	0.003 (0.654)	0.002 (0.663)	0.138

	Constant	$CAR_{-1,+1}$	Log(assets)	Board size	R^2
Year % women $\geq 20\%$	2003.626*** (0.000)	-15.501*** (0.000)			0.239
Year % women $\geq 20\%$	2005.634*** (0.000)	-12.624*** (0.000)	-0.335** (0.014)		0.324
Year % women $\geq 20\%$	2006.270*** (0.000)	-12.104*** (0.000)	-0.130 (0.522)	-0.262 (0.157)	0.362

*** Statistical significance at the 1% level.

** Statistical significance at the 5% level.

* Statistical significance at the 10% level.

TABLE 6

Board of directors characteristics by gender and year

This table presents averages of personal characteristics of the directors of Norwegian firms listed on the Oslo Stock Exchange in 2007 when available. The trend and p -value columns report the β coefficient and its p -value from the following regression: $Variable = \alpha + \beta(Year - 2000) + \varepsilon$. Statistical significance between men and women for each variable and year is from a two-sample t -test assuming unequal variances and is indicated on the Women entry for each variable. All variables are defined in the appendix.

		2001	2002	2003	2004	2005	2006	2007	2008	Trend	p -value
<i>Panel A: Demographics</i>											
CEO experience	Men	78.26	76.90	74.30	73.25	71.71	69.56	73.56		-1.11*	0.08
	Women	66.67	61.11	60.35	51.16**	45.41***	49.01***	45.11***		-3.09**	0.04
MBA	Men	22.41	24.29	27.56	25.97	27.61	26.43	30.36		0.96	0.16
	Women	40.00	47.06*	36.00	31.71	30.16	27.38	29.09		-2.31	0.13
Higher Educ.	Men	33.87	28.91	27.61	29.95	28.99	28.71	26.37		-0.70	0.31
	Women	22.22	31.25	36.00	30.95	32.84	39.58*	37.82**		1.86	0.24
Age	Men	51.84	52.58	53.07	53.40	53.70	54.24	54.19		0.39***	0.00
	Women	48.69	47.33***	47.22***	46.87***	46.14***	47.23***	47.52***		0.02	0.94
Tenure	Men	4.54	3.21	2.92	3.10	3.26	3.34	3.43		-0.04	0.52
	Women	1.96***	1.48***	0.95***	1.23***	1.27***	1.26***	1.24***		-0.02	0.58
Insider	Men	18.24	13.02	12.24	12.38	11.56	12.67	10.81		-0.79*	0.09
	Women	4.76**	3.51**	2.30***	1.55***	2.31***	1.75***	2.12***		-0.23	0.56
No. of connections	Men	6.93	7.25	7.11	7.35	7.30	7.76	7.88		0.15***	0.00
	Women	9.09***	10.00***	9.50***	8.94***	8.15*	8.62**	8.69**		-0.15	0.14
<i>Panel B: Shareholder Elected Directors' Primary Outside Occupation</i>											
Vice President	Men	3.46	1.78	2.60	3.22	3.78	4.19	4.43		0.33	0.18
	Women	0.00**	15.79	10.35	6.98	8.33	11.05**	10.71**		0.58	0.51
Consultant	Men	8.18	11.54	8.85	7.92	7.33	6.83	5.38		-0.71*	0.06
	Women	0.00***	0.00***	3.45	2.33*	4.17	8.42	10.91*		2.13***	0.00
Board Member	Men	20.44	19.53	21.70	20.79	21.19	20.34	21.79		0.17	0.76
	Women	14.29	18.42	32.76	26.74	22.22	20.00	13.89*		-1.93	0.10
Professor	Men	1.26	1.18	1.56	1.98	1.78	1.32	0.52		-0.07	0.68
	Women	0.00	0.00	0.00*	2.33	4.17	3.16	2.38		0.42	0.37
CEO	Men	24.53	26.33	27.87	26.98	25.26	24.49	24.91		-0.23	0.70
	Women	35.71	31.58	13.79*	19.77	20.83	26.32	20.64		-0.67	0.59
Attorney	Men	2.52	1.18	2.08	3.47	3.11	2.64	2.86		0.18	0.42
	Women	0.00**	0.00	0.00**	2.33	4.17	3.68	2.78		0.53	0.28
Non-exec. Manager	Men	1.89	1.78	0.52	0.50	1.33	1.76	2.08		0.07	0.67
	Women	0.00*	0.00*	10.35	11.63**	12.50***	8.42**	11.51***		1.15	0.20
CFO	Men	0.63	2.96	3.39	3.22	2.22	3.52	2.60		0.19	-0.23
	Women	21.43*	5.26	3.45	3.49	6.25	5.79	5.16		-0.69	0.31
Partner/Principal	Men	14.15	15.09	15.54	16.34	21.33	22.03	24.74		1.87***	0.00
	Women	23.81	25.44	20.12	18.22	16.44	9.30***	9.19***		-3.01***	0.00
Accountant	Men	0.00	0.00	0.00	0.50	0.44	0.00	0.00		0.01	0.82
	Women	0.00	0.00	0.00	0.00	0.00	0.00	0.79		0.15	0.32
Other	Men	6.29	6.51	4.17	4.46	3.56	3.52	3.78		-0.50*	0.08
	Women	0.00***	0.00***	3.45	4.65	2.78	6.84	13.49***		2.43***	0.00
Observations	Men	332	336	344	349	376	386	327			
	Women	22	30	44	63	106	153	200			

*** Statistical significance at the 1% level.

** Statistical significance at the 5% level.

* Statistical significance at the 10% level.

TABLE 7

Pair-wise correlations of within-differences of board characteristics

This table reports pair-wise correlations of the change from year $t - 1$ to t for average characteristics of the board of directors of sample firms. Data covers 2001 to 2007 for all firms listed on the Oslo Stock Exchange in 2007, where data is available. Occupations are the average by across directors for each firm. Statistical significance is reported as p -values in parantheses.

	Δ Female	Δ CEO exper	Δ MBA	Δ High educ	Δ Age	Δ Tnre	Δ Insr	Δ VP	Δ Cnsltnt	Δ Brd	Δ Prof.	Δ CEO	Δ Atrny	Δ Mgr	Δ CFO	Δ Ptnr
Δ CEO exper.	-0.21*** (0.00)	1.00 (0.00)														
Δ MBA	0.07 (0.13)	0.08 (0.13)	1.00 (0.00)													
Δ Higher educ	0.04 (0.35)	0.03 (0.50)	-0.07 (0.16)	1.00 (0.00)												
Δ Age	-0.14*** (0.00)	0.23*** (0.00)	-0.19*** (0.00)	0.05 (0.28)	1.00 (0.00)											
Δ Tenure	-0.29*** (0.00)	0.05 (0.31)	-0.09* (0.09)	-0.02 (0.69)	0.20*** (0.00)	1.00 (0.00)										
Δ Insider	-0.02 (0.71)	0.06 (0.30)	-0.06 (0.30)	0.02 (0.69)	0.03 (0.58)	0.04 (0.55)	1.00 (0.00)									
Δ VP	0.13** (0.03)	-0.05 (0.40)	-0.06 (0.34)	0.09 (0.15)	-0.07 (0.25)	0.03 (0.69)	0.03 (0.66)	1.00 (0.00)								
Δ Consultant	0.00 (0.99)	-0.05 (0.42)	-0.11* (0.06)	-0.05 (0.45)	0.22*** (0.00)	-0.05 (0.41)	-0.02 (0.68)	-0.11* (0.08)	1.00 (0.00)							
Δ Bd Mbr	-0.20*** (0.00)	0.04 (0.49)	-0.09 (0.14)	0.01 (0.82)	0.10 (0.10)	0.10 (0.13)	-0.10* (0.08)	-0.08 (0.19)	-0.15** (0.01)	1.00 (0.00)						
Δ Professor	0.08 (0.16)	-0.06 (0.29)	0.05 (0.45)	0.17*** (0.00)	-0.03 (0.68)	-0.05 (0.44)	0.05 (0.40)	0.00 (0.97)	-0.05 (0.36)	-0.19*** (0.00)	1.00 (0.00)					
Δ CEO	0.07 (0.25)	0.21*** (0.00)	-0.03 (0.67)	-0.02 (0.78)	-0.07 (0.23)	-0.12* (0.05)	-0.11* (0.01)	-0.16** (0.01)	-0.10 (0.10)	-0.34*** (0.00)	-0.04 (0.53)	1.00 (0.00)				
Δ Attorney	0.03 (0.61)	-0.05 (0.40)	0.13** (0.03)	0.07 (0.23)	0.00 (0.98)	0.02 (0.76)	-0.26*** (0.00)	-0.16** (0.01)	-0.03 (0.62)	0.02 (0.72)	0.05 (0.44)	0.03 (0.59)	1.00 (0.00)			
Δ N.E. Mgr	0.23*** (0.00)	-0.24*** (0.00)	0.15** (0.01)	-0.01 (0.86)	-0.02 (0.75)	-0.05 (0.46)	-0.06 (0.33)	-0.06 (0.33)	-0.15** (0.01)	-0.20*** (0.00)	-0.02 (0.80)	-0.07 (0.23)	0.03 (0.59)	1.00 (0.00)		
Δ CFO	0.08 (0.20)	-0.18*** (0.00)	-0.01 (0.82)	-0.09 (0.13)	-0.23*** (0.00)	-0.08 (0.19)	-0.07 (0.24)	0.07 (0.23)	-0.04 (0.49)	-0.12* (0.05)	0.03 (0.63)	-0.05 (0.40)	-0.02 (0.67)	0.08 (0.20)	1.00 (0.00)	
Δ Partner	-0.15** (0.01)	0.04 (0.48)	0.14** (0.02)	-0.02 (0.77)	-0.03 (0.62)	0.13** (0.04)	-0.14** (0.01)	-0.09 (0.14)	-0.14** (0.02)	-0.16** (0.01)	-0.07 (0.26)	-0.26*** (0.00)	-0.06 (0.33)	-0.02 (0.75)	-0.22*** (0.00)	1.00 (0.00)
Δ Cnnections	0.07 (0.12)	-0.01 (0.87)	0.04 (0.37)	0.08 (0.10)	0.00 (0.99)	0.00 (0.95)	-0.07 (0.24)	-0.12** (0.04)	0.05 (0.37)	-0.12** (0.04)	-0.07 (0.25)	0.12* (0.05)	-0.15** (0.01)	-0.05 (0.42)	0.06 (0.34)	0.08 (0.17)

*** Statistical significance at the 1% level.

** Statistical significance at the 5% level.

* Statistical significance at the 10% level.

THE CHANGING OF THE BOARDS

TABLE 8

First-difference regressions of board characteristics on Tobin's Q

This table presents coefficients from first-difference regressions of firm and board characteristics on Tobin's Q . Sample period is 2001 to 2007 where firms are all firms listed on the Oslo Stock Exchange in 2007 with available data and that use international accounting standards. All variables are defined in the appendix. The occupation variables are dummy variables equal to one if a board has at least one shareholder-elected board member whose primary occupation is the listed occupation. Heteroskedasticity-robust p -values clustered at the firm-level are reported in parentheses.

	Dependent variable: Δ Industry-adjusted Tobin's Q				
	(1)	(2)	(3)	(4)	(5)
Regime Shift $25\%_t$	(1) -0.366 (0.266)	(2) 0.358 (0.475)	(3) 0.162 (0.698)	(4) 0.186 (0.662)	(5) 0.258 (0.551)
Δ CEO duality	0.042 (0.907)	0.508 (0.280)	0.968* (0.061)	0.975* (0.067)	1.119* (0.085)
Δ Board size	1.026** (0.032)	0.417 (0.391)	1.232* (0.081)	1.211* (0.084)	1.265* (0.081)
Δ Board size ²	-0.068** (0.027)	-0.031 (0.303)	-0.086** (0.034)	-0.083** (0.040)	-0.089** (0.034)
Δ Board Female	0.586 (0.392)	0.498 (0.593)	1.065 (0.350)	1.254 (0.306)	0.878 (0.444)
Δ Age	-0.175 (0.471)	0.072 (0.840)	1.363*** (0.006)	1.202*** (0.009)	1.229*** (0.008)
Δ Age ²	0.002 (0.402)	0.000 (0.926)	-0.014*** (0.005)	-0.013*** (0.008)	-0.013*** (0.007)
Δ Higher Educ.	-1.406 (0.129)	-0.440 (0.644)	-2.628*** (0.001)	-2.540*** (0.001)	-2.773*** (0.002)
Δ MBA	-0.469 (0.289)	-1.024 (0.344)	-1.825** (0.038)	-1.711* (0.075)	-2.312** (0.016)
Δ Vice President		0.056 (0.761)	0.300 (0.191)	0.282 (0.237)	0.327 (0.161)
Δ Consultant		-0.556** (0.012)	-0.621*** (0.006)	-0.618*** (0.009)	-0.671*** (0.006)
Δ Board Member		0.352 (0.226)	0.546 (0.102)	0.534 (0.123)	0.540 (0.109)
Δ Professor		0.886* (0.061)	1.870*** (0.000)	1.845*** (0.000)	1.983*** (0.000)
Δ CEO		0.347* (0.059)	0.712*** (0.004)	0.695*** (0.006)	0.685*** (0.009)
Δ Attorney		-0.430 (0.288)	0.361 (0.163)	0.404 (0.138)	0.298 (0.234)
Δ Non-executive Manager		-0.379* (0.096)	-1.170** (0.016)	-1.189** (0.018)	-1.188** (0.018)

continued on next page

Table 8 - *Continued*

Dependent variable: Δ Industry-adjusted Tobin's Q					
	(1)	(2)	(3)	(4)	(5)
Δ CFO		-0.737*** (0.005)	-1.566*** (0.000)	-1.602*** (0.000)	-1.601*** (0.000)
Δ Partner/Principal		-0.423 (0.234)	-0.522* (0.080)	-0.516* (0.078)	-0.456 (0.119)
Δ Chair Age			0.258 (0.164)	0.280 (0.140)	0.215 (0.265)
Δ Chair Age ²			-0.003 (0.112)	-0.003* (0.097)	-0.003 (0.182)
Δ CEO share ownership			-4.752 (0.479)	-4.681 (0.488)	-4.344 (0.519)
Δ Std. dev(Board age)				0.028 (0.508)	
Δ Avg. personal contacts					0.480 (0.486)
Δ Log(assets _{<i>t</i>})	-0.868*** (0.000)	-1.081*** (0.000)	-1.164*** (0.000)	-1.158*** (0.000)	-1.182*** (0.000)
Δ Capex _{<i>t</i>}	1.164 (0.508)	2.953 (0.120)	1.667 (0.377)	1.777 (0.351)	1.840 (0.333)
Δ R&D _{<i>t</i>}	7.016 (0.180)	14.106*** (0.004)	19.746*** (0.000)	19.515*** (0.000)	19.767*** (0.000)
Δ Leverage _{<i>t</i>}	0.842 (0.170)	1.689 (0.109)	0.270 (0.779)	0.309 (0.753)	0.318 (0.734)
Δ Free cash flow _{<i>t</i>}	0.233 (0.883)	0.933 (0.535)	-0.674 (0.678)	-0.642 (0.690)	-0.564 (0.729)
Δ Durable assets _{<i>t</i>}	0.483 (0.329)	0.812 (0.342)	-1.512 (0.175)	-1.336 (0.261)	-1.721 (0.137)
Δ ROA _{<i>t-1</i>}	0.798 (0.165)	-0.010 (0.991)	-1.505* (0.071)	-1.543* (0.057)	-1.477* (0.077)
Adjusted R^2	0.345	0.426	0.609	0.600	0.602
N	121	80	64	64	64

*** Statistical significance at the 1% level.

** Statistical significance at the 5% level.

* Statistical significance at the 10% level.