THE CHANGING OF THE BOARDS: THE IMPACT ON FIRM VALUATION OF MANDATED FEMALE BOARD REPRESENTATION[*]

KENNETH R. AHERN
AMY K. DITTMAR

Abstract

In 2003, a new law required that 40 percent of Norwegian firms' directors be women – at the time only nine percent of directors were women. We use the pre-quota cross-sectional variation in female board representation to instrument for exogenous changes to corporate boards following the quota. We find that the constraint imposed by the quota caused a significant drop in the stock price at the announcement of the law and a large decline in Tobin's Q over the following years, consistent with the idea that firms choose boards to maximize value. The quota led to younger and less experienced boards, increases in leverage and acquisitions, and deterioration in operating performance, consistent with less capable boards.

First Draft: 18 March 2009
This Version: 20 May 2011

JEL Classification: G34, G38, J48, J20

Keywords: Board of directors, Natural Experiment, Tobin's Q, Gender

The Changing of the Boards:
The Impact on Firm Valuation of Mandated Female Board Representation

Abstract

In 2003, a new law required that 40 percent of Norwegian firms' directors be women – at the time only nine percent of directors were women. We use the pre-quota cross-sectional variation in female board representation to instrument for exogenous changes to corporate boards following the quota. We find that the constraint imposed by the quota caused a significant drop in the stock price at the announcement of the law and a large decline in Tobin's Q over the following years, consistent with the idea that firms choose boards to maximize value. The quota led to younger and less experienced boards, increases in leverage and acquisitions, and deterioration in operating performance, consistent with less capable boards.

I. Introduction

Though an extensive literature exists on the relation between board structure and firm value, the endogenous nature of corporate boards has limited our understanding of even the most basic questions (Hermalin and Weisbach, 2003; Adams, Hermalin, and Weisbach, 2011). For instance, in equilibrium it is difficult to distinguish if knowledgeable board members increase firm value through their actions or if highly valued firms simply attract knowledgeable board members. Generally, this endogeneity problem makes it hard to distinguish which characteristics of boards and board members affect firm value. Even further, some research argues that boards are merely cosmetic, with no effect on firm value (Westphal, 1998; Romano, 2005). The disagreement about fundamental issues in corporate governance can only be resolved with clear empirical evidence that is not confounded by endogeneity.

In this paper, we present new evidence on the relationship between firm value and board characteristics by exploiting a natural experiment in board structure created by an unprecedented exogenous change to corporate boards. 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 nine percent of board seats. After voluntary compliance failed, the law became compulsory 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 I 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 female directors 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).

The Norwegian law provides a unique opportunity to overcome the endogeneity problem described above because multiple board characteristics 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). Additionally, the shortage of women directors caused by the quota led to substantial changes across a range of director demographics.

The first question we ask is whether firm values improve or decline as a result of the new board structure mandated by the law. A finding of any effect, positive or negative, would be important evidence that boards affect value. We examine several hypotheses. First, if firms choose their board structures to maximize firm value, imposing binding legal constraints on their choices will lead to declines in values (Demsetz and Lehn, 1985). In contrast, the new law may lead to increases in value if firms choose their board structures to maximize the private benefits of management, an argument known as the 'captured boards' hypothesis (Bebchuk and Fried, 2005). To the extent that the forced addition of female directors reduces a CEO's influence over the board, the 'captured boards' hypothesis predicts that firm values will increase because agency costs are reduced. One may argue that the law change could allow CEOs to appoint additional 'captured' directors, which would reduce firm value. However, a self-interested CEO would have appointed captured female directors regardless of the law if it allowed the CEO to capture greater private benefits. A third hypothesis predicts that the diversity enforced by the law change itself would increase firm value (Higgs, 2003; Page, 2007). Finally, if boards are merely 'window-dressing,' the forced changes in board characteristics will have no effect on firm value (Westphal, 1998; Helland and Sykuta, 2004).

To estimate the impact of the quota on firm value, we use the pre-quota cross-sectional variation in female board representation as an exogenous instrument for the variation in board changes mandated by the quota. Since all public limited firms were required to meet a quota of at least 40% female directors, those firms that had a greater proportion of female directors prior to the quota faced a smaller constraint than the firms with fewer female directors.

In a panel of 248 publicly listed Norwegian firms from 2001 to 2009, we find a large negative impact of the mandated board changes on firm value. First, we run an event study on the stock price reaction to the initial announcement of the quota. As discussed in detail in the paper, the announcement of the law was made in an unusual manner, which created a highly unanticipated news event. On the days around the announcement, we find that the average industry-adjusted

stock return for firms with no female directors was -3.54%, compared to -0.02% for firms with at least one female director. The difference of 3.52% is economically and statistically significant. These findings are robust to controls for board size, firm size, and are significantly different than benchmark industry-adjusted returns of firms in the U.S. and other Scandinavian countries.

Second, instrumental variables estimates indicate that the quota caused a substantially large negative effect on industry-adjusted Tobin's Q. A forced 10 percent increase of women representation on the board led to a 12.4 percent decline in Tobin's Q from the average. Reduced-form estimates suggest that relative to 2003 benchmarks, firms with at least one female director in 2002 had industry-adjusted Q values in 2007 that were 0.26 higher than firms with no female directors in 2002; a substantial difference when compared to the average Q of 1.53. Additionally, placebo tests reveal no relationship between pre-quota female board representation and subsequent changes in firm value for U.S. firms. The results suggest that the constraint imposed by the law had a large negative effect on firm value, commensurate with the massive reorganization of corporate boards imposed by the gender quota.

To better understand the causes of the value loss, we next investigate how the quota impacted the characteristics of the boards of directors. Fama and Jensen (1983) propose that boards add value by monitoring and advising the CEO. Existing research posits that board size may be important for monitoring and advising (Jensen, 1993; Yermack, 1996). Other papers emphasize the role of insiders on a board (Hermalin and Weisbach, 1991; Adams and Ferreira, 2007; Harris and Raviv, 2008; Klein, 1998). We argue that personal characteristics of board members such as age, education, and professional experience are also likely to directly affect a director's ability to monitor and advise. With a few exceptions (e.g., Güner, Malmendier, and Tate (2008) and Adams and Ferreira (2009)), these characteristics have received relatively little attention in prior work on boards, but they are clearly relevant to the advisory role of directors.

We expect that the imposition of the quota likely led to the appointment of new female directors that were different than existing directors along multiple dimensions. At the introduction of the new law, the Norwegian business community argued that there would not be enough 'qualified' women to meet the gender quota. Indeed, Figure I shows that there were few women who had prior experience as directors or CEOs at the time when firms needed women on their boards.

Given the large demand shock for board candidates, the pool of potential female directors with similar backgrounds as the existing directors may have been quickly exhausted. The fact that the government of Norway in conjunction with NHO, a large employers' organization, created an online database of female candidates for election to boards supports this conjecture.

In univariate tests and instrumental variables regressions, we find that the new female directors were in fact substantially different than the existing male directors. New female directors had significantly less CEO experience and were younger, more highly educated, and more likely to be employed as a non-executive manager, compared to retained male directors. In particular, 31.2 percent of new female directors had prior CEO experience compared to 69.4 percent of retained male directors. The average new female director was over eight years younger than existing male directors. Interestingly, we do not find that board size changed as a result of the quota. We interpret this to mean that though firms could have met the quota by simply adding new female directors, it was optimal to maintain the size of the board at the cost of replacing male directors.

We next seek to understand the mechanisms through which the board may have affected firm value. Since boards of directors oversee all aspects of a firm, we explore a number of different firm policies that are likely to be related to firm value. Using the pre-quota variation in female directors as an instrument, we find that the quota led firms to increase in size through poorly performing acquisitions possibly financed by increased debt and cash holdings. Since boards of directors are likely to be involved with acquisition decisions and major changes to financial policies, our results are consistent with a deterioration in the capabilities of the board. We also find that operating performance decreased and costs increased as a result of the quota, complementing the results on Tobin's Q. We find no effects of the quota on CEO turnover, the likelihood of hiring a female CEO, or CEO compensation.

Finally, given the quota's large negative consequences for firm value, we expect that some firms may avoid the law by becoming a private limited firm or incorporating outside of Norway. Using aggregate statistics on the form of legal organizations in Norway, we find that the number of public limited firms in Norway in 2009 is less than 70 percent of the number in 2001. In contrast, the number of private limited firms, not affected by the quota, increases by over 30 percent. In firm-level tests, we find a strong negative relationship between the probability of delisting after the

quota is passed and the number of women on the board before the quota is passed, controlling for firm size, risky investments, and industry effects.

This paper contributes to two fields of research: corporate governance and political mandates. Its primary contribution is to present clean evidence on the value of boards using a natural experiment. Other papers examine the effect of regulatory changes to boards due to the Sarbanes-Oxley Act of 2002 (Chhaochharia and Grinstein, 2007; Duchin, Matsusaka, and Ozbas, 2010), the Cadbury Committee Report in the UK (Dahya and McConnell, 2007), and the 1976 German codetermination law (Petry, 2009). Our study is unique because the scale of the enforced changes to the board and the exogeneity of the regulation provide a massive change across multiple dimensions. Further, other papers examine board member characteristics, but none of these papers look at as many characteristics or do so in an exogenous setting.[1]

By providing some of the first evidence on gender mandates in corporate governance, this paper also expands on previous research on mandates for under-represented minorities in political settings. Pande (2003) finds that local governments in India redistribute wealth toward the ethnic minority groups that are elected by mandate. Similarly, Chattopadhyay and Duflo (2004) find that gender mandates for political representation in India lead to greater infrastructure spending preferred by women. Though our data do not allow us to test whether the quota led to greater female employment or higher wages for other employees, we investigate the prevalence of women CEOs and find no evidence that women CEOs are more likely to be appointed following the board quota. Our paper is also related to Beaman, Chattopadhyay, Duflo, Pande, and Topalova (2009), which finds that gender mandates in India change voters' perceptions of female leaders. Women are more likely to run and win an unregulated election if previous female leaders were elected by mandate. Though persistently low percentages of female CEOs and chairpersons suggest that the quota has not changed perceptions of business women in Norway, it is too early to be definitive.

Finally, our results inform the policy debate surrounding the increased movement of national legislatures toward boardroom gender quotas. Table I presents a summary of laws that regulate the gender of directors by country. As of the most recent draft of this paper, Spain, Iceland, and France, have passed gender quota laws, while Belgium, the Netherlands, and Italy have pending

---

[1]See Agrawal and Knoeber (2001), Kroszner and Strahan (2001), Helland and Sykuta (2004), Farrell and Hersch (2005), Byrd and Mizruchi (2005), Adams and Ferreira (2009), and Fahlenbrach, Low, and Stulz (2010).

quota laws. Quotas are being or have been seriously discussed in Sweden, Germany, the UK, and Canada. Additionally, many countries have recently incorporated recommendations for gender equality in their corporate governance codes or disclosure regulations. In developed economies around the world, boardroom gender quotas are quickly becoming the norm, not the exception. Our results suggest that though these rules are effective at creating gender diversity, there is a substantial cost to shareholders if the new female directors lack the experience of the exiting male directors. Thus, our paper highlights the importance of understanding why there are relatively few women with comparable top-level management experience as men, which is addressed in Bertrand, Goldin, and Katz (2010), Herr and Wolfram (2010), and Kuhnen (2011).

The paper proceeds as follows. Section II describes the board and governance structures in Norway. Section III describes the data and methods. Section IV investigates if the gender quotas had any effect on firm value. Section V presents results on mechanisms through which board structure impacts value. Section VI concludes.

II. Corporate Governance in Norway

In this section of the paper, we present a background of Norwegian corporate governance and the gender quota. Our goal is to provide evidence about the exogeneity of the quota as well as the generalizability of the Norwegian experience.

There are two different forms of limited liability stock companies in Norway. A private limited liability company is an Aksjeselskap, abbreviated AS. A public limited company is an Allmennaksjeselskap, abbreviated ASA. The key differences between the two forms are that ASA firms are much larger (with minimum capital requirements ten times larger than the requirement for AS firms), require no consent to trade shares, and hence, may list shares on a public stock exchange. The other key difference is that only ASAs are subject to the gender quota that is the focus of this paper. As described in the introduction, the quota was first passed on a voluntary basis in December 2003, then made mandatory in January 2006, with full compliance required by January

2008. 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.[2]

By all accounts, the quota was implemented without the consent of business leaders. First, press reports indicate that business leaders reacted angrily to the new law, complaining that there was a lack of 'qualified' women directors (Criscione, 2002). Second, the stated purpose in the language of the law was to reach a balanced participation for democracy and equality, not to improve or change the performance of the firms. Further, the government acknowledged that there may be less information about potential female 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."[3] Additional evidence suggests that the law was imposed exogenously. From 2003 to 2009, the percentage of female board members in private firms increased by only two to five percentage points, depending on the size of the firm, compared to increases of 23 to 34 percentage points for public limited firms. Moreover, the percentages of female chairpersons and CEOs remained roughly constant for both private limited firms and for public firms.[4] Thus, the language of the law, press reports, and the hiring practices of firms make it clear that the law was exogenously introduced and created substantial constraints.

Though the evidence suggests that the quota was exogenously imposed, we also want to know whether the results of this paper are relevant for firms in other developed nations. First, we compare Norwegian boards of directors to the boards of firms in the United States. Norwegian boards are roughly the same size as U.S. boards, but tend to have more independent directors. The average board in Norway has between 5 and 6 members. This is slightly smaller than the average board size of 7.5 for a large sample of U.S. firms reported in Linck, Netter, and Yang (2008), but roughly equal to their small firm sub-sample average of 5.9 members. 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. (Bøhren and Strøm, 2006).

---

[2]Specifically, if a firm has 2 or 3 members, both sexes should be represented; 4 or 5 members, both sexes must have 2 representatives from each sex; 6 to 8 members, both sexes must have 3 representatives from each sex; 9 members must have 4 representatives of each sex; and more than 9 members must have 40 percent of each sex.

[3]See the Norwegian Ministry of Children, Equality, and Social Inclusion webpage: http://www.regjeringen.no/en/dep/bld/Topics/equality/rules-on-gender-representation-on-compan.html.

[4]These statistics are from aggregated data provided by Statistics Norway. Tabulations are in Online Appendix Table II.

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. However, the quota rules apply separately to each group of board members. This means a firm cannot pack the employee-elected board with women in order to avoid appointing shareholder-elected women directors.

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 four out of six (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1998). This is relative to an average of four for English-origin countries and five 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, similar to the U.S. and U.K. Using the risk of expropriation measure of La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998), Norway scores a 9.88 (higher is better) compared to 9.98 for the U.S. and 9.71 for 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.

Though Norway is similar to the U.S. and U.K. in terms of governance, it differs in its gender and labor policies. Norway has very progressive gender policies; ranking number three in the United Nations Gender-Related Development Index of 2008, compared to a rank of 10 for the UK and 16 for the US. These policies are evident in the 2008 Norwegian Equal Pay Commission which recommends that new parents get 57 weeks leave (with 80% pay compensation) or 47 weeks (with full compensation) with an equal division into three periods, one for the mother, one for the father, and one for the mother and father to share. Morover, Norway has one of the highest shares of women in parliament. Following voluntary party quotas introduced in the 1970s, Norwegian women hold 62 percent of legislative seats in 2008, compared to the US with 20 percent and the UK with 25 percent. In light of Norway's progressive stance on gender equality, it is not surprising that it was the first nation to implement such large gender quotas on corporate boards. It also means that we

expect that the effects of the quota will be less impactful in Norway than they may be in another country.

III. Data and Summary Statistics

The gender quota law for corporate boards applies 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. Since the gender quota was informally announced in 2002, passed in 2003, and was officially enforced in 2008, we collect the names of all public limited Norwegian firms that traded on the Oslo Stock Exchange (OSE) anytime from 2001 to 2009. Though we will restrict our attention to firms that were listed prior to the passage of the law for our main tests, we collect data for all firm-years over 2001 to 2009 to provide a complete picture of the transformation of Norwegian boardrooms.

We hand-collect board of director and CEO information from annual reports filed by the sample firms from 2001 to 2009. For each board member and CEO, we record the person's name, gender, nationality, age, board title (e.g., Chair, Deputy-chair, etc.), education, prior experience as a CEO, current external job and employer, 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. If an annual report is not available, we search the Register of Business Enterprises from the Brønnøysund Register to collect the names of the board of directors (identified as shareholder and employee-elected), the chairperson, and the CEO. We collect data on both employee- and shareholder-elected board members since each are separately subject to the quota, though we restrict our attention throughout the paper to shareholder-elected board members where the law would have likely imposed a larger constraint. Our qualitative results are unchanged if we include the employee-elected members of the board.

If we are unable to find the date of birth of a board member or CEO from the annual report, we hand collect the year of birth from the Skattelister, a publicly available database of tax records for every taxpayer in Norway. If a search of the tax records produces more than one person who is at least twenty years old and shares the same name, we record the person's age as missing. In some cases, where multiple names are reported in the Skattelister, we can identify the correct person by

the home location reported in the Register of Business Enterprises. If more than half of a firm's board has missing data for any variable, we drop the firm-year observation for the variable.

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.

If data are missing, we supplement our hand-collected data with data from the Boardex database where available. The Boardex database records the same biographical information as we collect by hand, however its coverage is not as complete as our sample. Finally, we backfill demographic information when available for later dates and from the reports of other firms.

For comparison groups in some of our tests, we use data on board members of firms in Denmark, Finland, Sweden, and the United States. We collect data on board size, gender, and age for every public company reported in Boardex in each of these countries. Accounting and market data for Norway and the other comparison countries are from Compustat Global and CRSP (for U.S. market data). 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 each country's monthly Consumer Price Index. We include financial and utility firms in our sample for completeness, but our results hold if they are omitted.[5]

Following prior research on firm value and governance, we compute yearly Tobin's Q as our main 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 book 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.[6] We also

---

[5]Norwegian savings banks (Sparebanken) are not included in our final sample because they are not public limited firms, though they do have traded shares on the Oslo Stock Exchange.

[6]Multiple 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 177 had multiple classes of stock in 2001, decreasing afterward.

calculate additional financial and performance measures such as leverage and asset turnover for later tests. All variable definitions are provided in Appendix I.

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 change in accounting rules makes an analysis of the time-series of accounting measures of performance, such as return on assets (ROA), less reliable than market value performance measures, such as Q (Gjerde, Knivsfla, and Sættem, 2008). Restricting attention to 2005 and later is also problematic because the law was passed in 2003. For these reasons, we focus our attention on Tobin's Q, rather than accounting performance, for our main tests. However, in additional tests we also analyze accounting variables controlling for the accounting standards used.

Following these procedures yields one of the most comprehensive databases used for academic research on directors in a single country. The sample consists of 1,230 firm-year observations over 2001 to 2009 for 248 unique Norwegian firms. Not including employee-elected board members or CEOs, there are 12,203 person-year observations from 519 female and 1,484 male shareholder-elected directors. The number of firms in any one year varies from 113 in 2009 to 163 in 2007, as firms may merge, delist, or go public over our sample period.

To illustrate how our sample compares to the population of firms in Norway, in December 2007 (when the grace period for the quota ended), there were 437 public limited companies in Norway, according to Statistics Norway, all of which were subject to the gender quota. However, not all public limited firms chose to have publicly-listed shares. In 2007, the OSE had 241 firms traded on its exchange, including some foreign listings and Norwegian savings banks which were not subject to the quota. We were able to collect board, accounting, and stock price data for 163 firms in 2007. This means we have data on at least 68 percent of the firms traded on the OSE subject to the quota in 2007 and 37 percent of the universe of firms affected by the law change. Due to the difficulty of finding older annual reports, the coverage for earlier years is less, though still substantial with at least 60 percent coverage of OSE firms in 2002. In addition, our dataset includes the gender of every board member and age data for 89 percent of the board member-years in our sample. In

the comparison samples, there are 178 firms from Denmark, Finland, or Sweden, and 2,853 unique firms from the United States.

Using the board member data, we aggregate to the firm level to calculate the number of board members, the percentage of female board members, the average age, board tenure, percentage of members in different types of external job roles, and the percentage of members with an MBA, a post-baccalaureate degree, and prior CEO experience. Because media reports indicate that the shortage of female 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.

III.A. Summary Statistics

Table II presents cross-sectional mean values of firm and board characteristics from 2001 to 2009. Panel A details shareholder-elected board characteristics, Panel B details outside occupations of the board members, and Panel C details firm accounting variables.

Panel A shows that the average size of the board is roughly constant at about 5.5 members. If we include employee-elected directors, the average is 6.5 members, comparable to similar-sized firms in the U.S., as previously discussed. The relatively constant size of boards is particularly interesting and suggests that firms replace, rather than add, board members to comply with the law. As previously shown in Figure I, the proportion of female board members increases dramatically for our sample firms, with the largest increase from 2006 to 2007, when the grace period for compliance ended. From 2007 to 2009, the percent of women remains roughly constant at 41 percent. The dramatic change in board membership during this period is also reflected in the reduction in the percent of board members retained from the prior year, falling from an average of about 80 percent during 2002 to 2004 to 72 percent in 2007. Similarly, the average tenure of board members falls from a high of 4.3 years in 2001 to a low of 2.1 in 2007, which then rebounds in 2008 and 2009 as director turnover reduces.

The characteristics of the boards are changing in other ways as well. First, the proportion of directors with CEO experience on an average board declines from a relatively constant 67 percent

to a low of 55 percent in 2008. The fraction of board members that are insiders declines from 4.3 percent in 2001 to 2.6 percent in 2009. The number of additional board positions held by directors increases over the sample period, with the largest increase occurring in 2006 and peaking in 2007. Panel A also shows that the average age of an average board member, the fraction of board members that are nationals of Norway, and the fraction of board members that share a common name to another member of the board are all relatively constant in the total sample.

In Online Appendix Table II, we present board member characteristics separated by gender and find that the aggregate trends do not hold for men and women directors separately. In particular, the upward trend in the number of board positions is driven by increased female participation, while the number of positions held by male directors is relatively constant. We also find that female directors are consistently younger than male directors (by four to six years) and the average age of male directors increases over the time period, offsetting the younger age of the increased number of female board members. The percentage of female board members that are Norwegian declines from 96 percent in 2001 to 93 percent in 2009. The number of women with a shared last name as another board member increases from a low of 0.97 percent in 2003 to a high of 3.82 percent in 2009, statistically indistinguishable from the 5 percent of men with shared names. This suggests that some firms may have appointed family members to their board to comply with the law.[7]

Panel B of Table II presents the outside occupations of the board members as listed in the annual reports. CEOs and directors are the most common occupation of board members in an average firm, reported by roughly 25 and 20 percent of the average board. The next most common profession is principal or partner, accounting for about 17 percent of board members. There are significant time trends in the characteristics of directors over this period, especially during the period when boards are changing most dramatically, including an increasing proportion of members who are employed as vice presidents, attorneys, or non-executive managers, and a decreasing proportion of CEOs and directors. In the gender specific statistics in the online appendix, we find that these trends are driven primarily by female board members.

---

[7]These female directors are most likely wives or unmarried daughters or sisters of existing directors, as about 80% of married women in Norway use their husbands surname (Noack and Wiik, 2008).

Finally, in Panel C, we report that Tobin's Q ranges from a low of 1.11 during the global recession in 2008 to a high of 1.88 in 2005, with a mean of 1.53, comparable to the average Tobin's Q for U.S. firms of 1.79 (Coles, Daniel, and Naveen, 2008). The book assets of firms are growing over time, though the number of employees of an average firm first declines from 2001 to 2005 and then rebounds to end at its highest level in 2009. Leverage remains relatively constant, though the amount of short-term debt rises over time. Cash holdings follow a hump-shaped pattern, peaking in 2006. Last, capital expenditures, acquisitions, and R&D spending as a fraction of assets all follow a significant upward trend.

In general, these statistics show several changes in director characteristics during our sample period. By the end of the 2000s, the average board has less CEO experience, fewer insiders, and more non-executive managers. Given the coincidence of timing between these changes and the implementation of the quota, these results suggest that the quota dramatically changed not only the gender but other characteristics of the board. We document the causal impact of these changes in Section V.

IV. DOES THE STRUCTURE OF THE BOARD OF DIRECTORS AFFECT FIRM VALUE?

Our first set of tests investigates whether the gender quota has an effect on firm value. To identify a causal relationship between the quota and value, we take two complementary approaches. First, we calculate an event study on the stock price reaction at the day of the first announcement of the law. Second, we estimate the effect of the quota on Tobin's Q using firms' pre-quota female board representation as a measure of the exogenous change in boards required by the quota. The first approach identifies the immediate stock price reaction, whereas the second approach provides a long-run view of the impact of the quota on firm value.

IV.A. Stock Price Effects of the Announcement of the Gender Quota

The first announcement of the quota was made on February 22, 2002. The public announcement was the top story in Norway's largest newspaper, *Verdens Gang*, (VG) with the headline (translated from Norwegian), "Sick and Tired of the Old Men's Club!" In the article, the then Minister of Trade and Industry, Ansgar Gabrielsen, stated that the government would impose a 40 percent quota for

female directors. Though the issue had been discussed in Parliament in prior years, this public announcement was highly unanticipated. We know this from later interviews where Gabrielsen describes his strategy to implement the law. According to an interview in the *Sunday Times* of London on June 8, 2008, "Gabrielsen had bumped into Alf Bjarne Johnsen [of VG] in February 2002, and on the spur of the moment, he offered the veteran journalist the biggest story of his career if he would come to his office to meet with him within the hour" (Toomey, 2008). Though Gabrielsen had not consulted with other key members of the Norwegian government before making the announcement, he goes on to state that it was purposefully done:

> *"If I had told them before, the initiative would have been killed by one committee after another," he says. "No, I had to employ terrorist tactics. Sometimes you have to create an earthquake, a tsunami, to get things to change," he says, laughing at his own daring. "If a left-wing feminist had come out with something like that it would have been dismissed as just another scream in the night," he continues. "But because I said it, I knew that people would take notice."*

We emphasize the way this regulatory change was announced because it is unusual to find an unanticipated announcement of such a large change in government policy. The quote from Gabrielsen also reinforces the evidence that the law change was not brought about by firms, thus reverse causality (from firm value to the implementation of the law) is highly unlikely.

To estimate the stock price reaction to the announcement of the quota, we calculate industry-adjusted abnormal returns using U.S. industry data in the five days surrounding the announcement. We take the sum of the five days of abnormal returns as our measure of the stock impact. Using a five-day window allows us to capture price changes for thinly traded stocks. We use U.S. data for industry returns because global investors were unlikely to anticipate that the law would directly affect U.S. firms, as opposed to other Scandinavian countries where investors may have anticipated that similar laws would be passed. Additionally, the U.S. provides a larger number of comparison firms in each industry to use as benchmarks.[8] To interpret the impact of the announcement, we compare the difference of the stock price reaction for firms that will face larger constraints as a

---

[8]Industry classifications are from the Global Industry Classification Standard. For industry-adjustments, we use industry returns at GICS Industry level. If fewer than five firms exist in an industry, we use the GICS Group level. If fewer than five firms exist in the group, we use the GICS Sector level.

result of the law versus firms with smaller constraints, namely, firms with no women on their board versus firms with at least one woman on their board at the date of the announcement.

The results of the event study are presented in Table III. Our sample includes 94 firms with available stock price data at the announcement and with board data in 2001, the most recent year-end before the announcement. Sixty-eight of these firms have no female directors and 26 have at least one female director. In Panel A, we report an average industry-adjusted abnormal return for all Norwegian firms of −2.57 percent and a median of −1.8 percent, both statistically different from zero. The next columns in the table reveal that these negative returns are driven by firms with no female directors. These firms, which would be the most severely affected by the proposed quota, experience average losses of 3.5 percent in the days surrounding the announcement, compared to an abnormal return that is indistinguishable from zero for those firms with at least one female director. The difference in means and medians for the two samples are both statistically significant.

Next, in Panel B, we present additional evidence on the market reaction to the quota by comparing the announcement returns of Norwegian firms to foreign firms, where all returns are industry-adjusted as described above. In columns (1) through (4), we run differences-in-differences tests of the announcement returns for Norwegian and U.S. firms by gender representation. The coefficient on the dummy variable for Norwegian firms is negative and significant, ranging from −3.6 percent to −4.3. This indicates that an average Norwegian firm suffered a substantial market value loss at the announcement, compared to U.S. firms in the same industry. Next, we do not find a statistically significant main effect for either measure of female board representation (the percentage of female directors on the board, or a dummy variable for the presence of at least one female board member). However, the differences-in-differences interaction terms between the Norwegian dummy and the female representation measures are positive and significant. These results imply that the presence of female directors did not affect U.S. firms, but had substantial effects on Norwegian firms' returns. Norwegian firms with no female directors at the announcement experienced returns that are 3.5 percentage points lower than U.S. firms that also have no female directors. The effect holds after controlling for firm size and number of board members. For robustness, in columns (5) and (6) of Table III, we present results from a similar analysis but use Scandinavian firms as a

control group. As before, the Norwegian firms experience a significant decline in value relative to firms in Denmark, Finland, and Sweden, driven by Norwegian firms with no female directors.

The unique nature of this announcement provides a clean test of the market's expectation of the effect of the quota on firm value. Our findings show a large decline in value for Norwegian firms with no female directors, compared to U.S. firms and other Scandinavian firms. This provides evidence that the quota imposed significant and costly constraints on Norwegian firms. In the next section, we investigate how the *ex ante* representation of women on the board of directors affects the dynamics of value changes in the years following the passage of the quota law.

IV.B. The Impact of the Quota on Tobin's Q

In this section, we examine the impact of the quota on long-run firm value over the period when firms implemented the mandated board changes. Though the gender quota provides an exogenous shock that put severe constraints on firms' choices of directors, firms could have chosen to respond in various ways. For one, managers could strategically time when they complied with the law. Managers may have chosen to add female directors as scapegoats in advance of poor performance. Existing male directors may have chosen to give up their position, 'so a female director can be appointed,' immediately before he thought the firm would underperform. Alternatively, firms could choose to relocate to a foreign country or go private to avoid the law. Thus, endogenous decisions by the firm will confound the observed time series relationship between board changes and firm value.

To address this endogeneity, we use an instrumental variable approach similar to the approach of Stevenson (2010). Stevenson studies the effect of Title IX gender parity quotas for high school sports on girls' higher education and labor outcomes, where states have some freedom over the timing of compliance. To address this endogeneity, Stevenson uses the pre-law variation in boys' athletic participation across states as an instrument for changes in girls' athletic participation due to the law. We follow her approach and use the pre-quota variation in female board representation across firms as an instrument to capture exogenous variation in mandated changes in the proportion of female board members over time. Since all firms had to meet the same 40 percent quota, firms that had more women when the quota was passed were required to make a smaller change to their

boards to comply with the law, compared to firms that had fewer women when the quota was passed.

We use the 2002 annual reports to measure exogenous variation in the mandated board change, a full year before the quota was passed in December 2003. Though we could use an earlier year to measure exogenous variation, doing so is costly; as we look further back in time, the quality and amount of data deteriorates and the number of firms surviving during the post-quota period diminishes. To verify that the gender of the boards was not yet impacted in 2002, we compare the gender composition of the boards in 2001 to 2002 and find that the majority of the firms had the same gender composition in both years.

Though the change in a firm's board required by the law will vary by the pre-quota percentage of female directors, it is important to acknowledge that the pre-quota percentage of female board members is not randomly assigned. Therefore, we must be concerned about spurious correlations if the pre-quota percentage of women in 2002 is correlated with subsequent changes in firm value, unrelated to the changes in the board. To examine this issue, we compare the attributes of the 80 firms with no women directors in 2002 to the 42 firms with at least one female director (these results are tabulated in Table A.I in Appendix II). Across a host of firm characteristics, including financial policies, investment behavior, performance measures, and cost structures, we find that only firm size is substantially different between the two sets of firms, where larger firms are more likely to have at least one female director. Corresponding to this, firms with larger boards are also likely to have a female director as well. We also find some variation in the outside occupation of directors by the presence of women. Notably, Tobin's Q is not statistically different between firms with or without female directors.

Next, we compare the industry distribution between the two sets of firms. On a sector-by-sector basis, both sets of firms are equally likely to be in any sector, except that firms in the information technology sector are more likely to have no female board members. Twenty-nine percent of firms with no female directors are in the IT sector, compared to 12 percent of firms with at least one female director. Fisher's exact test of the difference in the distributions of industries by female representation does not reject the null, which means that there is no statistical difference between the likelihood of a firm to be in any one particular sector based on its percentage of female

directors in 2002. Since the only major pre-quota difference we identify between firms with no female directors and those with at least one female director is firm size, it is likely that a large part of the determinants of female board representation will be captured by firm fixed effects. Nevertheless, we are still concerned that industry effects could confound our tests. Therefore, we industry-adjust all of our accounting and market variables using industry averages based on U.S. firms for all remaining tests in the paper.

To identify the effect of the gender quota on firm value, we estimate the following equation:

$$(1) \qquad Q_{i,t} = \alpha + \beta \; percent \; female \; directors_{i,t} + \theta_i + \tau_t + \varepsilon_{i,t},$$

where i indexes firms and t indexes time. $Q_{i,t}$ is industry-adjusted Tobin's Q, *percent female directors*$_{i,t}$ is the percentage of female board members for firm i in year t, θ_i are firm fixed effects, and τ_t are time fixed effects for years 2003 to 2009. The firm fixed effects control for any observed or unobserved firm characteristics that are constant over time that may affect a firm's Q. The year effects control for any aggregate fluctuations of Q, such as recessions or expansions. To instrument for *percent female directors*, we use the firm's percentage of female directors in 2002 interacted with year dummies.[9] We could add additional time-varying controls to the specification in Equation 1, but given the endogenous nature of corporate choices, we would run the risk of including 'bad controls,' in the sense of Angrist and Pischke (2009), where the control variable is itself an outcome of the quota change. For example, R&D expenditures may affect Tobin's Q, but R&D expenditures may change independently as a result of the quota. Therefore, we only include firm fixed effects in our specifications, though all of our tests are robust to the inclusion of log(assets), which is arguably an endogenous choice of the firms (in later tests we show that an increase in firm size is in fact an outcome of the quota). Finally, in all of the firm fixed effects regressions in the paper, we cluster standard errors within the firm. This accounts for the serial correlation in the time-series of within-firm variation commonly observed in differences-in-differences variables (Bertrand, Duflo, and Mullainathan, 2004; Petersen, 2009).

Panel A of Table IV presents the results of the instrumental variables estimates of the effect of female board representation on Tobin's Q. The coefficient on *percent female directors* in column (1)

---

[9]Our qualitative results are the same if we use the percentage of women in 2002 to instrument for *number of female directors* or *log(1+number of female directors)* and also if we use these same count variables in 2002 as instruments.

is negative and significant. The point estimate implies that a ten percent increase in the percentage of female directors leads to a decline in Tobin's Q of 0.19, compared to the mean of 1.53 across all firms and years. This is a large effect on the value of firms, commensurate with the large announcement effects reported in the previous section. In columns (2) and (3), we run placebo tests using only firms located in Denmark, Finland, or Sweden or only firms in the U.S. Because the legal systems in Scandinavian countries are similar, we may expect to see a small effect for the other Scandinavian countries if managers and investors anticipated that a similar law would be passed in their home country, following Norway's lead. In fact, as shown in Table I and as seen in news articles, the possibility of a quota was soon discussed by governments in some of these countries (Lindahl, 2003). We should expect to see no effect for U.S. firms. We find that in both cases the instrumental variable estimate is insignificant.

Panel B presents the reduced-form estimates of the effect of the quota on Tobin's Q. In the sample of Norwegian firms, we find that Q is significantly greater in 2007 (the year of mandatory compliance), 2008, and 2009 for firms that had more female directors in 2002. Given that the average percentage of female board members for firms with at least one woman in 2002 was 22.8 percent, the reduced-form coefficients imply that relative to 2003, those firms with at least one female director in 2002 had average industry-adjusted Q values in 2007 that were 0.26 higher than those firms with no female directors in 2002. In 2008, the difference is 0.31 and in 2009 it is 0.25. Again, these are sizable differences in firm value. In the placebo tests, we find evidence that higher 2002 female representation led to an increase in Tobin's Q in 2006 and 2009 for firms in other Scandinavian countries (similar to Norway), but we find no effect for firms in the U.S. This is consistent with the idea that firms in Scandinavia may have responded to the Norwegian quota in anticipation of a similar quota in their own country.

The reduced-form results indicate that the negative impact of the quota on firm value persists over time. Compared to 2003 firm values, firm valuations in 2007 through 2009 remain substantially lower for those firms most impacted by the quota. Unreported Wald tests of the differences of the coefficients for the 2007, 2008, and 2009 interaction terms are insignificant. This means that the value losses are not increasing after the mandatory deadline of the quota, but neither are the value losses being erased. The persistence in the value loss suggests that declines in firm value are not

simply temporary overreactions by the stock market. Instead, the imposition of the quota appears to have affected the fundamentals of Norwegian firms.

Finally, Panel C of Table IV presents the first-stage regression results which reveal the time-series average changes in female representation. As expected, the 2002 female board member representation is a strong predictor of the changes to female representation in Norwegian firms, with a large $F-$statistic indicating strong explanatory power. It is also interesting to note that the same pattern is observed for foreign firms, though the magnitudes are much smaller. Though the two placebo tests have low $F-$statistics, the point estimates imply that firms with fewer female board members are more likely to increase the number of female directors compared to firms with more female directors. This may simply reflect a reversion to the mean or it may indicate that firms choose to meet an informal quota of female board members, albeit low.

In summary, the results in this section indicate that the gender quota imposed substantial costs on shareholders of Norwegian firms and are consistent with the theory that boards are chosen to increase shareholder wealth. Firms with no female directors at the announcement of the gender quota lost over 3 percentage points in value compared to those with at least one female director. The instrumental variables estimates suggest that the forced addition of new female directors on boards led to value losses of upwards of 20 percent for the firms with large constraints. Reduced-form estimates confirm the prior results and demonstrate that the value losses are persistent across time. We recognize that these magnitudes may appear large and are conservative in our interpretation. However, it should not be forgotten how substantial is the change in board composition. These firms are undergoing a massive reorganization of their shareholder representatives, where over 30 percent of the members of their board of directors are changing, on average. Given the unprecedented nature of the change required by the gender law, we have no clear comparison to which we can directly measure these magnitudes.

V. How Does Board Structure Affect Firm Value?

In this section of the paper, we attempt to identify the changes to board characteristics that may lead to the loss of firm value. We first look at the differences in the characteristics of new versus exiting directors. Second, we investigate how the quota affected other aspects of the board besides

gender. We then look at the quota's effect on changes in firms' financial and investment policies, performance, and costs. Finally, we investigate the likelihood of changes in incorporation status to avoid the quota.

V.A. The Difference Between New, Retained, and Exiting Directors by Gender

As shown in Table II, the average size of corporate boards in Norway remained steady from 2001 to 2009, even as female representation changed dramatically. This implies that existing male directors were exiting the board in large numbers. Which men are kept as board members and which exit? How do the retained members compare to the new female members? Though the law only mandated a gender quota, it is likely that the new female directors will have different backgrounds than the existing men. For example, Figure I shows that the fraction of CEOs that are women in Norway is around five percent or less. Since many board members are current or past CEOs, the new female directors are likely to have less CEO experience than the existing male directors. Therefore, though the quota only mandated gender representation, it may have imposed de facto limits on other director characteristics, simply because the pool of female and male candidate directors differ on additional dimensions.

To better understand the change in the characteristics of board members induced by the quota, we compare the average backgrounds of new, retained, and exiting board members by their gender in Table V. There is a meaningfully large difference in CEO experience of female versus male directors, whether the director is new, retained, or exiting. Only 31.1 percent of the new female directors have CEO experience, compared to 65.2 percent of the exiting and 69.41 percent of the retained male directors. New female directors also have less CEO experience than retained female directors (43%). All of these differences are significantly different from zero, though the comparison between new and retained female directors test statistic is not reported. Similarly, the new female directors are statistically and substantially younger on average (45.8 years) than are the exiting male directors (52.9 years) and the retained male directors (54.1 years). Both of these characteristics indicate that existing male directors were replaced by new female directors who had less top-level experience. The new female directors are also less likely insiders (1.4%) as compared to retained (5.3%) and exiting (7.1%) men directors, but similar to retained and exiting women directors.

Other characteristics are more or less the same between the exiting male and new female directors. The likelihood of having an MBA degree is roughly constant for all categories at about 25 percent, though new female directors are more likely to be higher educated than either retained or exiting male directors. The fraction of Norwegian directors is lower for new directors than retained or exiting directors, but not significantly so. The likelihood that a new female director shares the same last name as another board member is roughly equal for new women as it is for exiting men, though retained male directors are more likely to share a common last name than are new female directors.

In Panel B, we provide the same analysis for the job titles reported as the directors' primary occupations. We find further evidence that the new female directors have different types of experience than the existing men. First, new female directors are more likely to be a vice-president, a non-executive manager, or a consultant, compared to retained and existing male directors. New female directors are also statistically less likely to be a CEO, a full-time board member, or a partner or principal, than are exiting male directors. These differences are quite large. For instance, 27 percent of retained male directors are CEOs, compared to just 16 percent for new female directors. Over 14 percent of new female directors are non-executive managers, compared to just 2.5 percent of retained male directors.

It is also useful to compare the men that left the board to the men that were retained. The outcome of this choice gives an alternative view of the characteristics that are valued by boards, where firms are not necessarily constrained. First, retained men are more likely to have CEO experience, to be older, to have longer board tenures, and are less likely to be a non-executive manager than are exiting men directors. These results provide further evidence that firms seek board members with experience at top-level positions, precisely what the new female directors lack. Finally, not surprisingly, directors who share a common last name are most common among the retained men, indicative of family-run firms.

We interpret the results in this table as additional evidence that the small supply of female directors led to boards that are substantially different on multiple dimensions, notably boards that have younger directors with less high-level experience. We acknowledge that we cannot determine if this is by choice or by necessity. Without having a sample of all possible candidate directors,

we cannot determine if firms are choosing to appoint younger women with less CEO experience. However, the evidence that the retained men are also more likely to be older and to have top-level experience suggests that these characteristics are valuable to firms and they are not likely to willingly choose to appoint less experienced and younger directors, male or female.

V.B. The Effect of the Quota on Board Characteristics

We next use the same instrumental variables approach as in subsection IV.B to provide causal evidence of how the quota impacted characteristics of Norwegian boards. First, in Panel A of Table VI, we run instrumental variable regressions of the effect of the mandated increase in women on the size, experience, age, and education of the board. Panel B presents the reduced form coefficients. These tests are identical to those presented in Table IV except that the dependent variable is changed. Board size and the fraction of board members with an MBA are unaffected. The change in the percentage of directors with degrees of higher education is larger for firms that faced a greater constraint from the quota, as shown by the reduced-form estimates. Consistent with the previous findings, the CEO experience and age of board members are both significantly reduced as a result of the gender quota. The estimates imply that a 20 percent increase in female representation on the board leads to a decline in the fraction of directors with CEO experience of nearly 12 percent. It is interesting to note that although board size is unchanged, we find strong evidence in columns (1) and (2) of Table VI that industry-adjusted log(assets) and log(employees) both increase as a result of the quota.

We also test whether the gender quota had an effect on CEOs. Since one of the main roles of the board of directors is to monitor and advise the CEO, a significant change in the board may alter the decision to replace a CEO, the likelihood of hiring a female CEO, or the compensation received by the CEO. We run these tests as linear probability models since binary choice models are not well specified if the explanatory variables are mainly dummy variables. In columns (8) through (10) of Table VI, we do not find strong evidence for any of these possible outcomes.

We also run IV regressions on the likelihood that a board has at least one member that has one of the outside occupations listed in Table V. We run these tests as linear probability models, as before. Consistent with our previous results, we find that the gender quota led to a lower likelihood

that at least one director is employed as a CEO. We also find weak evidence that the quota led to a smaller likelihood of having a consultant or a lawyer and a greater likelihood of having a partner or a professor on the board. These results are presented in Online Appendix Table III.

To test for the possibility that the quota led to an increase in 'captured' directors, we calculate the fraction of board members that were appointed prior to the current CEO. Hermalin and Weisbach (1998) argue that as a CEO becomes more entrenched, she will appoint new directors that are acquiescent. To calculate the fraction of pre-CEO directors we require a change in the CEO to identify which directors were appointed prior to the current CEO. For firms with board data in 2002, there are 331 firm-years over 2003 to 2009 where we can identify the fraction of the board that was appointed prior to the CEO, out of 641 total firm-years. Therefore, there may be selection bias in our tests since CEO changes are not randomly assigned. In unreported results, we run the same IV and reduced-form models as in our previous tests where the percentage of directors appointed prior to the current CEO is the dependent variable. The IV estimate is insignificant (coefficient$= -0.083$, $p-value = 0.870$, standard error$= 0.503$) and the reduced-form coefficients are insignificant in all years as well. This evidence supports our argument that the quota did not increase the ability to hire captured directors and that the value loss is unlikely to be related to increased managerial entrenchment.

Finally, we investigate the importance of directors for firm value by exploiting the variation in the timing of compliance with the quota. Recent theory and evidence argues that firms have heterogeneous needs for director expertise (Raheja, 2005; Harris and Raviv, 2008; Adams and Ferreira, 2007; Coles, Daniel, and Naveen, 2008). For instance, R&D-intensive firms may prefer insiders with firm-specific knowledge. Larger, diversified firms may require a larger number of directors with more varied backgrounds. In a model where firms have heterogeneous demand for directors, we expect that the firms that have the greatest need to find replacement directors with equivalent backgrounds as existing directors would be the first to comply with the quota. In contrast, those firms where directors are more easily replaced may choose to comply with the law later.

To test the determinants for early compliance, we run logit tests where the dependent variable equals one if the firm complied with the law by December 2006 and zero if the firm complied

afterward. An alternative break point is the end of the voluntary compliance period. We use December 2006 instead because it splits the two-year grace period from the enactment of the mandatory law in January 2006 to the compliance deadline of January 2008 in half and also roughly splits the sample in half. In our tests, we include only firms that have pre-quota data available in 2002, using the pre-quota variation across firms as explanatory variables. For brevity, we present these results in Online Appendix Table IV.

Not surprisingly, we find that the percentage of female board members in 2002 is positively and significantly related to early compliance with the law. We also find that the average age and CEO experience of board members is positively and significantly related to early compliance. In addition, firms with higher R&D expenditures are more likely to comply early with the law. To be certain that these effects are not simply picking up a positive correlation between the pre-quota percentage of women and other firm characteristics, we run the same tests using only those firms with no female directors in 2002. This ensures that each firm has an equally difficult time meeting the quota based solely on gender and isolates the other characteristics of directors. The qualitative results are unchanged in these tests. Firm size is unrelated to the decision to comply early in all tests. In addition, firms where board members share a common last name and where the CEO is on the board are significantly less likely to comply early with the law.

These results are consistent with the idea that firms have heterogeneous demands for directors. Those firms that value age and experience appear to have acted quickly to find replacement directors, anticipating the shortage of equally qualified women directors. Additionally, firms that require specialized expertise, proxied by R&D expenditures, also found replacements early. In contrast, firms where the management and the board of directors are inter-connected complied later. This may reflect that the quota will have less impact on these firms, since CEOs and family-members will continue to influence the direction of the firm, even after they are replaced on the board.

We interpret the results in this section to provide further evidence that directors are chosen to maximize shareholder wealth. Though the quota only mandated gender diversity, it de facto constrained the ability of firms to find replacement directors with the same sought-after characteristics of the replaced directors. Further, our finding that the sought-after characteristics were age and

top-level management experience is consistent with the hypothesis that directors add value through monitoring and advising.

V.C. The Effect of the Gender Quota on Firm Policies

In this section of the paper, we investigate a number of channels through which the change in board member characteristics may have led to a loss in value. If the new board lacks the expertise or experience of the pre-quota board, the management may make fundamentally different decisions about financial and investment policies, impacting performance measures and cost structures of the firm. These policy choices are not exhaustive, but capture many of the most important decisions faced by a firm.

In Table VII, we run identical IV regressions as before using the pre-quota variation in female representation as our exogenous instrument, but where the dependent variable is a financial policy choice or an investment choice. All variables are industry-adjusted. As mentioned previously, Norwegian firms were required to change from local to international accounting standards (IFRS) in 2005. Therefore, for robustness, we run each of our tests with both the full sample and the subset of firm-years where firms reported using international standards, as some firms voluntarily reported using IFRS prior to 2005. The change in accounting standards have a greater affect on income statement variables, such as return on assets and costs/sales than they have on balance sheet items, such as leverage and cash holdings (Gjerde, Knivsfla, and Sættem, 2008). This implies that differences in results for performance measures and costs between the full sample and the IFRS sample are more likely related to accounting differences, whereas differences in results for financial and investment policies are more likely related to other differences between the two samples.

In columns (1) – (6) of Table VII, we examine the impact of the quota on financial policy. We find that by all three measures, firms increase their financial risk. Specifically, both leverage (total liabilities/assets) and current debt/equity increased as a result of the quota, though this result is not significant in the international accounting standards subsample. In addition to the increase in debt levels, we also find that the quota led to a decline in cash holdings, but again not in both samples. The coefficient estimates imply changes of substantial economic significance. For a 20 percent increase in female board representation, leverage increases by 6.4 percentage points,

compared to a mean of 55 percent. Cash as a fraction of assets declines by 5.4 percentage points for the same change in the board, compared to an average of 15.9 percent. As seen in the results from the reduced form analysis, the increase in debt and decrease in cash occur in the later years of the sample, during the same period when we find significant value declines.

In columns (7) – (12), we investigate the investment policies of the firm. We find evidence that the firms most affected by the quota undertook significantly more acquisitions than those less affected. This is consistent with the increase in debt and reduction in cash, since our acquisition variable is the cash outflow for acquisitions in that year. The magnitude of the coefficient estimates imply meaningful increases of one to four percentage points of acquisitions relative to assets for a 20 percent increase in female representation. Similar to financial leverage, the significantly higher levels of acquisition expenditures are found in the later years in the sample, corresponding to years when firm value declined substantially. Other studies have linked acquisitions to value losses. Moeller, Schlingemann, and Stulz (2004) show that an average U.S. acquirer loses $25 million at the announcement of an acquisition. The increase in acquisitions is also consistent with the result that the quota led to increases in firm size and employment. We find evidence of a modest decrease in capital expenditures and a modest increase in R&D. Since directors are more likely to be directly involved in decisions about major acquisitions than about R&D expenditures or capital expenditures, these results are consistent with the findings in the prior section. In particular, we would expect that a change in the percentage of board members with top-level management experience would have a greater impact on acquisition policies than other investment policies.

The next sets of outcomes we investigate are performance measures and costs structures in Table VIII. First, using acquisition data from SDC, we find that the yearly aggregated industry-adjusted abnormal announcement returns are weakly higher for firms less affected by the quota which supports the interpretation that less experienced directors may be involved in poor acquisition decisions, though the results are only present in a few of the reduced-form estimates. Next, we find that the change in the board following the gender quota led to lower daily industry-adjusted returns and lower asset turnover (sales/assets), a measure of firm efficiency. We also find evidence in the reduced-form estimates using international accounting standards that return on assets (ROA) was higher for those firms that had a smaller change required by the quota. Both decreases in ROA

and asset turnover are consistent with lower market valuations and suggest that changes in the board may hinder the efficiency and profitability of the firm. In columns (7)–(10), we find evidence that both fixed costs (SGA/Sales) and variable costs (COGS/Sales) increased as a result of the quota-induced board changes.

In sum, the results of the analyses in this section provide evidence that the gender quota changed the characteristics of directors in multiple dimensions. Directors became younger and less experienced at top managerial levels. In addition, the quota led to substantial changes in firm policies. Firms grew through debt-financed acquisitions, while efficiency decreased. These results are consistent with the idea that experienced board members act as valuable monitors and advisors for CEOs and that firms seek directors who have particular backgrounds to maximize shareholder wealth.

It is important to note, however, that we cannot directly test for a causal relationship between the effect of any one of these changes to the board and firm value. The exogenous shock utilized in this paper is based purely on the gender quota and the subsequent firm choices are endogenous. Because the quota caused the demographics of directors to change in multiple dimensions, including gender, age, and experience, our estimates capture all of these effects and potentially others. Therefore, though we would like to directly test the marginal impact on value caused by gender versus experience, or experience versus age, these tests could not provide any causal evidence and their interpretations would be unclear. We therefore rely on the direct tests of the impact of the quota on value, board characteristics, and firm policies to illustrate how the quota led to the appointment of directors that were less capable as advisors and monitors.

Nevertheless, in tests reported in Online Appendix Table V, we run OLS regressions of Tobin's Q on board characteristics and find that the negative effect of gender becomes insignificant when age and experience are included, which could imply that the effect is not driven by gender changes. However, we are careful to place little emphasis on such tests due to their inherent endogeneity. In addition, we cannot be sure that omitted variables do not confound these tests and affect their estimated magnitudes. For instance, age may be correlated with risk aversion and experience may proxy for a director's social connections. However, our main results do provide strong casual evidence of the effect of the quota on value, board characteristics, and firm policies individually.

V.D. The Effect of the Gender Quota on Incorporation Rates

If the negative effects of the gender quota on firm value were as large as our evidence suggests, we would expect to see firms try to avoid the law altogether. There are at least two ways that firms could do this. First, existing firms could change their form of legal organization to private limited, rather than public limited. Second, firms could incorporate in another country. In this section, we provide evidence that both changes occurred following the introduction of the law.

Using data from Statistics Norway, Figure II presents the time series of the number of all public limited and private limited firms in Norway from 2001 to 2009. There are, of course, many more private limited firms, so we normalize the time series to 1 in 2001. We also present the time series of total employment in Norway over this time period for comparison.

The figure shows that there is a steady decline in public limited firms starting in 2003 and continuing throughout the period. By 2009, there are less than 70 percent as many public limited firms in Norway as there were in 2001. In contrast, the number of private limited firms increases beginning in 2003 and continues throughout, ending in 2009 with over 30 percent more private limited firms than existed in 2001. These changes occur at a time when employment is increasing, with the exception of 2009. This indicates that, while the economy was growing, firms were more likely to choose to organize as a private limited firm rather than a public limited firm starting in the years after the announcement of the gender quota law, which only affects public limited firms. These data do not allow us to identify firms that changed incorporation status, but reflect the net change in incorporation status, including new incorporations, reincorporations, and terminations.

Next, we investigate the likelihood of delisting by our sample firms, based on their pre-quota percentage of female directors in 2002. We expect that if the quota imposed substantial costs on firms, those firms where the costs of compliance were highest would be the most likely to delist. Not all delistings entail going private, however, so we identify the reason for delisting. To do so, we read newspaper articles to classify delistings into five categories: *i*) went private or changed the country of incorporation, *ii*) acquired by a private or foreign firm, *iii*) acquired by a Norwegian public firm, *iv*) bankruptcy, or *v*) other or no reason can be determined. Notice that reasons *i* and *ii* allowed the firm to continue its operations but avoid the quota, whereas *iii* does not allow the firm to avoid the quota.

Of the 119 firms in 2002, 49 delisted by the end of 2009. Of the 80 firms with no female directors in 2002, 37 (46.3%) delisted, compared to 12 delistings out of 39 firms (30.8%) with at least one female director. The most common reason for delisting was an acquisition by a private or foreign firm (25), followed by going private or relocation (13), and an acquisition by a Norwegian public company (6). However, of the 38 firms that avoided the quota through an acquisition by a private or foreign firm, or by going private or relocating, 81.6% had no female directors in 2002. In contrast, of the firms that delisted following an acquisition by a public Norwegian firm, and thus did not avoid the quota, only 50% had no female directors in 2002.

These statistics provide evidence that the firms most affected by the quota chose to avoid the law through a change in incorporation. Table IX presents additional multivariate evidence controlling for other factors that are likely to affect the decision to delist. Using the sample of 2002 firms, we run logit tests on the likelihood of delisting any time in 2003 to 2009. In columns (1)–(3), the dependent variable records if the firm delisted for any reason. In columns (4)–(6), the dependent variable is one if the firm delisted and avoided the quota (reasons *i* and *ii* above), and zero otherwise. In all specifications, the pre-quota percentage of female directors is negatively and significantly related to the likelihood of delisting, indicating that those firms more affected by the quota were more likely to delist over 2003 to 2009. We also find that firms are more likely to delist if they have a younger board with less CEO experience. This complements our prior finding that firms are more likely to comply early if they have an older board with more CEO experience. These results hold after controlling for firm size, the level of risky investment (proxied by R&D expenditures), and industry effects.

In sum, our analysis in this section suggests that the gender quota imposed large enough costs on firms that those most affected avoided the law by changing their legal status. We find evidence consistent with this both at the aggregate country level as well as at the firm level. Though we do not control for this attrition bias in our main tests, it is most likely that if we could retain those firms that avoided the law in our sample, our main results would be strengthened.

VI. Conclusions

In this paper, we exploit a natural experiment in Norway to identify the impact of corporate boards on firm value. Using the predetermined variation in the percentage of women on corporate boards to measure the exogenous change in boards mandated by a gender quota first passed in 2003, we find that the quota led to a substantial decline in Tobin's Q. We also document a significantly different stock price reaction to the announcement of the law for those firms with at least one female director (-0.02%) compared to firms with no female directors (-3.54%). These results are consistent with the hypothesis that boards are chosen to maximize shareholder value and that imposing a severe constraint on the choice of directors leads to economically large declines in value.

Next, we show that the limited pool of new female directors led multiple characteristics of boards to change as a result of the quota. New women directors had significantly less CEO experience and were younger than the existing men directors. Using the exogenous nature of our setting, we then show that, consistent with the value loss, the quota led firms to take on more debt, make more and underperforming acquisitions, and grow in absolute size, while the size of the board remained constant. We also find significant decreases in operating performance and higher costs as a result of the imposition of the quota. These results are consistent with boards of directors that lack sufficient experience to act as capable advisors. However, our setting does not allow us to separately identify the causal effect of age, experience, or gender on firm value.

Our results are relevant to academics, investors, and policy makers. This paper presents the first evidence on the effect of the groundbreaking quota rules adopted in Norway. Other countries have recently passed or are currently considering similar laws. For example, Spain, Iceland, and France have all passed similar quota laws. Our results quantify the costs of such laws borne by shareholders and point to the potential causes of the value decline. In addition, we present evidence that firms avoid the quota by relocating or changing incorporation status. These results may provide policymakers guidance on how to maintain value while providing greater gender equality in the boardroom.

This paper also extends prior research on similar gender mandates in political settings. Just as government policies are affected by new legislators elected by mandate, we study how newly appointed female directors affect firm policies and firm value. Prior research investigating electoral

quotas may provide clues to how the boardroom quotas will affect firms and workers in the future. For instance, will an increase in female board members change the hiring practices or compensation for rank-and-file employees, similar to the change in government spending following electoral quotas? Will perceptions of female corporate leaders change, and if so, will this change the career paths of young women? The search for answers to these and many other interesting questions are important avenues for future research.

References

Adams, Renée B., and Daniel Ferreira, 2007, A theory of friendly boards, *The Journal of Finance* 62, 217–247.

———, 2009, Women in the boardroom and their impact on governance and performance, *Journal of Financial Economics* 94, 291–309.

Adams, Renée B., Benjamin E. Hermalin, and Michael S. Weisbach, 2011, The role of boards of directors in corporate governance: A conceptual framework & survey, *Journal of Economic Literature, forthcoming.*

Agrawal, Anup, and Charles R. Knoeber, 2001, Do some outside directors play a political role?, *Journal of Law and Economics* 44, 179–198.

Angrist, Joshua D., and Jörn-Steffen Pischke, 2009, *Mostly Harmless Econometrics: An Empiricist's Companion* (Princeton University Press: Princeton, New Jersey).

Beaman, Lori, Raghabendra Chattopadhyay, Esther Duflo, Rohini Pande, and Petia Topalova, 2009, Powerful women: Does exposure reduce bias?, *The Quarterly Journal of Economics* 124, 1497–1540.

Bebchuk, Lucian A., and Jesse M. Fried, 2005, Pay without performance: Overview of the issues, *Journal of Applied Corporate Finance* 17, 8–23.

Bertrand, Marianne, Esther Duflo, and Sendhil Mullainathan, 2004, How much should we trust differences-in-differences estimates?, *The Quarterly Journal of Economics* 119, 249–275.

Bertrand, Marianne, Claudia Goldin, and Lawrence F. Katz, 2010, Dynamics of the gender gap for young professionals in the financial and corporate sectors, *American Economic Journal: Applied Economics* 2, 228–255.

Bitti, Mary Teresa, 2010, Look who is legislating seats for women at the boardroom table, *CBC News* October 20.

Bøhren, Øyvind, and R. Øystein Strøm, 2006, Aligned, informed, and decisive: Characteristics of value-creating boards, *BI Norwegian School of Management Working Paper.*

Byrd, Daniel T., and Mark S. Mizruchi, 2005, Bankers on the board and the debt ratio of firms, *Journal of Corpoate Finance* 11, 129–173.

Chattopadhyay, Raghabendra, and Esther Duflo, 2004, Women as policy makers: Evidence from a randomized policy experiment in India, *Econometrica* 72, 1409–1443.

Chhaochharia, Vidhi, and Yaniv Grinstein, 2007, Corporate governance and firm value: The impact of the 2002 governance rules, *The Journal of Finance* 62, 1789–1825.

Coles, Jeffrey L., Naveen D. Daniel, and Lalitha Naveen, 2008, Boards: Does one size fit all?, *Journal of Financial Economics* 87, 329–356.

Criscione, Valeria, 2002, Oslo's boardroom battle, *Financial Times* March 13.

Dahya, Jay, and John J. McConnell, 2007, Board composition, corporate performance and the Cadbury Committee recommendation, *Journal of Financial and Quantitative Analysis* 42, 535–564.

Demsetz, Harold, and Kenneth Lehn, 1985, The structure of corporate ownership: Causes and consequences, *The Journal of Political Economy* 93, 1155–1177.

Duchin, Ran, John G. Matsusaka, and Oguzhan Ozbas, 2010, When are outside directors effective?, *Journal of Financial Economics* 96, 195–214.

European Commission, 2011, The gender balance in business leadership, *European Commission Staff Working Paper*.

Fahlenbrach, Rüdiger, Angie Low, and René Stulz, 2010, Why do firms appoint CEOs as outside directors?, *Journal of Financial Economics* 97, 12–32.

Fama, Eugene F., and Michael C. Jensen, 1983, Separation of ownership and control, *Journal of Law and Economics* 26, 301–325.

Farrell, Kathleen A., and Philip L. Hersch, 2005, Additions to corporate boards: The effect of gender, *Journal of Corporate Finance* 11, 85–106.

Fox, Holly, 2011, Business leaders divided on workplace gender quotas, *Deutsche Welle* February 2.

Gjerde, Øystein, Kjell Knivsfla, and Frode Sættem, 2008, The value-relevance of adopting IFRS: Evidence from 145 NGAAP restatements, *Journal of International Accounting, Auditing and Taxation* 17, 92–112.

Goldsmith, Charles, 2002, Norway plans to require gender equality on corporate boards, *The Wall Street Journal* July 19, A.9.

Güner, A. Burak, Ulrike Malmendier, and Geoffrey Tate, 2008, Financial expertise of directors, *Journal of Financial Economics* 88, 323–354.

Harris, Milton, and Artur Raviv, 2008, A theory of board control and size, *The Review of Financial Studies* 21, 1797–1832.

Helland, Eric, and Michael Sykuta, 2004, Regulation and the evolution of corporate boards: Monitoring, advising, or window dressing?, *Journal of Law and Economics* 47, 167–193.

Hermalin, Benjamin E., and Michael S. Weisbach, 1991, The effects of board composition and direct incentives on firm performance, *Financial Management* 20, 101–112.

———, 1998, Endogenously chosen boards of directors and their monitoring of the CEO, *American Economic Review* 88, 96–118.

———, 2003, Boards of directors as an endogenously determined institution: A survey of the economic literature, *Economic Policy Review* 9, 7–26.

Herr, Jane Leber, and Catherine Wolfram, 2010, Work environment and "opt-out" rates at motherhood across high-education career paths, *NBER Working Paper*.

Higgs, Derek, 2003, Review of the role and effectiveness of non-executive directors, *United Kingdom Department of Trade and Industry*.

Jensen, Michael C., 1993, The modern industrial revolution, exit, and the failure of internal control systems, *The Journal of Finance* 48, 831–880.

Klein, April, 1998, Firm performance and board committee structure, *Journal of Law and Economics* 41, 275–303.

Kroszner, Randall S., and Philip E. Strahan, 2001, Bankers on boards: Monitoring, conflicts of interest, and lender liability, *Journal of Financial Economics* 62, 415–452.

Kuhnen, Camelia M., 2011, Searching for jobs: Evidence from MBA graduates, *Northwestern University Working Paper*.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert W. Vishny, 1998, Law and finance, *The Journal of Political Economy* 106, 1113–1155.

Linck, James S., Jeffry M. Netter, and Tina Yang, 2008, The determinants of board structure, *Journal of Financial Economics* 87, 308–328.

Lindahl, Björn, 2003, Women on the board – threat of quotas makes the debate pick up pace, *Nordic Labour Journal* November 1.

Moeller, Sara B., Frederik P. Schlingemann, and René M. Stulz, 2004, Firm size and the gains from acquisitions, *Journal of Financial Economics* 73, 201–228.

Nenova, Tatiana, 2003, The value of corporate voting rights and control: A cross-country analysis, *Journal of Financial Economics* 68, 325–351.

Noack, Turid, and Kenneth Aarskaug Wiik, 2008, Women's choice of surname upon marriage in Norway, *Journal of Marriage and Family* 70, 507–518.

Ødegaard, Bernt Arne, 2007, Price differences between equity classes: Corporate control, foreign ownership or liquidity?, *Journal of Banking & Finance* 31, 3621–3645.

Øie, Kjell Erik, 2007, Gender equality: A key component of a modern growth strategy, in *Economic Commission for Europe, 60th Anniversary Session*.

Page, Scott E., 2007, *The Difference: How the Power of Diversity Creates Better Groups, Firms, Schools, and Societies* (Princeton University Press).

Pande, Rohini, 2003, Can mandated political representation increase policy influence for disadvantaged minorities? Theory and evidence from India, *The American Economic Review* 93, 1132–1151.

Petersen, Mitchell A., 2009, Estimating standard errors in finance panel data sets: Comparing approaches, *The Review of Financial Studies* 22, 435–480.

Petry, Stefan, 2009, Workers on the board and shareholder wealth: Evidence from a natural experiment, *University of Melbourne Working Paper*.

Pinkowitz, Lee, René Stulz, and Rohan Williamson, 2006, Does the contribution of corporate cash holdings and dividends to firm value depend on governance? A cross-country analysis, *The Journal of Finance* 61, 2725–2751.

PIRC, 2011, Italy legislates for gender target, *PIRC News*.

Raheja, Charu G., 2005, Determinants of board size and composition: A theory of corporate boards, *Journal of Financial and Quantitative Analysis* 40, 283–306.

Romano, Roberta, 2005, The Sarbanes-Oxley Act and the making of quack corporate governance, *The Yale Law Journal* 114, 1521–1611.

Stevenson, Betsey, 2010, Beyond the classroom: Using Title IX to measure the return to high school sports, *The Review of Economics and Statistics* 92, 284–301.

Toomey, Christine, 2008, Quotas for women on the board: Do they work?, *The Sunday Times* June 8.

Vijselaar, Jiska, 2011, Met of zonder quota: de vrouwen komen eraan, *VNO-NCW Opinieblad Forum* 6, 24–27.

Westphal, James D., 1998, Board games: How CEOs adapt to increases in structural board independence from management, *Administrative Science Quarterly* 43, 511–537.

Yermack, David, 1996, Higher market valuation of companies with a small board of directors, *Journal of Financial Economics* 40, 185–211.
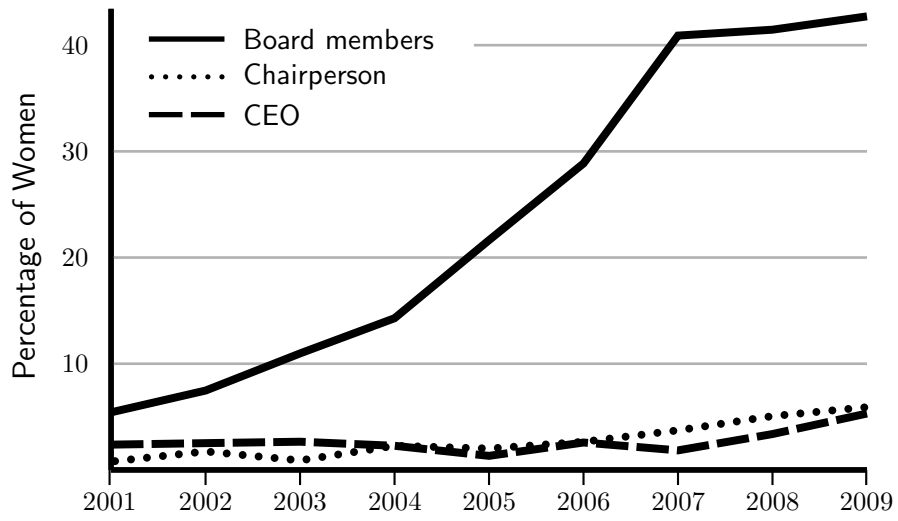
FIGURE I
Percentage of Women Directors and CEOs of Norwegian Public Limited Firms
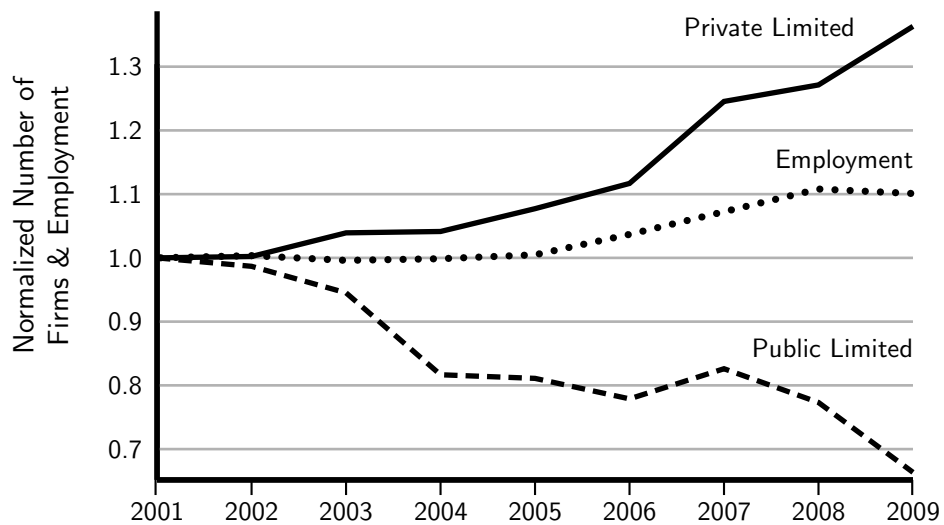
FIGURE II

Number of Firms by Organizational Status in Norway

Numbers of firms include firms of any size. In 2001, there were 529 public limited firms (Allmennaksjeselskap (ASA)) and 118,533 private limited firms (Aksjeselskap (AS)). In 2009, there were 351 public limited firms and 161,584 private limited firms. If firms were restricted to have 50 or more employees, the pattern would be the same with 126 and 2,816 public and private firms in 2001 and 69 and 3,536 firms in 2009. Employment was 2.28 million persons in 2001 and 2.51 million persons in 2009. Each series is normalized to start at 1 in 2001. Data are from Statistics Norway (Statisisk sentralbyrå).

TABLE I
BOARDROOM GENDER QUOTA LAWS AND RECOMMENDATIONS BY COUNTRY

Country	Year Quota Passed	Mandatory Quota	Quota Compliance Year	Gender Equality in Governance Code	Average Percent of Women on Boards in 2010
Norway	2003	40%	2008	2009	39
Spain	2007	40%	2015	2006	10
Iceland	2010	40%	2013		16
Finland	2010[a]	1 Woman	2010	2010	26
France	2011	40%	2017	2010	12
Belgium	Pending[a]	33%	N/A	2009	10
Netherlands	Pending[b]	30%	2015	2010	15
Italy	Pending[c]	30%	2015		5
Sweden	Discussion[d]			2004	26
Germany	Discussion[e]			2009	13
UK	Discussion[f]			2010	9
Canada	Discussion[g]				14
Denmark				2008	18
Luxembourg				2009	4
Australia				2009	8
US				2009	16
Austria				2010	9
Poland				2010	12

Pending indicates that a law has passed at least one stage of the legislative process. *Discussion* indicates that media sources cite politicians debating a quota. *Gender Equality in Governance Code* indicates the year in which the country's code of good governance recommended gender equality. *Average percent of women on the board of directors in 2010* for European countries is taken from the European Commission Database on Women & Men in Decision Making. For non-European countries the data is from Catalyst. Data for *Year Quota Passed* is from European Commission (2011), unless otherwise noted: *a*: Legislative Document No. 5-603/1 of the Belgian Senate, *b*: Vijselaar (2011), *c*: PIRC (2011), *d*: Sweden had discussions in 2003 (Lindahl, 2003), *e*: Fox (2011), *f*: 2011 Lord Davies Report, *g*: Bitti (2010). Note that Finland's quota is in the governance code and requires firms to have at least one woman director or to explain why they do not.

TABLE II

FIRM AND BOARD OF DIRECTORS SUMMARY STATISTICS BY YEAR

	2001	2002	2003	2004	2005	2006	2007	2008	2009
Panel A. Board Characteristics									
Number of Members	5.54	5.53	5.39	5.32	5.39	5.60	5.63	5.57	5.29
Female (%)	5.42	7.47	10.97	14.29	21.64	28.75	40.80	41.39	42.62
CEO Experience (%)	73.62	64.86	68.21	66.01	61.52	59.05	55.69	55.55	58.44
MBA (%)	22.45	23.69	25.71	25.65	26.39	27.88	25.82	24.62	21.63
Higher education (%)	25.38	26.15	28.14	29.42	25.69	28.15	29.60	27.42	28.67
Age	50.47	51.25	51.47	51.79	50.86	50.75	50.91	51.34	52.26
Tenure (years)	4.33	3.03	2.46	2.40	2.17	2.32	2.10	2.23	2.58
Insider (%)	2.22	2.21	2.87	4.96	2.72	1.54	2.31	1.65	1.80
Std. dev (age)	7.87	8.15	8.08	8.23	8.17	8.02	8.07	8.24	7.67
Std. dev. (tenure)	2.25	1.60	1.36	1.36	1.50	1.80	1.75	1.82	1.76
Percent retained from prior year		78.22	80.23	82.26	78.68	80.04	71.41	76.35	78.30
Norwegian (%)	89.24	92.75	90.46	90.17	91.15	91.72	91.46	89.80	89.59
Same name as other on board (%)	4.55	5.19	4.09	3.83	3.16	2.99	3.10	3.84	5.16
Board or CEO positions/person	2.44	2.38	2.52	2.82	2.80	3.34	3.71	3.11	2.94
Positions/Board size	1.94	2.03	2.13	2.55	2.44	2.80	3.20	2.71	2.63
Panel B. Outside Occupation of Shareholder Elected Directors (%)									
Vice President	6.19	6.34	5.02	4.20	5.76	7.14	8.91	8.83	9.06
Consultant	8.87	13.65	9.72	7.14	6.72	8.29	9.79	10.22	9.32
Board member	22.70	20.60	23.19	21.09	21.33	17.58	14.80	11.73	19.25
Professor	2.15	1.35	1.55	1.92	2.39	1.67	1.36	1.22	1.13
CEO	25.20	25.95	26.34	26.43	24.56	25.49	23.39	26.37	24.36
Attorney	2.10	0.54	2.02	4.70	3.94	3.93	3.86	4.44	4.30
Non-executive manager	5.38	5.05	4.60	4.91	6.36	6.43	7.76	6.71	6.77
CFO	3.87	3.99	4.40	3.87	3.40	5.95	6.04	6.14	3.94
Partner/Principal	17.38	17.07	17.13	16.48	19.55	17.55	17.87	18.84	16.39
Accountant	0.00	0.00	0.00	0.79	0.33	0.00	0.16	0.00	0.00
Other	3.47	3.27	2.70	3.71	3.09	4.48	3.84	3.86	3.53
Panel C. Firm Characteristics									
Tobin's Q	1.44	1.21	1.54	1.67	1.88	1.88	1.71	1.11	1.35
Log(assets)	4.88	4.98	4.95	5.03	5.14	5.44	5.71	5.57	5.92
Log(employees)	−0.66	−0.62	−0.70	−0.67	−1.01	−0.90	−0.80	−0.73	−0.40
Leverage (%)	56.97	56.44	54.04	53.95	51.85	53.38	54.03	57.24	57.27
Current Debt/Equity (%)	15.26	17.28	13.67	12.51	21.34	22.49	19.89	35.71	21.07
Cash/Assets (%)	13.13	14.05	16.01	16.75	17.15	19.61	17.08	14.09	14.30
Capex/Assets (%)	7.58	5.86	4.94	5.97	6.22	7.44	8.53	9.43	6.20
Acquisitions/Assets (%)	0.56	0.51	0.65	1.24	1.27	2.19	2.86	1.15	0.40
R&D/Assets (%)	0.96	0.96	0.87	1.15	0.58	1.06	2.05	2.24	2.15
Observations	127	119	113	131	151	155	163	148	113

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, where available. All variable definitions are in Appendix I. Outside occupations are not mutually exclusive and so do not add to 100%.

TABLE III
STOCK RETURNS AT THE INITIAL ANNOUNCEMENT OF THE BOARDROOM GENDER QUOTA

A. Abnormal Announcement Returns (%) of Norwegian Firms

	All Firms	No Women Directors	Women Directors> 0	Difference
	(1)	(2)	(3)	(2)-(3)
Mean	−2.573***	−3.547***	−0.024	−3.523***
	(0.001)	(0.001)	(0.977)	(0.008)
Median	−1.804**	−2.521**	−0.928	−1.593*
	(0.017)	(0.010)	(0.845)	(0.054)
Observations	94	68	26	

B. OLS Regressions on Abnormal Announcement Returns (%)

	Norwegian and US Firms				Scandinavian Firms	
	(1)	(2)	(3)	(4)	(5)	(6)
Norwegian dummy	−4.347***	−4.146***	−3.803**	−3.574**	−4.026**	−3.773**
	(1.468)	(1.404)	(1.571)	(1.525)	(1.671)	(1.644)
Women directors > 0	0.046		−0.214		−1.536	
	(0.320)		(0.381)		(1.041)	
Percentage women directors		0.594		−0.390		−9.457
		(1.928)		(2.319)		(6.344)
Norwegian × Women directors > 0	3.477**		3.252*		4.775**	
	(1.648)		(1.658)		(1.897)	
Norwegian × Percentage women directors		14.342*		12.517		23.724**
		(7.589)		(7.861)		(10.746)
Board size			−0.052	−0.060	0.246	0.287
			(0.068)	(0.065)	(0.314)	(0.323)
Log(Assets)			0.362**	0.350**	0.021	−0.039
			(0.149)	(0.150)	(0.305)	(0.321)
Constant	0.799***	0.776***	−1.206	−1.137	−0.920	−0.954
	(0.271)	(0.265)	(1.093)	(1.088)	(1.687)	(1.715)
Adjusted R^2	0.025	0.024	0.030	0.029	0.056	0.053
Observations	1,252	1,252	1,224	1,224	205	205

Abnormal returns are the sum of industry-adjusted returns (using US industry returns) over the five days surrounding the date of the first announcement of the gender quota on February 22nd, 2002. *Women Directors > 0* is a dummy variable equal to 1 if the firm has at least 1 women director. *Percentage women directors* is the percentage of the shareholder-elected board members that are women. *Board size* is the number of board members. Board data is taken from the 2001 annual reports. Scandinavian firms include firms in Norway, Denmark, Finland, and Sweden. Statistical significance is reported as $p-$values in Panel A ($t-$tests for the mean and sign and rank-sum tests for the medians) and robust standard errors clustered by industry in Panel B. * Significant at 10%; ** at 5%; *** at 1%.

TABLE IV
EFFECTS OF BOARD MEMBER GENDER QUOTAS ON TOBIN'S Q

| | | Placebo Tests | |
	Norway	Denmark, Finland, and Sweden	U.S.A.
	(1)	(2)	(3)
Panel A. Instrumental Variables Regressions: Dependent Variable = Industry-Adjusted Q			
Percent Women Directors$_t$	−1.938***	−3.635	−0.264
	(0.586)	(2.352)	(0.465)
Year Fixed Effects	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes
F-statistic	29.790	20.240	2.690
Observations	603	634	2,706
Panel B. Reduced Form Regressions: Dependent Variable = Industry-Adjusted Q			
2004 Dummy × Percent of Women in 2002	−0.340	−0.008	−0.027
	(0.228)	(0.397)	(0.078)
2005 Dummy × Percent of Women in 2002	−0.261	0.292	0.077
	(0.416)	(0.556)	(0.096)
2006 Dummy × Percent of Women in 2002	0.535	1.443**	0.080
	(0.492)	(0.737)	(0.092)
2007 Dummy × Percent of Women in 2002	1.124**	1.112	0.028
	(0.512)	(0.926)	(0.112)
2008 Dummy × Percent of Women in 2002	1.352***	0.902	−0.085
	(0.492)	(0.717)	(0.129)
2009 Dummy × Percent of Women in 2002	1.080*	1.246*	−0.053
	(0.555)	(0.690)	(0.148)
Year Fixed Effects	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes
F-statistic	15.840	18.130	2.430
Observations	605	721	2,999

TABLE IV
(CONTINUED)

	Norway	Placebo Tests	
		Denmark, Finland, and Sweden	U.S.A.
	(1)	(2)	(3)
Panel C. First-Stage Regressions: Dependent Variable = Percent Women Directors$_t$			
2004 Dummy	0.047***	0.041***	0.010***
	(0.012)	(0.009)	(0.003)
2005 Dummy	0.128***	0.059***	0.024***
	(0.017)	(0.011)	(0.004)
2006 Dummy	0.212***	0.095***	0.037***
	(0.017)	(0.013)	(0.005)
2007 Dummy	0.354***	0.092***	0.041***
	(0.013)	(0.014)	(0.005)
2008 Dummy	0.368***	0.110***	0.049***
	(0.014)	(0.015)	(0.005)
2009 Dummy	0.368***	0.114***	0.055***
	(0.014)	(0.033)	(0.006)
2004 Dummy × Percent of Women in 2002	−0.117	−0.177**	−0.050**
	(0.073)	(0.077)	(0.025)
2005 Dummy × Percent of Women in 2002	−0.274***	−0.188	−0.139***
	(0.091)	(0.119)	(0.036)
2006 Dummy × Percent of Women in 2002	−0.419***	−0.412***	−0.190***
	(0.087)	(0.116)	(0.046)
2007 Dummy × Percent of Women in 2002	−0.793***	−0.286**	−0.195***
	(0.089)	(0.115)	(0.047)
2008 Dummy × Percent of Women in 2002	−0.807***	−0.344***	−0.250***
	(0.082)	(0.116)	(0.044)
2009 Dummy × Percent of Women in 2002	−0.799***	−0.546*	−0.277***
	(0.091)	(0.293)	(0.051)
Firm Fixed Effects	Yes	Yes	Yes
F-statistic	19.670	6.150	8.400
Observations	603	634	2,706

Norwegian firms are included in results in column (1), Danish, Finnish, and Swedish firms in column (2), and US firms in column (3). *Percent Women Directors$_t$* is a predicted variable estimated in the first stage regressions. *Percent of Women in 2002* records the percentage of shareholder-elected directors that were women as reported in the firm's 2002 annual report. Year 2003 is omitted. Standard-errors are clustered by firm and are reported in parentheses. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

TABLE V

CHARACTERISTICS OF NEW, RETAINED, AND EXITING DIRECTORS BY GENDER

	New		Retained		Exiting		Differences		
	Women	Men	Women	Men	Women	Men			
	(1)	(2)	(3)	(4)	(5)	(6)	(1)−(4)	(1)−(6)	(4)−(6)
Panel A. Demographics									
CEO Exp. (%)	31.18	63.86	42.97	69.41	36.02	65.17	−38.24***	−34.00***	4.24*
							(−15.527)	(−11.284)	(1.930)
MBA (%)	26.09	25.82	28.06	24.31	25.82	24.81	1.78	1.27	−0.50
							(0.759)	(0.446)	(−0.241)
Higher Educ. (%)	33.09	19.46	35.41	24.97	30.06	23.27	8.13***	9.83***	1.70
							(3.264)	(3.329)	(0.832)
Age	45.84	50.37	48.24	54.08	47.58	52.94	−8.24***	−7.10***	1.14***
							(−23.615)	(−16.079)	(3.252)
Tenure	0.00	0.00	2.19	3.94	1.37	2.54	−3.94***	−2.54***	1.40***
							(−38.983)	(−16.000)	(7.744)
Insider (%)	1.42	4.36	0.88	5.33	1.50	7.05	−3.91***	−5.63***	−1.72
							(−4.322)	(−3.785)	(−1.208)
Norwegian (%)	87.55	85.53	90.28	90.04	88.28	87.88	−2.49	−0.33	2.16
							(−1.152)	(−0.135)	(1.488)
Same Last Name	3.33	4.62	4.06	6.98	2.81	4.35	−3.65***	−1.01	2.64***
							(−4.325)	(−1.069)	(3.599)
Panel B. Primary Outside Occupation (%)									
VP	13.48	6.81	10.72	5.83	14.29	4.96	7.64***	8.51***	0.87
							(3.603)	(3.670)	(0.694)
Consultant	14.18	9.81	6.90	9.45	9.02	9.66	4.74**	4.52*	−0.21
							(2.145)	(1.759)	(−0.126)
Board member	9.93	16.89	15.71	20.36	11.28	19.32	−10.43***	−9.39***	1.03
							(−5.081)	(−3.485)	(0.457)
Professor	2.13	1.09	3.23	1.33	3.01	1.31	0.80	0.82	0.03
							(0.877)	(0.792)	(0.040)
CEO	16.31	28.34	21.59	27.14	19.55	25.85	−10.83***	−9.54***	1.29
							(−4.380)	(−3.035)	(0.516)
Attorney	5.32	2.18	4.70	3.30	4.51	3.39	2.02	1.92	−0.10
							(1.432)	(1.182)	(−0.094)
Non-exec. Mgr.	14.54	4.63	9.25	2.54	14.29	4.70	12.00***	9.84***	−2.16*
							(5.609)	(4.160)	(−1.876)
CFO	7.09	4.90	6.17	3.23	9.02	3.13	3.86**	3.96**	0.10
							(2.419)	(2.234)	(0.101)
Partner/Principal	9.93	20.16	13.22	19.78	7.52	18.54	−9.86***	−8.61***	1.25
							(−4.815)	(−3.223)	(0.560)
Accountant	0.35	0.00	0.15	0.13	0.00	0.00	0.23	0.35	0.13
							(0.623)	(1.000)	(1.415)
Other	5.32	0.82	7.49	1.52	6.02	2.09	3.80***	3.23**	−0.57
							(2.764)	(2.117)	(−0.714)
Observations	600	865	1,182	3,723	285	1,150			

Averages of personal characteristics of shareholder-elected directors. '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. Observations are person-years. Statistical significance is reported by t−statistics in parentheses from two-sample tests assuming unequal variances. Statistical significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *. All variables are defined in Appendix I.

Table VI

Table VI

Instrumental Variables Estimates of the Effect of the Gender Quota on Corporate Leadership

	Log(Assets)	Log(Employees)	Board Characteristics							
			Board Size	CEO Exper.	Age	MBA	Higher Educ.	New CEO	Woman CEO	CEO Comp.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
A. Instrumental Variables										
Percent Women	2.00**	2.10**	0.49	−59.80**	−7.115*	−9.72	34.30	−25.70	25.90	2.33
	(0.81)	(0.86)	(1.07)	(23.70)	(3.65)	(33.20)	(22.10)	(37.70)	(21.60)	(1.87)
B. Reduced-form Results										
$I_{2004} \times$ % Women$_{2002}$	−0.22	0.50	0.49	23.10*	−1.18	6.60	−9.77	28.90	−0.24	0.98
	(0.26)	(0.34)	(0.61)	(13.70)	(1.92)	(9.43)	(7.41)	(33.20)	(0.18)	(1.67)
$I_{2005} \times$ % Women$_{2002}$	−0.31	0.06	0.16	40.40**	3.64	−0.28	−29.70**	70.40*	−19.10	1.09
	(0.49)	(0.46)	(0.68)	(17.20)	(2.51)	(12.00)	(11.70)	(37.10)	(18.20)	(1.64)
$I_{2006} \times$ % Women$_{2002}$	−0.78	−0.39	−0.49	42.10**	7.71***	16.00	−27.60**	−3.43	−20.00	7.50
	(0.57)	(0.56)	(0.83)	(17.10)	(2.55)	(14.80)	(14.00)	(24.80)	(19.10)	(6.79)
$I_{2007} \times$ % Women$_{2002}$	−1.26*	−1.25*	−0.95	54.70***	6.39**	12.10	−41.40**	28.80	−13.10	13.39
	(0.64)	(0.69)	(0.88)	(20.00)	(3.12)	(20.80)	(17.00)	(35.60)	(12.40)	(13.56)
$I_{2008} \times$ % Women$_{2002}$	−1.65**	−1.29*	−0.19	47.90**	4.69*	0.45	−27.40*	48.00	−31.20	1.76
	(0.69)	(0.69)	(0.98)	(23.30)	(2.63)	(23.60)	(16.60)	(37.70)	(20.50)	(1.49)
$I_{2009} \times$ % Women$_{2002}$	−1.84**	−1.24**	0.27	78.00***	4.99	16.30	−25.00	41.80	−21.10	1.61
	(0.74)	(0.60)	(0.91)	(22.00)	(3.08)	(28.50)	(19.30)	(44.50)	(23.70)	(1.49)
Observations	639	479	640	605	640	578	578	637	640	325

Dependent variables are listed at the top of each column. *Log(Assets)* and *Log(Employees)* are industry-adjusted, using US industry values. *Percent Women* is a predicted variable, estimated in a first-stage regression using the percent of women board members in 2002 interacted with year dummies. First stage estimates are not reported for brevity. I_t for $t = 2004, \ldots, 2009$ are dummy variables for years 2004 to 2009. All regressions include year and firm fixed effects. Year 2003 is omitted. Standard errors are clustered by firm and reported in parentheses. * Significant at 10%; ** at 5%; *** at 1%.

Table VII

Instrumental Variables Estimates of the Effect of the Gender Quota on Financial and Investment Policies

	Financial Policies						Investment Policies					
	Leverage		Current Debt/Equity		Cash/ Assets		Capex/ Assets		Acquisitions/ Assets		R&D/ Assets	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
A. Instrumental Variables												
Percent Women	0.32**	0.24	0.53*	1.37	−0.10	−0.27**	−0.04	−0.08	0.07***	0.23***	0.01	0.04
	(0.15)	(0.23)	(0.30)	(1.08)	(0.10)	(0.11)	(0.05)	(0.06)	(0.03)	(0.07)	(0.02)	(0.03)
B. Reduced-form Results												
$I_{2004} \times$ % Women$_{2002}$	−0.01	0.15	0.07	−0.27	−0.08	0.16***	0.00	0.13***	0.02	−0.04	−0.02	−0.05**
	(0.07)	(0.14)	(0.15)	(0.31)	(0.08)	(0.05)	(0.03)	(0.03)	(0.03)	(0.02)	(0.01)	(0.02)
$I_{2005} \times$ % Women$_{2002}$	−0.04	0.32	0.75	0.14	−0.06	0.18	−0.02	0.00	0.10**	−0.01	0.00	−0.02
	(0.10)	(0.25)	(0.69)	(0.84)	(0.08)	(0.12)	(0.04)	(0.04)	(0.04)	(0.05)	(0.01)	(0.02)
$I_{2006} \times$ % Women$_{2002}$	−0.12	0.25	0.00	−0.54	−0.14	0.11	0.00	0.03	0.04	−0.07	0.02	0.00
	(0.12)	(0.24)	(0.22)	(0.59)	(0.09)	(0.11)	(0.04)	(0.04)	(0.04)	(0.05)	(0.02)	(0.01)
$I_{2007} \times$ % Women$_{2002}$	−0.22*	0.15	−0.06	−0.61	−0.03	0.21*	0.04	0.08*	−0.06*	−0.17***	−0.01	−0.03**
	(0.13)	(0.24)	(0.20)	(0.63)	(0.10)	(0.12)	(0.05)	(0.04)	(0.03)	(0.06)	(0.02)	(0.01)
$I_{2008} \times$ % Women$_{2002}$	−0.24**	0.15	−0.19	−0.76	0.01	0.26**	0.01	0.04	0.00	−0.11**	−0.03	−0.06***
	(0.11)	(0.24)	(0.24)	(0.59)	(0.08)	(0.12)	(0.05)	(0.05)	(0.02)	(0.05)	(0.03)	(0.02)
$I_{2009} \times$ % Women$_{2002}$	−0.28**	0.09	−0.54**	−1.12*	0.14	0.39***	0.01	0.07	−0.03	−0.14**	0.01	−0.01
	(0.13)	(0.24)	(0.25)	(0.65)	(0.09)	(0.14)	(0.04)	(0.05)	(0.02)	(0.05)	(0.02)	(0.02)
Intl. Accounting Std.	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	642	422	638	418	633	421	633	415	627	412	642	422

Dependent variables are listed at the top of each column. All dependent variables are industry-adjusted, using US industry values. *Percent Women* is a predicted variable, estimated in a first-stage regression using the percent of women board members in 2002 interacted with year dummies. First stage estimates are not reported for brevity. I_t for $t = 2004, \ldots, 2009$ are dummy variables for years 2004 to 2009. All regressions include year and firm fixed effects. Year 2003 is omitted. *Intl. Accounting Std.* indicates whether firm-years included in the sample are restricted to accounting disclosures that follow international accounting standards. Standard errors are clustered by firm and reported in parentheses. * Significant at 10%; ** at 5%; *** at 1%.

TABLE VIII

INSTRUMENTAL VARIABLES ESTIMATES OF THE EFFECT OF THE GENDER QUOTA ON PERFORMANCE AND COSTS

	Performance						Costs			
	M&A Returns	Daily Returns	ROA		Asset Turnover		SGA/ Sales		COGS/ Sales	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
A. Instrumental Variables										
Percent Women	0.01	−0.45**	−0.07	−0.21	−0.34	−1.24*	0.05	0.17*	1.21	5.01
	(0.03)	(0.22)	(0.11)	(0.17)	(0.48)	(0.64)	(0.11)	(0.10)	(1.40)	(3.74)
B. Reduced-form Results										
$I_{2004} \times$ % Women$_{2002}$	0.02	−0.10	−0.12	0.33***	−0.10	0.52**	−0.16	0.00	−0.78	0.03
	(0.02)	(0.27)	(0.07)	(0.12)	(0.11)	(0.23)	(0.16)	(0.00)	(0.74)	(0.02)
$I_{2005} \times$ % Women$_{2002}$	0.01	0.35**	−0.14*	0.13	−0.52	0.39	−0.05	0.02	1.70	0.55
	(0.02)	(0.16)	(0.08)	(0.10)	(0.44)	(0.28)	(0.03)	(0.03)	(1.71)	(1.86)
$I_{2006} \times$ % Women$_{2002}$	0.08**	0.28	−0.07	0.19*	−0.28	0.69**	−0.04	0.03	0.64	−0.57
	(0.03)	(0.19)	(0.11)	(0.11)	(0.37)	(0.27)	(0.04)	(0.03)	(1.17)	(1.35)
$I_{2007} \times$ % Women$_{2002}$	0.02	0.51**	0.09	0.37***	0.07	0.96***	−0.08**	−0.01	−1.25	−2.50**
	(0.02)	(0.20)	(0.09)	(0.11)	(0.36)	(0.25)	(0.04)	(0.02)	(1.00)	(1.18)
$I_{2008} \times$ % Women$_{2002}$	−0.04	0.24	−0.01	0.25*	0.07	1.06***	−0.13***	−0.07**	−0.48	−1.76**
	(0.05)	(0.25)	(0.11)	(0.13)	(0.42)	(0.24)	(0.05)	(0.03)	(0.53)	(0.84)
$I_{2009} \times$ % Women$_{2002}$	0.04***	0.18	−0.14	0.13	0.30	1.21***	−0.11*	−0.07*	−0.81	−2.15**
	(0.01)	(0.25)	(0.11)	(0.10)	(0.45)	(0.33)	(0.06)	(0.04)	(0.80)	(1.01)
Intl. Accounting Std.	No	No	No	Yes	No	Yes	No	Yes	No	Yes
Observations	635	550	610	414	642	422	575	404	577	406

Dependent variables are listed at the top of each column. All dependent variables are industry-adjusted, using US industry values. *Percent Women* is a predicted variable, estimated in a first-stage regression using the percent of women board members in 2002 interacted with year dummies. First stage estimates are not reported for brevity. I_t for $t = 2004, \ldots, 2009$ are dummy variables for years 2004 to 2009. All regressions include year and firm fixed effects. Year 2003 is omitted. *Intl. Accounting Std.* indicates whether firm-years included in the sample are restricted to accounting disclosures that follow international accounting standards. Standard errors are clustered by firm and reported in parentheses. * Significant at 10%; ** at 5%; *** at 1%.

Table IX
Likelihood of Delisting by 2002 Board Gender

	Dependent Variable: Delist for any reason			Dependent Variable: Avoid quota through delisting		
	(1)	(2)	(3)	(4)	(5)	(6)
Percent women directors	−6.604***	−8.959***	−9.763***	−7.919***	−9.143***	−10.460***
	(1.724)	(2.151)	(1.801)	(2.725)	(3.376)	(3.998)
Board size	−0.093	−0.194	−0.250	−0.306*	−0.374	−0.472*
	(0.146)	(0.176)	(0.212)	(0.179)	(0.244)	(0.256)
Board age	−0.018	−0.086**	−0.082*	−0.025	−0.070	−0.073
	(0.022)	(0.039)	(0.045)	(0.027)	(0.047)	(0.048)
Board CEO Experience	−1.304**	−1.511***	−2.159***	−0.809***	−0.903***	−1.834***
	(0.659)	(0.534)	(0.758)	(0.257)	(0.313)	(0.563)
Log(Assets)		0.378**	0.488***		0.247	0.439
		(0.173)	(0.131)		(0.295)	(0.358)
R&D/Assets		4.421	5.912		−0.803	−2.401
		(7.974)	(12.681)		(6.685)	(9.027)
Industry:			0.419			−0.115
Industrials			(0.257)			(0.111)
Industry:			−0.109			−0.699***
Consumer Discretionary			(0.245)			(0.252)
Industry:			0.871***			1.284***
Consumer Staples			(0.258)			(0.370)
Industry:			−1.141***			−1.852***
Health Care			(0.138)			(0.419)
Industry:			−0.466			0.590
Information Technology			(1.863)			(1.377)
Industry:			0.858***			0.761
Utilities			(0.281)			(0.559)
Constant			4.332***			4.753**
			(1.550)			(1.961)
Observations	95	95	91	95	95	91
Pseudo R^2	0.112	0.144	0.191	0.131	0.144	0.215

Logit regresssion estimates where the dependent variable equals one if the firm delisted from 2003 to 2009 and zero otherwise in columns (1)-(3), or equals one if the firm avoided the quota through delisting (acquisition by a private/foreign firm, went private, or changed location) or zero otherwise (didn't delist, went bankrupt, or no reason can be determined). Variables are based on 2002 data only. Omitted industry sector is Energy. Standard errors in parentheses are robust to industry sector clusters. Statistical significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *. All variables are defined in Appendix I.

APPENDIX I: VARIABLE DEFINITIONS

Accounting ratios	
Asset turnover	Revenues/Total assets
CAPEX/Assets	Capital expenditures/Total assets
COGS/Sales	Cost of goods sold/Total revenues
Leverage	Book liabilities/Total assets
M&A Returns	Yearly aggregated abnormal announcement returns over the 5 days surrounding the announcement for all mergers and acquisitions where abnormal returns are calculated by subtracting the MSCI country index of the firm's country from the raw return
R&D/Assets	R&D/Total assets
ROA	Operating income before depreciation/Total assets
SGA/Sales	Selling, general, & administrative expense/Total revenues
Tobin's Q	Total assets - common equity + market equity/Total assets
Board of directors variables	
% Retained from prior year	Percentage of board members in year t that were board members in the same firm in year $t-1$
Age	The average age of the board of directors
Board position/person	Average of the total number of CEO and board positions held in any given year per director
CEO compensation	The value of total compensation paid to a CEO as recorded in the Boardex database
CEO Exp. (%)	Percentage of board members that have work experience as a CEO or owner
Female (%)	Percentage of board members that are female
Higher Educ. (%)	Percentage of board members that have a post-baccalaureate degree including M.A., M.S., M.D., J.D., and PhD., excluding M.Sc. degrees from Norway since these are not typically equivalent to U.S. master's degrees, especially before 2001.
Insider	Percentage of board members that are employed full-time by the same firm
MBA (%)	Percentage of board members that have an MBA
Same last name	Percentage of board members that have the same last name as another board member or the CEO in the same year
Size	Total number of directors
Tenure	Average number of years since board members have been appointed
Board of directors external primary occupation	
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
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

APPENDIX II: PRE-QUOTA CHARACTERISTICS

Table A.I

Firm Characteristics by Share of Female Directors in 2002

	No Women Directors	Women Directors > 0	Difference	Standard Error
	(1)	(2)	(3)	(4)
Panel A. Firm characteristics				
Tobin's Q	1.238	1.141	0.097	0.122
Log(assets)	4.433	6.073	−1.639***	0.368
Log(employees)	−1.230	0.643	−1.873***	0.328
Leverage	0.545	0.611	−0.066*	0.038
Current Debt/Equity	0.177	0.156	0.021	0.072
Cash/Assets	0.150	0.118	0.033	0.027
Capex/Assets	0.054	0.071	−0.017	0.012
Acquisitions/Assets	0.004	0.007	−0.004	0.004
R&D/Assets	0.010	0.007	0.003	0.006
Last year returns	−0.131	−0.118	−0.013	0.063
ROA	−0.171	−0.060	−0.111	0.069
Asset turnover	1.079	1.048	0.031	0.140
SGA/Sales	0.020	0.003	0.017	0.012
COGS/Sales	0.104	0.084	0.019	0.052
Panel B. Board characteristics				
Board size	5.100	6.410	−1.310***	0.311
Percent women directors	0.000	22.802	−22.802***	1.774
Percent with CEO experience	63.613	67.093	−3.479	7.428
MBAs	22.006	27.434	−5.428	5.740
Higher education	25.250	28.161	−2.911	6.976
Age	50.694	52.392	−1.697*	0.974
Tenure	3.097	2.914	0.183	0.924
Insider	2.424	1.905	0.519	2.573
Norwegian	94.058	90.177	3.880	3.014
Percent same name	5.673	4.188	1.485	2.413
Occupation: Vice President	5.606	7.405	−1.799	3.771
Consultant	6.970	13.444	−6.475	6.580
Board Member	17.424	28.595	−11.171*	6.006
Professor	0.000	3.333	−3.333	2.271
CEO	37.235	19.389	17.846**	8.661
Attorney	0.909	0.000	0.909	0.909
Non-Exec. Mgr.	6.212	0.000	6.212**	2.837
CFO	3.750	4.333	−0.583	3.375
Partner/Principal	15.492	19.373	−3.881	6.117
Other	3.977	2.222	1.755	3.199
Panel C. Industrial sectors (%)				
Materials	5.000	7.143	−2.143	4.711
Industrials	18.750	26.190	−7.440	8.151
Consumer Discretionary	11.250	23.810	−12.560	7.542
Consumer Staples	6.250	4.762	1.488	4.299
Health Care	6.250	4.762	1.488	4.299
Financials	1.250	0.000	1.250	1.250
Information Technology	28.750	11.905	16.845**	7.177
Telecommunications	0.000	2.381	−2.381	2.381
Utilities	1.250	2.381	−1.131	2.689
Observations	80	42		

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. All variable definitions are in the appendix. Outside occupations are not mutually exclusive and so do not add to 100%. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Supplementary Material

ONLINE APPENDIX TABLE I
WOMEN DIRECTORS IN PRIVATE VERSUS PUBLIC FIRMS

		2003	2004	2005	2006	2007	2008	2009
Panel A. Women Board Members (%)								
Private Limited Firms	All	19.6	20.2	21.0	21.7	21.8	22.0	22.2
	100-249 Employees	15.4	16.7	18.6	19.8	20.6	20.3	20.0
	250 Employees and more	17.7	19.2	20.7	22.7	23.0	23.7	24.1
Public Limited Firms	All	10.7	14.3	21.8	30.8	45.0	49.3	47.6
	100-249 Employees	16.9	19.9	29.9	33.7	48.1	47.9	47.6
	250 Employees and more	25.1	28.4	36.7	41.0	47.9	48.5	46.7
Panel B. Women Chairpersons (%)								
Private Limited Firms	All	10.2	10.4	10.7	11.0	11.1	11.4	11.4
	100-249 Employees	4.4	4.6	5.1	5.7	5.6	6.2	7.0
	250 Employees and more	3.0	5.2	6.2	4.6	5.1	4.8	6.5
Public Limited Firms	All	2.6	2.3	2.4	3.0	5.0	6.8	7.0
	100-249 Employees	9.4	8.8	3.1	3.4	3.4	8.0	0.0
	250 Employees and more	0.0	0.0	4.3	0.0	0.0	4.5	5.9
Panel C. Women CEOs (%)								
Private Limited Firms	All	13.0	13.3	13.6	13.7	13.9	14.0	14.2
	100-249 Employees	3.6	5.9	6.7	6.4	6.4	7.8	8.5
	250 Employees and more	8.0	8.6	9.3	8.0	6.7	8.0	8.0
Public Limited Firms	All	4.6	3.2	3.1	3.8	4.6	4.9	6.5
	100-249 Employees	0.0	0.0	3.1	3.4	3.4	4.0	10.0
	250 Employees and more	0.0	0.0	0.0	4.5	5.0	4.5	5.9

Data are from Statistics Norway (Statisisk sentralbyrå) and cover all public (Allmennaksjeselskap (ASA)) and private (Aksjeselskap (AS)) limited firms registered in Norway. Boards of directors include both shareholder- and employee-elected members.

ONLINE APPENDIX TABLE II
BOARD OF DIRECTORS CHARACTERISTICS BY GENDER AND YEAR

		2001	2002	2003	2004	2005	2006	2007	2008	2009
Panel A. Demographics										
CEO exper.	Men	66.51	65.43	66.29	65.89	64.89	62.91	63.93	67.09	69.87
	Women	52.94	42.86**	44.44**	39.68***	33.48***	35.74***	34.87***	34.31***	39.01***
MBA	Men	21.74	23.01	22.96	21.75	23.95	23.49	24.61	23.02	23.51
	Women	25.00	30.00	26.83	32.81*	26.09	23.31	24.65	22.90	22.05
Higher Educ.	Men	23.80	22.66	22.83	25.50	21.29	22.48	22.86	21.19	22.46
	Women	25.00	26.67	34.15	34.38	33.04**	35.07***	34.27***	32.63***	33.59***
Age	Men	50.51	51.18	52.34	52.54	52.41	53.09	53.65	53.66	54.78
	Women	46.46***	47.88***	47.55***	46.92***	45.97***	46.35***	46.60***	47.44***	48.29***
Tenure	Men	4.25	2.72	2.39	2.63	2.74	2.87	2.86	2.79	2.83
	Women	2.23**	1.28***	0.98***	1.01***	0.99***	0.99***	1.02***	1.53***	2.11***
Insider	Men	10.83	9.50	8.25	8.10	5.80	5.80	3.82	2.91	2.58
	Women	0.00***	0.00***	0.00***	0.00***	1.09**	1.21***	1.75	1.56	0.57*
Norwegian	Men	90.63	91.85	91.01	90.09	90.55	89.61	87.97	85.91	83.60
	Women	96.00	96.67	93.75	92.54	90.81	87.13	87.07	85.35	83.00
% Same Name	Men	3.57	4.26	4.19	3.40	2.71	3.38	2.89	3.84	5.05
	Women	1.33	1.21**	0.97**	3.67	3.28	1.74	2.94	2.56	3.82
No. of Positions	Men	1.18	1.18	1.21	1.21	1.22	1.21	1.22	1.18	1.17
	Women	1.08*	1.22	1.22	1.26	1.21	1.30*	1.34**	1.31***	1.32***
Panel B. Directors' Primary Outside Occupation										
Vice President	Men	6.37	5.59	5.15	4.29	5.13	5.37	6.78	6.36	10.12
	Women	12.50	18.18	18.18*	8.51	9.78	14.11***	12.67**	11.89**	10.06
Consultant	Men	7.01	10.34	8.25	7.46	8.01	9.91	9.06	11.64	8.07
	Women	0.00***	4.55	4.04	3.90	6.34	6.85	10.30	9.11	8.72
Board Member	Men	21.66	19.83	21.65	21.67	23.14	19.14	18.38	10.73	18.85
	Women	6.25**	15.91	18.69	20.92	14.49*	11.69**	11.99*	12.33	17.15
Professor	Men	1.27	1.12	1.55	1.90	1.73	0.93	0.83	1.09	1.59
	Women	6.25	4.55	3.03	4.26	5.43	3.23	2.92	2.08	2.87
CEO	Men	24.84	26.82	27.58	28.02	27.18	25.40	25.56	30.73	28.51
	Women	31.25	27.27	12.12**	15.96**	18.48*	24.06	20.47	22.14**	22.99
Attorney	Men	2.55	1.68	2.58	4.29	4.62	4.81	3.53	3.27	3.57
	Women	0.00**	0.00*	0.00**	4.26	4.35	3.90	4.77	5.68	6.03
Non-Exec. Mgr.	Men	3.82	3.35	2.06	2.14	1.99	2.78	3.94	4.18	3.57
	Women	0.00**	0.00**	9.09	9.57*	13.59***	13.04***	13.65***	11.30***	8.33**
CFO	Men	3.18	3.91	4.12	3.33	1.92	3.33	3.32	5.09	2.78
	Women	18.75	4.55	3.03	4.96	5.80	5.24	7.31*	7.03	6.32*
Partner/Principal	Men	14.65	14.53	17.27	16.19	19.36	21.05	23.13	23.27	19.18
	Women	25.00	25.00	22.73	18.09	13.59	9.41***	8.32***	11.41***	11.93**
Accountant	Men	0.00	0.00	0.00	0.48	0.38	0.00	0.00	0.00	0.00
	Women	0.00	0.00	0.00	2.13	0.00	0.00	0.58	0.00	0.00
Other	Men	3.82	3.35	1.55	2.14	1.15	1.48	1.66	0.73	0.79
	Women	0.00**	0.00**	9.09	7.45	7.07**	7.26**	5.26*	5.47***	5.03**
Observations	Men	653	591	541	569	603	594	519	482	383
	Women	50	55	69	100	173	225	323	313	249

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. Statistical significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *. All variables are defined in Appendix I of the paper.

Online Appendix Table III

Instrumental Variables Estimates of the Effect of the Gender Quota on Directors' Occupations

	Insider	VP	Cnsltnt	Board Member	Prof.	CEO	Law	Non-exec. Manager	CFO	Partner/ Principal	Acnt.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
A. Instrumental Variables											
Percent Women	−0.16	0.86	−1.30**	0.65	0.72	−1.20*	−0.78	−0.25	0.35	0.71**	−0.06
	(0.18)	(0.56)	(0.65)	(0.50)	(0.49)	(0.70)	(0.49)	(0.46)	(0.52)	(0.36)	(0.04)
B. Reduced-form Results											
$I_{2004} \times$ % Women$_{2002}$	−0.09	0.00	−0.30	0.22	−0.27*	0.34*	−0.06	0.25	0.27	−0.16	−0.20
	(0.11)	(0.14)	(0.40)	(0.23)	(0.16)	(0.20)	(0.13)	(0.32)	(0.32)	(0.18)	(0.14)
$I_{2005} \times$ % Women$_{2002}$	−0.23	−0.17	0.24	0.56**	−0.45**	1.20**	−0.11	0.20	0.32	−0.47	−0.10
	(0.16)	(0.31)	(0.46)	(0.28)	(0.20)	(0.48)	(0.17)	(0.34)	(0.37)	(0.34)	(0.09)
$I_{2006} \times$ % Women$_{2002}$	−0.13	−0.14	0.38	0.34	−0.20	0.17	−0.01	0.02	0.42	−0.39	−0.01
	(0.15)	(0.47)	(0.58)	(0.26)	(0.25)	(0.54)	(0.25)	(0.38)	(0.42)	(0.29)	(0.01)
$I_{2007} \times$ % Women$_{2002}$	−0.06	−0.59	0.07	0.02	−0.72*	0.41	0.02	0.38	−0.15	−0.46	−0.05
	(0.19)	(0.42)	(0.65)	(0.32)	(0.40)	(0.76)	(0.32)	(0.47)	(0.38)	(0.41)	(0.05)
$I_{2008} \times$ % Women$_{2002}$	−0.04	−0.66	1.02	−0.22	−0.65*	1.11*	0.85*	−0.25	−0.15	−0.71**	0.00
	(0.17)	(0.51)	(0.69)	(0.45)	(0.38)	(0.61)	(0.49)	(0.48)	(0.43)	(0.35)	(0.06)
$I_{2009} \times$ % Women$_{2002}$	0.30	−0.76	1.53**	−0.86	−0.70	1.80***	0.75	0.75	−0.15	−0.72*	−0.05
	(0.22)	(0.54)	(0.61)	(0.66)	(0.44)	(0.45)	(0.55)	(0.54)	(0.80)	(0.41)	(0.04)
Observations	345	345	345	345	345	345	345	345	345	345	345

Dependent variables are listed at the top of each column. *Cnsltnt* is for Consultant, *Law* is for lawyer, and *Acnt.* is for accountant. All dependent variables are indicator variables for the presence of at least one board member that is employed in the job-class listed. *Percent Women* is a predicted variable, estimated in a first-stage regression using the percent of women board members in 2002 interacted with year dummies. First stage estimates are not reported for brevity. I_t for $t = 2004, \ldots, 2009$ are dummy variables for years 2004 to 2009. All regressions include year and firm fixed effects. Year 2003 is omitted. Standard errors are clustered by firm and reported in parentheses. * Significant at 10%; ** at 5%; *** at 1%.

ONLINE APPENDIX TABLE IV
LIKELIHOOD OF EARLY COMPLIANCE WITH THE GENDER QUOTA

	All Firms in 2002			Firms with No Women Directors in 2002		
	(1)	(2)	(3)	(4)	(5)	(6)
Percent women directors	11.547***	11.018***	14.491***			
	(2.309)	(3.137)	(4.371)			
Board size	−0.176	−0.180	0.085	−0.144	−0.105	0.322
	(0.135)	(0.205)	(0.202)	(0.227)	(0.180)	(0.356)
Board age	0.089**	0.056	0.099	0.142***	0.097*	0.268***
	(0.038)	(0.047)	(0.089)	(0.046)	(0.058)	(0.076)
Board CEO Experience	1.376*	1.190	1.813	1.789*	1.926*	4.145**
	(0.744)	(0.786)	(1.166)	(1.051)	(1.018)	(1.770)
Members with same name	−3.074*	−2.758	−2.695	−4.067	−5.198**	−4.937
	(1.650)	(1.850)	(2.257)	(2.630)	(2.128)	(4.429)
CEO on board	−0.989*	−1.198*	−1.109*	−1.414	−2.323**	−2.721**
	(0.513)	(0.638)	(0.643)	(0.863)	(0.978)	(1.240)
Log(Assets)		0.185	−0.212		0.471	−0.390
		(0.304)	(0.383)			(0.452)
R&D/Assets		16.571***	26.779***		20.305***	48.387***
		(6.262)	(8.104)		(6.970)	(16.434)
Industry: Industrials			−0.436*			0.415
			(0.256)			(0.980)
Industry: Consumer Discretionary			−0.808*			1.819*
			(0.455)			(0.968)
Industry: Consumer Staples			3.369***			5.194***
			(1.031)			(1.175)
Industry: Health Care			−1.146			−4.793
			(0.912)			(3.101)
Industry: Information Technology			0.259			−0.292
			(0.184)			(0.922)
Industry: Utilities			0.075			
			(0.429)			
Constant	−4.891**	−3.995	−6.674	−7.833**	−7.800***	−17.003***
	(2.171)	(2.692)	(4.784)	(3.499)	(2.859)	(5.123)
Observations	75	75	71	48	48	46
Pseudo R^2	0.278	0.313	0.375	0.159	0.235	0.378

Logit regresssion estimates where the dependent variable equals one if the firm complied with the gender quota before December 2006 and zero if the firm complied later than December 2006. Variables are based on 2002 data only. Omitted industry sector is Energy. Standard errors in parentheses are robust to industry sector clusters. Statistical significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *. All variables are defined in Appendix I of the paper.

ONLINE APPENDIX TABLE V
THE EFFECT OF BOARD CHARACTERSTICS ON FIRM VALUE: OLS ESTIMATES

	Dependent variable: Industry-Adjusted Tobin's Q				
	(1)	(2)	(3)	(4)	(5)
Percent Women Directors	−0.821***	−0.593*	−0.536	−0.541	−0.541
	(0.247)	(0.313)	(0.340)	(0.351)	(0.345)
Board age			0.006	0.006	0.006
			(0.012)	(0.012)	(0.012)
Board CEO Experience				−0.016	−0.017
				(0.188)	(0.196)
Board size					0.000
					(0.055)
Acquisitions/Assets	−0.944**	−0.738*	−0.754*	−0.752*	−0.752*
	(0.464)	(0.442)	(0.442)	(0.433)	(0.439)
Log(Assets)	−0.331***	−0.393**	−0.394**	−0.394**	−0.394**
	(0.128)	(0.160)	(0.161)	(0.160)	(0.162)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.202	0.214	0.213	0.211	0.208
Observations	701	488	488	488	488

OLS regressions on industry-adjusted Tobin's Q using US industry data. *Log(Assets)* and *Acquistions/Assets* are industry-adjusted values. Observations are over 2003–2008. Standard errors are clustered by firm and are presented in parentheses. Statistical significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *. All variables are defined in Appendix I of the paper.