

## A Female Style in Corporate Leadership? Evidence from Quotas<sup>†</sup>

By DAVID A. MATSA AND AMALIA R. MILLER\*

*This paper studies the impact of gender quotas for corporate board seats on corporate decisions. We examine the introduction of Norway's 2006 quota, comparing affected firms to other Nordic companies, public and private, that are unaffected by the rule. We find that affected firms undertake fewer workforce reductions than comparison firms, increasing relative labor costs and employment levels and reducing short-term profits. The effects are strongest among firms without female board members beforehand and are present even for boards with older and more experienced members afterward. The boards appear to be affecting corporate strategy in part by selecting like-minded executives. (JEL G34, J16, J78, M12, M51)*

*It's just a terrible thought having to lay off people, because we like our employees and we need them. And they are well-trained, and they're loyal. And they have been working for us for decades, some of them, or many of them have. And it's just a terrible thought to have to send them away.*

— Nicola Leibinger-Kammüller, CEO, TRUMPF Group  
(PBS Newshour, February 8, 2012)

*When you make a decision, whatever that decision is whether it's about an acquisition, whether it's about anything, [being a woman] just makes you more sensitive to everyone that's involved, everyone that's involved; their health care, their retirement, all their benefits.*

— Female corporate board member  
(Broome, Conley, and Krawiec 2011, 794; repetition in original)

Despite substantial female progress in recent years, business leadership remains largely male dominated. In the past 15 years, women's share of corporate officer positions in Fortune 500 firms has grown from 8.7 to 15.7 percent; board seats from 9.6 to 15.2 percent; and CEO positions from 0.2 percent to 3.0 percent (Catalyst 2010).

\*Matsa: Kellogg School of Management, Northwestern University, 2001 Sheridan Road, Evanston, IL 60208 (e-mail: [dmatsa@kellogg.northwestern.edu](mailto:dmatsa@kellogg.northwestern.edu)); Miller: Department of Economics, University of Virginia, 237 McCormick Road, Charlottesville, VA 22904 (e-mail: [armiller@virginia.edu](mailto:armiller@virginia.edu)). For helpful comments, we thank Susan Athey, Amy Dittmar, Alice Eagly, Ray Fisman, Astrid Kunze, Brian Melzer, Paola Sapienza, Carmit Segal, Justin Wolfers, and seminar participants at Georgetown University, Harvard University, Indiana University, Inter-American Development Bank, Massachusetts Institute of Technology, Northwestern University, Texas A&M University, the University of Zurich, the IZA-MIT Sloan Conference on the Economics of Leadership, the NBER Summer Institute, and the Western Finance Association Meetings. Mads Johnsen and Candice Choi provided excellent research assistance.

<sup>†</sup>Go to <http://dx.doi.org/10.1257/app.5.3.136> to visit the article page for additional materials and author disclosure statement(s) or to comment in the online discussion forum.

This trend is likely to continue as young women increasingly invest in business school training and gain access to valuable professional networks.<sup>1</sup> Whereas the pace of progress has been extensively documented and examined, little is known about how corporate strategy would be different if women were better represented at the top of the corporate ladder.

Policymakers in Europe have recently begun to hasten women's growth in business leadership by adopting gender quotas for corporate boards of directors. The European Union collectively, and more than a dozen countries individually, have considered these requirements. Early adopters include France and Spain. The first such law, and the only mandatory quota already in effect, was adopted in Norway in 2006. The law required all publicly listed companies to increase female representation on their boards of directors to 40 percent within 2 years. The quota increased female representation by over 20 percentage points at the typical affected firm.

A large body of literature on gender points to fundamental differences in the preferences of men and women (Marini 1990; Croson and Gneezy 2009), and there is evidence that individual managers bring their own personal styles to managing their firms (Bertrand and Schoar 2003; Graham and Narasimhan 2004; Bloom and Van Reenen 2010; Malmendier, Tate, and Yan 2011). This does not necessarily imply, however, that gender quotas will affect corporate policy decisions. First, are there similar gender differences among the selected group of men and women at the top of the corporate world? Second, given that the policy focus has been on increasing *board* diversity, do corporate boards matter?

Despite the importance of this issue for the future of industry, if and how gender quotas will affect corporations remains unclear. Studies interested in the effects of female leaders and directors are based on cross-sectional comparisons and are difficult to interpret because selection in the matching of female managers and directors to firms can bias correlations of female leadership and firm outcomes. For example, Ryan and Haslam (2005) find that firms are more likely to promote women after negative performance shocks. The correlation between women's leadership and corporate outcomes thus may not imply a causal relation.

Furthermore, even if we knew the causal effect of women's business leadership, this knowledge would not necessarily extend to the effects of quotas or other mechanisms to enforce greater participation of women in corporate leadership. Ensuring women's board representation through quotas may change the nature of board member selection and thus have direct effects. For example, it may lower the average competence in the pool of eligible candidates, increase the number of members that are new to the board, or increase the total number of board seats.

This paper studies the effects of the Norwegian gender quota on corporate decision making. Comparing financial data for publicly listed firms in Norway

<sup>1</sup>In 1970, only 3.6 percent of master's degrees and 8.7 percent of bachelor's degrees in US business schools were conferred on women. Today, women earn more than 44 percent of master's degrees in business and management, accounting for 37 percent of MBAs and 48 percent of specialized master's degrees. Among undergraduate business majors, women first outnumbered men in 2002 (Association to Advance Collegiate Schools of Business International 2010). As more women reach leadership positions in business, they may improve mentorship and advancement opportunities for other women in business or change stereotypes about gender and leadership (e.g., Athey, Avery, and Zemsky 2000; Matsa and Miller 2011).

with a matched sample of unlisted firms in Norway and listed and unlisted firms in other Nordic countries, we find that most corporate decisions were unaffected after women's board representation increased. Revenues and nonlabor costs were similar between firms affected and unaffected by the policy. Sizable differences emerged, however, in these firms' employment policies. Specifically, firms affected by the quota undertook fewer employee layoffs, causing an increase in relative labor costs (but not the average wage).<sup>2</sup> Fewer layoffs reduced firms' short-run profits. After the quota, the ratio of operating profits to assets among affected firms decreased by about 4 percentage points, relative to firms that were unaffected by the law.

These results are robust to a variety of specifications and samples, and we find the strongest effects among firms that were required to add the most women in order to comply with the law. The reduced layoffs cannot be attributed to general board dysfunction, as boards affected and unaffected by the quota appear equally willing to initiate mergers, acquisitions, and joint ventures. Our estimate for the magnitude of the employment effects is large, indicating the quota increased relative employment by almost 30 percent; adjusting for outliers reduces the estimate by as much as two-thirds and leaves the finding qualitatively unchanged. Falsification tests find no evidence of pre-trends or differential employment patterns among listed Norwegian firms during the previous global recession.

We also find no evidence that the impact of the Norwegian gender quota was driven by changes in board member characteristics other than gender, such as age or experience. Although the female directors were younger on average, they replaced younger men and did not decrease the average age of the boards. Indeed, we find that layoffs similarly decreased for boards with older and more experienced members after the quota. To the extent that the effects of the quota reflect gender differences in corporate leadership, the findings align with prior research documenting gender differences in attitudes toward layoffs, such as Rubinstein's (2006) survey of business newspaper readers. The differences may reflect female board members' consideration of labor hoarding as a more profitable long-run strategy or their having a greater concern for workers' vulnerability to unemployment risk. Indeed, experiments find that women are generally more long-term oriented (Silverman 2003) and altruistic (Andreoni and Vesterlund 2001) than are men, and survey evidence documents corresponding sex differences in corporate directors' preferences and values (Adams and Funk 2012). It is also possible that men and woman have the same corporate goals but differ in their ability to achieve them. Whatever the motivation, our findings suggest that labor hoarding may be part of a distinctive female leadership style.

Separate from gender, our results indicate that corporate boards influence business decisions. They provide new evidence that boards of directors affect business strategy—an issue that is fundamental to developing effective corporate governance but inherently complicated by the endogeneity of the director-selection process. With respect to gender diversity on corporate boards, the closest paper is Adams and Ferreira (2009), who use fixed effects and instrumental variables to link female directors to increased monitoring but potentially lower firm value. We also examine

<sup>2</sup>Throughout the paper, we use "layoffs" as shorthand to describe year-to-year net reductions in the size of the workforce.

the mechanisms through which corporate directors affect business strategy—an area in which a recent survey about the role of boards of directors by Adams, Hermalin, and Weisbach (2010, 80) concludes that “much work remains to be done.” We find that new female directors appear to affect strategy in part by selecting like-minded executives to run the business and in part by influencing existing managers, which is consistent with surveys, such as Demb and Neubauer (1992), who describe boards as playing an active role in developing corporate strategy and objectives.

This paper is part of a growing body of literature on the Norwegian gender quota. Event studies of the stock market reaction to these policies find opposite results, depending on which announcement date is examined (Nygaard 2011; Ahern and Dittmar 2012).<sup>3</sup> Our paper is the first to exploit a triple-difference identification strategy based on public/private and cross-country differences, in addition to exploiting variation based on firms’ distance from compliance prior to quota adoption. Among these papers, ours was also the first to find a significant effect of the quota on accounting variables, such as return on assets, and on employment. Most importantly, our paper is unique in its examination of how the gender quota changed the *style* of corporate leadership, and shows that these changes in corporate strategy *cannot* be explained by board member age or experience. We find that the gender quota did not lead to less profitable business decisions overall—only to changes in human resources management—an outcome that has been linked to gender differences in multiple surveys of business professionals and executives (e.g., Rubinstein 2006; Adams, Licht, and Sagiv 2011).

More broadly, the paper contributes to the economic literature on gender and organizations. Many studies have been concerned with existing barriers to women’s professional advancement, including discrimination (e.g., Goldin and Rouse 2000), family obligations that reduce human capital investments and slow career progress (e.g., Bertrand, Goldin, and Katz 2010; Miller 2011; Kunze 2011), and the lack of mentors (e.g., Athey, Avery, and Zemsky 2000).<sup>4</sup> In contrast, this paper is primarily concerned with understanding what happens when public policies help women overcome these barriers and occupy positions at the top of the corporate hierarchy. Rather than limiting our analysis to the effects of the quota on profits, we explore how management style changes when female leadership is exogenously increased.<sup>5</sup> Within the literature on gender quotas, our approach is closest in spirit to that of

<sup>3</sup> A gender quota on Norwegian boards was first debated in the Norwegian legislature as early as October 1999 (Nygaard 2011). Ahern and Dittmar (2012) examine stock returns in February 2002 when the Minister of Trade and Industry first discussed the policy in an interview with Norway’s largest newspaper. Nygaard (2011) examines stock returns in December 2005 when it was unexpectedly announced that the quota would actually be mandated and under the threat of forced liquidation. Both events are described as a surprise, but the first is associated with negative average stock returns and the second with positive average stock returns.

<sup>4</sup> See Blau and Kahn (2000) for more on the sources of the gender pay gap for all workers. For a discussion of gender imbalances among top positions, see Bertrand and Hallock (2001) and Federal Glass Ceiling Commission (1995).

<sup>5</sup> Much of the affirmative action literature, in contrast, focuses on documenting the direct effects of programs or legislation on the employment or college admissions of the protected group (see, e.g., Holzer and Neumark 2000 and references therein). Studies that consider private sector business activity tend to focus on performance, assessing the potential efficiency costs from binding regulations, rather than asking if women bring a new leadership style to organizations.

Chattopadhyay and Duflo (2004) and Pande (2003), who study how public good provision changes under the leadership of female and minority politicians.

## I. The Policy and Design of the Study

### A. *The Norwegian Gender Quota*

The regulation we study requires that Norwegian public limited companies have at least 40 percent representation from each sex on their board, among directors appointed by shareholders. In Norway, public limited companies are required to have a capitalization of at least one million Norwegian kroner (about US\$150,000) and an auditor, and their shares must be available to the general public, typically through a stock exchange. Similar gender quotas have been proposed or adopted elsewhere in Europe, and disclosure requirements have been introduced in the United States, United Kingdom, and Australia.<sup>6</sup> In Norway, a voluntary quota was initially proposed in 2003. After firms failed to increase their female representation, however, a mandatory quota was instituted in 2006, and firms were given two years to comply. According to official records from Statistics Norway, nearly all firms complied by February 2008, and all did by April 2008. Although efficiency arguments have been advanced in support of greater board diversity, they do not appear to be the reason why Norway adopted the quota scheme. Scholars summarize the events leading up to the quota as “the equity argument has become law” (Randøy, Thomsen, and Oxelheim 2006, 2).<sup>7</sup> Policymakers appear to have been aiming to promote equality, rather than targeting any particular economic outcome.

To ensure that our estimates capture the effects of the quota for board members and not other policy changes, we investigated other legal changes implemented in Norway around the time of the quota. In corporate law, the Competition Act of 2004, which replaced the Competition Act of 1993, harmonized Norwegian law with European Union competition rules and introduced a pre-merger notification scheme. In commercial law, an act relating to cosmetic products was passed in 2005 and became effective in 2006. Potentially more relevant for our analysis is the 2005 Working Environment Act, which updated the 1977 law (as amended in 1995). Online Appendix A describes all aspects of the law that affect employee termination. As we document, there were minimal changes in these provisions. Both versions of the law also equally applied to listed and unlisted firms *within* Norway, which means that its impact should be accounted for in our within-Norway and triple-difference identification strategies.<sup>8</sup> The European Union also required firms

<sup>6</sup>Following the Norwegian gender quota, others have been passed in Spain (in 2007), the Netherlands (2009), France (2010), and Iceland (2010) and have been proposed in Belgium, Finland, and Sweden. The Swedish proposal was withdrawn following a change of government in 2006. European Union Justice Commissioner Viviane Reding has called for an EU-wide quota.

<sup>7</sup>Ansgar Gabrielsen, the Minister of Trade and Industry, proposed the quota in 2002 to overcome the perceived problem of “boys’ clubs” excluding women from corporate boards (Reiersen and Sjøfjell 2008).

<sup>8</sup>The only exception is one change (to requirements about what economic information firms must share with employees) that applied only to larger firms with 50 or more workers, which could potentially differentially impact public companies (both laws required advance notification of terminations; see online Appendix A for further details). Our results, reported below, are robust to restricting the sample to these larger firms (see Table 5).

to adjust their accounting from domestic Generally Accepted Accounting Principles (GAAP) to International Financial Reporting Standards (IFRS) by 2005. Although this change should not differentially affect financial reporting within Norway, we also re-estimate our main models with controls for accounting standards (results in the online Appendix, Table A1). This does not alter the results.

### *B. Data and Empirical Approach*

We analyze a panel of Nordic companies in the years 2003 through 2009 using accounting data from Bureau Van Dijk's Orbis database; supplementary analyses examine data as early as 1997. From Orbis, we also obtained data on firms' mergers, acquisitions, joint ventures, and minority stake purchases for the full sample period, and data on board membership from 2006 and 2009.<sup>9</sup> Because historical board membership is not available from live subscriptions to Orbis, we collected archived snapshots of the database, so that we could measure female representation in all of the Nordic countries before and after the quota was implemented.<sup>10</sup> We augmented these data with additional information on Norwegian boards. First, we obtained official lists from the Norwegian Register of Business Enterprises containing annual information on the boards from 2002 through 2009, including individual board member age and gender, for all public and private Norwegian firms in our sample. Second, from Thomson ONE Banker, we collected detailed individual background and demographic characteristics for the directors of listed Norwegian firms in 2009.

We start with public limited companies in Norway, excluding banks and financial institutions and companies in the petroleum industry. We exclude financial firms because they are subject to different ownership rules.<sup>11</sup> The petroleum industry is larger in Norway than in the comparison countries. We exclude companies in that industry in case high oil prices buffered these companies from the recession. We limit the sample to the 159 remaining firms that have shares listed on an exchange, and then exclude firms with missing information on directors, industry, assets, leverage, employees, labor costs, or operating profits in 2006, leaving us with 104 listed Norwegian companies. In the regression analysis of accounting and labor variables, we further limit the sample to firms with at least one year of outcome data prior to 2006 and to firm-year observations with nonmissing values for assets, profits, revenues, and labor costs in order to maintain a consistent sample.<sup>12</sup>

<sup>9</sup>Pinto Ribeiro, Memghinello, and Backer (2010) discuss advantages and drawbacks of using data from Orbis. The largest drawback—Orbis's limited coverage of small firms—does not apply to our analysis, which focuses on exchange-listed companies and similarly sized private firms.

<sup>10</sup>We impute the gender of each named director by matching first and middle names to official lists of names used in Nordic countries. For cases in which the record includes a gendered title, such as Mr. or Mrs., we use the title. We are unable to determine gender for 0.57 percent of the directors and instead assign a weight of one-half for both male and female in these cases. The unassigned gender cases are due to directors with gender-neutral names and without gendered titles. The results are identical if we exclude these individuals from the director sample or assume that they are all men.

<sup>11</sup>Norway also changed the registration requirements for financial firms during this period, leading many financial firms to change their organization's form away from being a public limited company.

<sup>12</sup>The results are not sensitive to these sample selection criteria. In analysis reported in online Appendix Table A2, panel A, we include as many observations as possible for each dependent variable (and exclude the board controls to further increase the sample size) and obtain similar results. For operating profits, this analysis includes at least one observation for 158 of the 159 firms.

Restricting the treatment group to listed companies ensures comparability across countries for the listed versus unlisted classification used for identification. This choice also focuses our analysis on the subset of companies, subject to the quota, that were least able to avoid it. To avoid the regulation, a *listed* firm would have to delist and concentrate its ownership before it could convert to private status. Indeed, a substantial number of *unlisted* Norwegian public limited companies converted to private status in the wake of the quota, whereas few public *listed* companies changed to private status (Nygaard 2011).<sup>13</sup> Our results are robust to a broad range of alternate sample selection rules.<sup>14</sup>

Our estimation approach relies on difference-in-differences comparisons with matched samples of private firms in Norway and public and private firms in other Nordic countries.<sup>15</sup> For each public listed company in Norway, we identify the five closest firms in each of the three comparison groups based on industry, assets, employees, and operating profits in 2006. We create a single index for firms' proximity using Abadie et al.'s (2004) matching algorithm, weighting differences in each firm characteristic using the inverse of its sample standard error. Although matching helps ensure similarity between the various samples, we obtain similar results when we forgo matching and use the full samples.<sup>16</sup> Financial variables are winsorized at the 1 percent tails, as is common when working with accounting data.

Summary statistics for the various samples are reported in Table 1 for 2006. Affected firms are similar to matched firms, although they have somewhat higher assets and lower profits and labor costs as a percent of assets (these differences are not statistically significant at conventional levels). These samples of affected and matched firms were also similar in 2005, as shown in online Appendix Table A4. Industry mix is similar across the groups as well, with many firms in manufacturing; transport, storage, and communication; or real estate, renting, and business (i.e., service) activities. Because each affected firm is matched with its nearest neighbors, the matching procedure can draw the same comparison firm multiple times. In all, the 1,560 observations for comparison firms correspond to 1,103 distinct firms. We account for the repeated observations in the estimation by adjusting the standard errors for clustering at the firm level. Online Appendix Table A5 reports summary statistics for the main estimation sample.

<sup>13</sup>In our sample, none of the Norwegian firms that were listed on an exchange in 2006 had converted to private status by 2009. For public limited companies that were *not* listed on an exchange in 2006, the rate of conversion to private status was over 60 percent.

<sup>14</sup>For example, panel A of Table A3 in the online Appendix reports results that include unlisted public limited Norwegian companies in the treated group and draws additional matched controls for them. As expected, the effects are diluted by including these firms; the estimates are smaller in magnitude than our main results, yet still statistically significant. Panel B of that table shows that the main estimates are also robust to including firms that later delisted in the treatment group. Panel C shows robustness to excluding public unlisted companies from the control group.

<sup>15</sup>If firms differ along both observable and unobservable dimensions, estimation that combines matching on observables and fixed effects (to account for time-invariant unobservables) can yield more reliable estimates than matching alone (Smith and Todd 2005).

<sup>16</sup>Table A2 in the online Appendix reports these results. Estimates in panel B forgo the matching procedure and find similar results using a control group comprised of all unlisted companies in Norway and all companies in other Nordic countries for which data are available. As an additional robustness check, estimates in panel C show that the main results are also robust to limiting the control sample to companies most similar to the affected companies (within a distance of five units) and excluding the two affected companies with no close matches.

TABLE 1—SUMMARY STATISTICS FOR EXCHANGE-LISTED COMPANIES IN NORWAY AND MATCHED COMPARISON COMPANIES, 2006

	Norway		Other Nordic countries	
	Listed	Unlisted	Listed	Unlisted
<i>Assets (€ millions)</i>				
Mean	836	470	780	485
Median	104	95	74	92
Standard deviation	2,213	1,097	2,215	1,137
<i>Employment</i>				
Mean	2,024	796	2,634	1,620
Median	302	96	310	319
Standard deviation	5,433	2,469	6,017	4,198
<i>Operating profit/assets</i>				
Mean	0.034	0.071	0.043	0.053
Median	0.061	0.063	0.068	0.058
Standard deviation	0.175	0.097	0.160	0.104
<i>Labor cost/assets</i>				
Mean	0.220	0.252	0.283	0.250
Median	0.187	0.194	0.236	0.202
Standard deviation	0.189	0.245	0.225	0.229
<i>Debt/assets</i>				
Mean	0.190	0.146	0.139	0.153
Median	0.157	0.011	0.080	0.042
Standard deviation	0.176	0.201	0.150	0.207
<i>Industry share</i>				
Agriculture, hunting, and fishing	4.8	4.0	0.0	4.8
Mining	1.0	1.0	0.8	1.0
Manufacturing	37.5	36.7	42.3	36.5
Electricity, gas, and water supply	2.9	3.7	2.9	3.7
Construction	2.9	2.3	2.9	2.3
Wholesale and retail trade	9.6	11.0	9.8	10.4
Transport, storage, and communication	18.3	18.5	18.3	17.3
Real estate, renting, and business activities	22.1	21.9	22.1	22.7
Other community, social, and personal services	1.0	1.0	1.0	1.4
Observations	104	520	520	520
Number of distinct firms	104	396	293	414

*Notes:* This table reports summary statistics in 2006 for exchange-listed companies in Norway and three sets of matched comparison companies. Each set of comparison firms consists of the five most similar firms based on assets, operating profits, labor costs, and industry in 2006 (matched with replacement using Abadie et al.'s (2004) matching algorithm and inverse variance weighting). Variables are winsorized at the 1 percent tails.

### C. Effects of the Quota on Board Composition

To assess the direct impact of the quota on female board representation, we analyze firms' board composition in 2006 and 2009. Over the three-year period, the average female share on boards of directors more than doubled among affected firms, whereas that share increased by only 35 percent for private firms in Norway. In other Nordic countries, the increase was 58 percent for public firms and 45 percent for private firms. On average, affected firms increased female representation by about

one board member (from 1.1 to 2.3 women) and reduced their male membership by a similar amount (from 5.0 to 4.1 men). Board size increased slightly over the period from 6.1 to 6.3 members. As board size and turnover may directly affect board performance (Adams, Hermalin, and Weisbach 2010), we control for these changes in our analysis of the impact of the quota, where the data are available. In all, 122 new women assumed positions on boards of listed companies in our sample after the law was implemented.<sup>17</sup>

To further document the direct impact of the quota, we estimate the following regression model for gender representation on the board of firm  $j$ :

$$(1) \quad Y_j = \beta_1 \text{Norway}_j \times \text{Listed}_j + \gamma_1 \text{Norway}_j + \delta_1 \text{Listed}_j + \varepsilon_j,$$

where  $Y_j$  is one of various dependent variables;  $\text{Norway}_j$  and  $\text{Listed}_j$  are indicator variables; and  $\varepsilon_j$  is an idiosyncratic error. We report the difference-in-differences estimate for  $\beta_1$  in the first row of Table 2. Before the quota was adopted in 2006, there was no greater difference in female board share among listed and unlisted firms in Norway than there was in other Nordic countries (the difference-in-differences estimate is 2.8 percent with a standard error of 1.9; see column 1). But this changed dramatically after the quota's adoption. Relative to other listed firms outside of Norway and to unlisted firms in Norway, affected firms' female board shares in 2009 were 20 percentage points higher (column 2), following an average 17-percentage-point larger increase in female board share (column 3). These dramatic differences indicate that the law had a substantial impact on board composition after 2006. The estimates for  $\gamma_1$  also show no differences in female representation between private companies in Norway and elsewhere in either 2006 or 2009. Outside of Norway, listed companies have about 5 to 6 percent lower female representation than unlisted companies in both years (columns 1 and 2)—a baseline pattern that remained stable over the period (column 3).

## II. Effects of the Quota on Corporate Activity

### A. Corporate Profits

This section describes our main empirical strategy and describes the quota's overall effects on profitability—a measure of short-term firm performance. Figure 1 plots the median ratio of operating profits to assets among various sets of firms in the years before and after the quota's adoption. The median profitability of listed firms in Norway decreases by more than 20 percent after the quota (from 5.8 to 4.6 percent) and average profitability drops even more (from 2.4 to 0.2 percent), but events

<sup>17</sup>Based on administrative data from the Norwegian government, the number of distinct women serving on the corporate boards of public companies in our sample increased from 159 at the end of 2005 to 281 in 2009. Although the additional women substantially changed board composition, they represent a trivial share of the more than 80,000 Norwegian women with more than an undergraduate education. In addition to the domestic supply of talent, Norwegian companies can also draw both male and female directors from outside of the country (as long as one-half of the directors are residents of Norway or citizens and residents of a different country in the European Union or European Economic Area), which greatly increases the pool of potential directors. In 2009, foreigners comprised only about 17 percent of directors at public companies in Norway.

TABLE 2—CHANGE IN GENDER REPRESENTATION ON CORPORATE BOARDS

	Share female, 2006	Share female, 2009	Change in share female, 2006–2009
<i>Norway × Listed</i>	0.028 (0.019)	0.199*** (0.019)	0.171*** (0.020)
<i>Norway</i>	0.000 (0.010)	−0.004 (0.010)	−0.004 (0.010)
<i>Listed</i>	−0.045*** (0.010)	−0.056*** (0.010)	−0.011 (0.010)
Observations	1,660	1,660	1,660
R <sup>2</sup>	0.050	0.096	0.071

Notes: This table reports coefficient estimates and standard errors (in parentheses) from cross-sectional regressions of different dependent variables on indicators for whether the firm is in Norway, whether the firm is listed, whether the firm is both in Norway and listed, and industry fixed effects. Listed Norwegian firms were affected by the gender representation law. Each observation is a firm, and the sample includes all listed companies in Norway and the matched set of control firms, described in Table 1, with nonmissing data.

\*\*\*Significant at the 1 percent level.

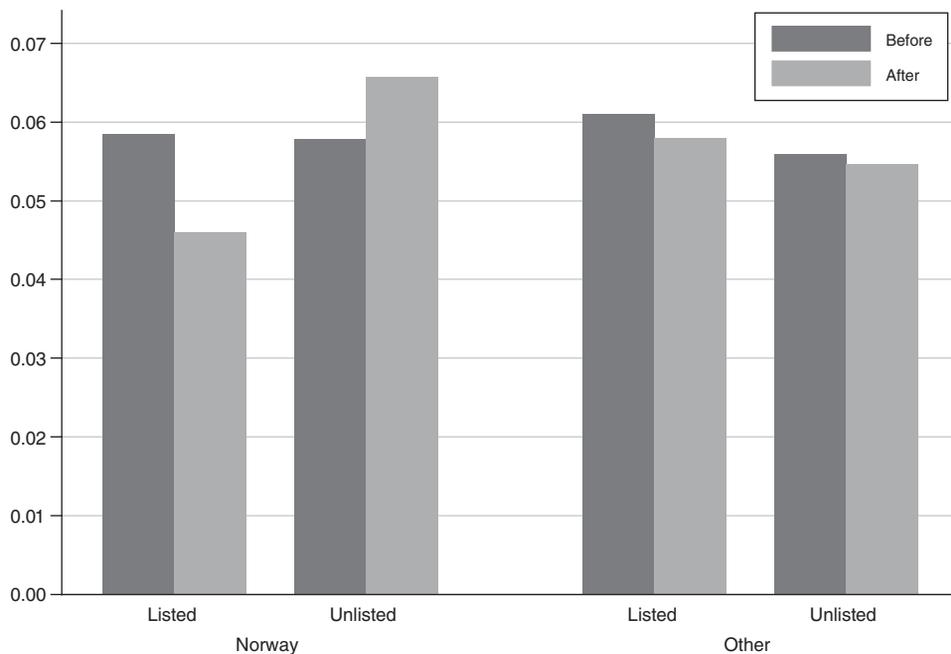


FIGURE 1. OPERATING PROFITS/ASSETS BEFORE AND AFTER THE QUOTA

Notes: Each bar in the figure depicts, for different samples of firms, the median operating profits over assets in the periods before (2003–2006) and after (2007–2009) the quota’s adoption. The rates are shown for firms affected by the quota (Norway listed) and each of the three matched comparison groups described in Table 1.

TABLE 3—CHANGES IN OPERATING PROFITS/ASSETS, 2003–2009

	DD: Within Norway by listed		DD: Within listed by Norway		DDD: By Norway and listed	
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Norway</i> × <i>Listed</i> × <i>Post2006</i>					−0.041**	−0.040**
					(0.016)	(0.017)
<i>Norway</i> × <i>Post2006</i>			−0.034**	−0.034**	0.010	0.010
			(0.015)	(0.014)	(0.007)	(0.007)
<i>Listed</i> × <i>Post2006</i>	−0.027**	−0.027**			0.015	0.014
	(0.011)	(0.011)			(0.012)	(0.012)
Controls for board size and average number of other board seats		X		X		X
Observations	3,116	3,116	3,460	3,460	8,901	8,901
Number of firms	610	610	596	596	1,620	1,620
<i>R</i> <sup>2</sup>	0.05	0.05	0.10	0.10	0.05	0.05

*Notes:* This table summarizes the results from firm-panel regressions of firms' profitability (operating profits divided by assets) on variables indicating whether a firm is affected by the gender representation law and a set of controls. Results are reported using three different samples of comparison firms to provide different counterfactuals for what would have happened to listed, Norwegian firms (the affected group) absent the reform: columns 1 and 2 use unlisted, Norwegian firms; columns 3 and 4 use listed, non-Norwegian firms; and columns 5 and 6 use both sets of comparison firms in a triple-difference specification. Controls in all regressions include firm and year fixed effects and industry-specific time trends. Where indicated, controls also include board size and the average number of other board seats. Standard errors, adjusted for clustering at the firm level, are reported in parentheses.

\*\*Significant at the 5 percent level.

unrelated to the quota may contribute to these changes. To isolate the impact of the quota, we examine changes in profits during the same time period among samples of similar comparison firms that were not directly affected by the quota. As shown in Figure 1, none of the other groups exhibits a similar decline.

Because no single comparison group is ideal, we estimate the relative changes in profitability using three different identification strategies, which we report in Table 3. We begin by comparing listed and unlisted firms within-Norway. We combine the sample of listed Norwegian firms with the matched control sample of the five closest unlisted Norwegian companies and estimate the following specification:

$$(2) \quad Y_{ijt} = \beta_2 \text{Listed}_j \times \text{Post2006}_t + \lambda_i \text{Year}_t + \alpha_j + \tau_t + \zeta_{ijt},$$

where  $Y_{ijt}$  measures profits at firm  $j$  in industry  $i$  in period  $t$ , and the terms  $\alpha_j$  and  $\tau_t$  are firm and year fixed effects, respectively. The term  $\lambda_i$  allows for differential linear time trends by industry group (using the NACE revision 1.1 industry groups listed in Table 1). The sample period is from 2003 to 2009, and standard errors are adjusted to allow for arbitrary within-firm correlations in the error term.

Estimates from the within-Norway specification are reported in column 1 of Table 3. The impact of the quota is negative, indicating that annual profits decreased. Within Norway, profits declined by 2.7 percent of assets among listed firms after 2006 relative to the change in profits in unlisted firms during the same time period ( $p < 0.05$ ). However, this empirical approach will not isolate the impact of the quota if listed and unlisted companies in Norway do not follow a common time trend (Dale-Olsen, Schøne, and Verner 2011). An important concern is that being publicly traded might afford affected firms greater access to capital in distress or could

expose their managers to different governance structures and other pressures under similar market conditions.

To address this concern, we employ a second identification strategy that exploits variation within the set of listed companies in Nordic countries. In this approach, listed companies in Denmark, Finland, and Sweden provide the comparison group used to estimate the counterfactual year effects:

$$(3) \quad Y_{ijt} = \beta_3 \text{Norway}_j \times \text{Post2006}_t + \lambda_i \text{Year}_t + \alpha_j + \tau_t + \eta_{ijt}.$$

In equation (3), the impact of the law is represented by  $\beta_3$ , the coefficient for the interaction term between Norway and the post-reform period. The estimate for  $\beta_3$ , reported in column 3 of Table 3, is remarkably similar to the estimate in column 1. The quota is associated with a decline in profits of 3.4 percent of assets relative to the change in profits of listed companies outside of Norway ( $p < 0.05$ ).

Our third identification strategy combines these two approaches to calculate a triple-difference estimate of the impact of the law. This approach simultaneously allows public and private firms to follow different trends, while also accounting for any differential changes in business conditions or regulatory environments that may have affected Norwegian firms relative to firms in other Nordic countries. In this specification, we compare the change in outcomes between listed and unlisted companies in Norway and elsewhere in the region:

$$(4) \quad Y_{ijt} = \beta_4 \text{Norway}_j \times \text{Listed}_j \times \text{Post2006}_t + \gamma_4 \text{Norway}_j \times \text{Post2006}_t \\ + \delta_4 \text{Listed}_j \times \text{Post2006}_t + \lambda_i \text{Year}_t + \alpha_j + \tau_t + \varphi_{ijt}.$$

The impact of the law is captured by  $\beta_4$ , the double-interaction (or “triple-difference”) between indicators for Norway, listed, and post-2006. This term can be interpreted as the difference in how the profit differential between listed and unlisted companies in Norway changed after 2006, compared to how the corresponding differential changed in other countries at the same time. Equivalently, it is the difference in how the profit differential between Norway and other countries changed differentially for listed and unlisted companies after the quota.

The effect of the quota on profitability is negative, as in the previous columns, and the magnitude is 4.1 percent of assets (column 5). The difference in economy-wide trends between Norway and the other countries is measured by the term  $\gamma_4$ , which can be interpreted as the difference-in-differences between Norway and other countries among unlisted companies. Similarly, the term  $\delta_4$  captures the differential change in listed versus unlisted companies outside of Norway. In specification (4), these simple difference-in-differences estimates are unrelated to the effect of the quota. These estimates can be thought of as specification checks for equations (2) and (3) in that there is no reason to expect the quota to induce any variation along these dimensions after controlling for the triple-difference. Indeed, the estimates are small, positive, and statistically indistinguishable from zero. The results in columns 2, 4, and 6 of Table 3 show that the results are robust to the inclusion of additional controls

TABLE 4—BREAKING DOWN THE CHANGE IN OPERATING PROFIT/ASSETS, DDD SPECIFICATION

	Operating profit/Assets	Revenue/ Assets	Labor costs/Assets	Other costs/Assets
<i>Panel A. Main results</i>				
<i>Norway × Listed × Post2006</i>	−0.041** (0.016)	−0.009 (0.057)	0.041** (0.017)	−0.010 (0.049)
Observations	8,901	8,901	8,901	8,901
Number of firms	1,620	1,620	1,620	1,620
R <sup>2</sup>	0.05	0.01	0.02	0.01
<i>Panel B. With controls for other board characteristics</i>				
<i>Norway × Listed × Post2006</i>	−0.040** (0.017)	−0.007 (0.057)	0.042** (0.017)	−0.009 (0.050)
Controls for board size and average number of other board seats	X	X	X	X
Observations	8,901	8,901	8,901	8,901
Number of firms	1,620	1,620	1,620	1,620
R <sup>2</sup>	0.01	0.05	0.01	0.03

*Notes:* This table summarizes the results from firm-panel regressions of firms' profits, revenues, labor costs, and other costs (each divided by assets) on an indicator for whether the firm is affected by the gender representation law using the triple-difference framework reported in Table 3, columns 5 and 6. Standard errors, adjusted for clustering at the firm level, are reported in parentheses.

\*\*Significant at the 5 percent level.

for the total board size and the average number of other board seats occupied by its members in 2006 and 2009.<sup>18</sup>

The relative change in profits is also not due to affected firms increasing their assets, while leaving sales revenue unchanged. The estimated effect of the quota on total assets, measured in either levels or logs, is not statistically significant. Indeed, Table A6 in the online Appendix shows that the results are robust to measuring profits relative to sales (instead of to assets).

### B. Labor Outcomes

While the profitability results in the previous section provide important summary measures of the immediate impact of the quota, the main goal of this paper is to uncover *how* corporate decision-making changes after the quota. Our next analysis, reported in Table 4, decomposes the change in profits into the effects on revenues and costs and identifies increased relative employment as a root cause. Each column reports the triple-difference estimate of the effect of the quota using specification (4) for a different dependent variable.

The first column of Table 4 repeats the estimate for overall profitability; operating profits decrease by 4.1 percent of assets. Because of the accounting identity, this decrease in profits must reflect some combination of a decrease in revenues and/or an increase in costs. To explore the corporate changes that lead to the

<sup>18</sup>The point estimates for the control variables are not reported in Table 3 to save space; they are tiny and statistically insignificant.

decrease in profits, we separately examine the impact of the quota on these items. Because the triple-difference specification is common across these regressions, the sum of the effects on each of these components must sum to the aggregate effect on overall profitability. The second column reports the results for revenues. The estimate, which is noisy and not statistically significant, suggests that revenues decrease by a modest 0.9 percent of assets, on average, after the quota is imposed.

The most substantial effect of the law, both statistically and economically, is its effect on labor costs. As reported in the third column of Table 4, labor costs increase by 4.1 percent of assets, on average, relative to unaffected firms after the quota ( $p < 0.05$ ). In contrast to the results for labor costs, we find that other costs decrease by about 1.0 percent of assets, on average, after the quota, and the decrease is not statistically significant (column 4). The fact that other costs *decrease* suggests that the increase in labor costs are not simply attributable to the firms negotiating poorly with all of their suppliers after the quota takes effect. This evidence is thus more consistent with changes in board members' style and preferences, rather than skill or experience, causing the drop in short-run profitability. These patterns are repeated in the second panel of Table 4, where estimates are reported that include controls for board size and the number of other boards.

To investigate the impact on labor outcomes in further detail, we separately estimate the quota's effects on employment (number of workers) and labor costs (the sum of compensation costs for all workers). We unfortunately do not observe the full distribution of wages paid to individual workers at these firms. The main results are reported in columns 1 and 4 of Table 5. The three panels report estimates from the different identification strategies described in the previous section: the within-Norway comparison (specification 2) is in panel A; the cross-country, within-listed comparison (specification 3) is in panel B; and the triple-difference comparison (specification 4) is in panel C. The 2005 update to employment regulation in Norway (described in Section III and in online Appendix A) makes the within-Norway and the triple-difference approaches especially valuable for exploring labor effects of the quota. Columns 2 and 5 show that the effects are similar in a sample limited to firms with more than 50 workers, providing further evidence that they are not driven by the changes in employment regulation.

These estimated effects of the quota are again quite similar across the three empirical approaches. For total employment, the triple-difference estimate is an increase of 0.31 log points, or 36 percent ( $p < 0.01$ ). For the median listed Norwegian firm, this corresponds to about 110 additional jobs that were either created or not destroyed, relative to the comparison firms. The estimates for total labor costs are also positive and statistically significant across the three models. The magnitudes are slightly smaller than the employment estimates—about 0.15 log points, or 16 percent, in the triple-difference specification. The difference between these estimates implies that the quota led to greater relative employment, but did not also increase average wages per worker. For all specifications, the results are robust to the inclusion of controls for board size and the average number of other boards (columns 3 and 6).

The sign and significance of the employment results are not driven by a few outlier observations with large employment changes, but the precise magnitude may be inflated. To investigate this possibility, we first re-estimated the main triple-difference

TABLE 5—CHANGES IN EMPLOYMENT AND LABOR COSTS

	Log employment			Log labor costs		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel A. DD: Within Norway by listed</i>						
<i>Listed × Post2006</i>	0.468*** (0.077)	0.374*** (0.075)	0.464*** (0.076)	0.293*** (0.069)	0.194*** (0.064)	0.296*** (0.068)
Observations	2,369	1,612	2,369	2,369	1,612	2,369
Number of firms	520	351	520	520	351	520
R <sup>2</sup>	0.20	0.25	0.20	0.32	0.33	0.33
<i>Panel B. DD: Within listed by Norway</i>						
<i>Norway × Post2006</i>	0.276*** (0.083)	0.304*** (0.072)	0.292*** (0.082)	0.260*** (0.071)	0.254*** (0.061)	0.284*** (0.070)
Observations	3,324	2,641	3,324	3,324	2,641	3,324
Number of firms	583	481	583	583	481	583
R <sup>2</sup>	0.22	0.24	0.23	0.22	0.17	0.23
<i>Panel C. DDD: By Norway and listed</i>						
<i>Norway × Listed × Post2006</i>	0.310*** (0.091)	0.294*** (0.081)	0.307*** (0.091)	0.153* (0.082)	0.128* (0.076)	0.144* (0.084)
Observations	7,811	5,987	7,811	7,811	5,987	7,811
Number of firms	1,517	1,181	1,517	1,517	1,181	1,517
R <sup>2</sup>	0.15	0.17	0.15	0.24	0.21	0.24
Limit to firms with at least 50 employees		X			X	
Controls for board size and average number of other board seats			X			X

*Notes:* This table summarizes the results from firm-panel regressions of firms' log employment and log labor costs on indicators for whether the firm is affected by the gender representation law using the three different samples of comparison firms and specifications reported in Table 3. Standard errors, adjusted for clustering at the firm level, are reported in parentheses.

\*\*\*Significant at the 1 percent level.

\*Significant at the 10 percent level.

employment model on a sample limited to observations with standardized regression residuals of less than three (positive or negative). The estimated effect of the quota dropped to a more moderate 0.24 log points (standard error of 0.03). We also experimented with dropping each of the treated companies (and their associated controls) in turn; the point estimates ranged from 0.27 to 0.33. Finally, we estimated robust regression and least absolute deviation versions of our main triple-difference model, which yielded point estimates of 0.11 (standard error of 0.02) and 0.20 (standard error of 0.02), respectively.<sup>19</sup> These results support the robustness of the positive employment estimate but also reveal some sensitivity in the exact magnitude of the estimate to individual observations. Adjusting for outliers reduces the size of estimate by as much as two-thirds.

<sup>19</sup>The robust regression procedure first estimates the model using all observations with no weights. Then the main estimates are computed, excluding all influential observations (with Cook's D values greater than one) and with lower weight on observations with large absolute residuals from the original regression.

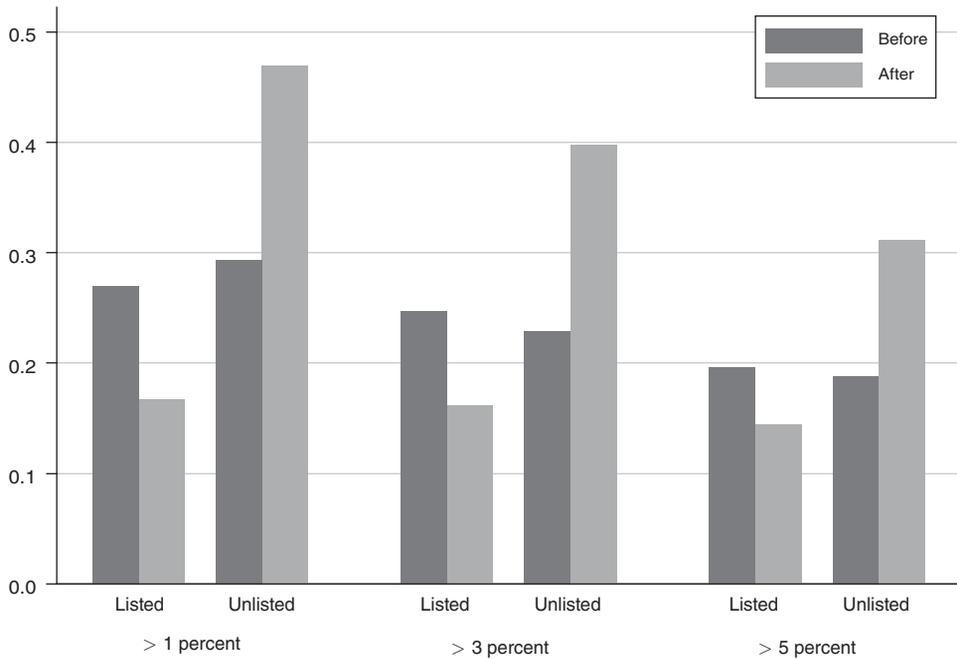


FIGURE 2. RATES OF EMPLOYMENT DOWNSIZING IN NORWAY BEFORE AND AFTER THE QUOTA

Notes: Each bar in the figure depicts the average rate of year-to-year decreases in employment (larger than 1 percent, 3 percent, and 5 percent, respectively) in the periods before (2003–2006) and after (2007–2009) the quota's adoption. The rates are shown for listed firms (affected by the quota) and unlisted comparison firms in Norway.

This pattern of changes in employment and labor costs is consistent with affected firms' corporate boards leading management to hire or retain additional workers whose salaries are below average for the firm. These lower-compensated workers are more vulnerable to risks of negative employment shocks than their highly compensated counterparts. To examine the role of layoffs in these effects, we measure the effect of the quota on year-to-year net reductions in employment. Figure 2 displays the raw rates of workforce reductions among affected and comparison firms in Norway in the period surrounding the quota. Although these rates were similar before the quota, affected firms were less likely to downsize afterward.

Table 6 reports estimates for the triple-difference model. The first column presents estimates from a linear probability model of an indicator for a greater than 1 percent decline in total firm employment. The probability of such a reduction in total firm employment in a given year decreases by 25 percentage points among affected firms, relative to other firms, after the quota is adopted ( $p < 0.01$ ). This constitutes a sizable drop, especially when compared with the sample mean of 32 percent and standard deviation of 47 percent. In analysis reported in the next two columns, we separately examine the incidence of larger layoff events, affecting more than 3 or 5 percent of the workforce. Layoffs fitting these definitions occur in 25 percent and 20 percent, respectively, of firm-year observations in the full sample.

TABLE 6—YEAR-TO-YEAR CHANGES IN EMPLOYMENT, DDD SPECIFICATION

	Downsizing: Annual decrease in employment			Expansion: Annual increase in employment		
	> 1 percent	> 3 percent	> 5 percent	> 1 percent	> 3 percent	> 5 percent
	(1)	(2)	(3)	(4)	(5)	(6)
Mean of dependent variable	0.32	0.25	0.20	0.55	0.48	0.42
<i>Panel A. Main results</i>						
Norway × Listed × Post2006	-0.252*** (0.065)	-0.204*** (0.063)	-0.130** (0.060)	0.080 (0.071)	0.098 (0.072)	0.110 (0.072)
Observations	6,872	6,872	6,872	6,872	6,872	6,872
Number of firms	1,347	1,347	1,347	1,347	1,347	1,347
R <sup>2</sup>	0.04	0.04	0.03	0.03	0.03	0.03
<i>Panel B. With controls for other board characteristics</i>						
Norway × Listed × Post2006	-0.250*** (0.066)	-0.193*** (0.062)	-0.121** (0.060)	0.074 (0.072)	0.089 (0.073)	0.117 (0.073)
Controls for board size and average number of other board seats	X	X	X	X	X	X
Observations	6,872	6,872	6,872	6,872	6,872	6,872
Number of firms	1,347	1,347	1,347	1,347	1,347	1,347
R <sup>2</sup>	0.04	0.04	0.03	0.03	0.03	0.03

*Notes:* This table summarizes the results from firm-panel regressions of various measures of net changes in firms' employment on an indicator for whether the firm is affected by the gender representation law using the triple-difference framework reported in Table 3, columns 5 and 6. Standard errors, adjusted for clustering at the firm level, are reported in parentheses.

\*\*\*Significant at the 1 percent level.

\*\*Significant at the 5 percent level.

After female board representation increases with the quota, the incidence of these larger layoffs among affected firms decreases by 20 percentage points (for the 3 percent cutoff;  $p < 0.01$ ; column 2) and by 13 percentage points (for the 5 percent cutoff;  $p < 0.05$ ; column 3) relative to unaffected firms. These estimates reflect 65 to 80 percent reductions in the annual incidence of layoffs, relative to the sample means, and 32 to 54 percent of the sample standard deviations.

The quota's impact on employment changes is not symmetric. We also examine the incidence of year-to-year *increases* in employment of more than 1, 3, and 5 percent (columns 4–6). Workforce expansions are more common than layoffs in our sample, and these occur in 55, 48, and 42 percent of firm-year observations. We find little evidence of a relation between the quota and employment expansions; the estimates are much smaller relative to the sample means and standard deviations and are not statistically significant.

Together, these estimates suggest that the growth in relative employment after the quota primarily results from fewer workforce reductions, rather than more workforce expansions. One interpretation is that the gender quota induced transfers from shareholders to workers, at least in the short-run, possibly because the preferences or ability of directors changed. Another possibility is that the quota-induced, gender-diverse boards shifted focus to maximizing long-run shareholder value by avoiding layoffs. Layoffs directly reduce payroll costs and improve short-run operating

performance, but they may also increase costs later by decreasing employee morale and requiring the recruiting and training of new hires when demand rebounds (Parsons 1972; Katz 1986).<sup>20</sup> Either way, the new board structures appear to reduce mass layoffs. We conclude that gender quotas for directors can translate into meaningful differences in corporate strategy.

In theory, stock market event studies of the policy's announcement could be used to indicate whether the market expected the quota to create value for shareholders, but such studies of the Norway quota find opposite results, depending on which announcement date is examined (Nygaard 2011; Ahern and Dittmar 2012).<sup>21</sup> Even if the market correctly anticipated that women would reduce layoffs, Edmans (2011) finds that the stock market undervalues the intangible benefits from such strategies. Ultimately, time will tell whether the gender quota created value for these firms in the long run.

### C. Robustness Checks

*Preexisting Trends.*—We examine various robustness checks in order to verify the connections between the gender quota for board composition, decreased profits, and reduced layoffs. We start by testing for pre-existing trends. We compare relative changes among affected firms during the period preceding the mandatory quota for two reasons. First, firms may have changed their strategies in anticipation of the quota. Although possibly the quota itself, and certainly the severity of the penalty for noncompliance, were a surprise when the mandate was adopted in 2006 (Nygaard 2011), public firms in Norway had been encouraged to increase female representation on their boards of directors since 2003, and were warned that a mandatory quota might be adopted. In practice, few firms added women in earnest until the mandatory period, as illustrated by the estimates in column 1 of Table 2. Thus, the timing of the effects may suggest whether the results are in fact due to the addition of women to the boards or are instead attributable to an omitted variable that led Norway to adopt the rule. Second, we test for differences between affected and unaffected firms before 2007 as a falsification check for pre-existing trends that could obscure proper inference of the quota's effects.

To investigate the presence of pre-existing trends between 2003 and 2006, we extend our dataset back to 1999 in order to include a baseline period before 2003. We estimate an expanded version of specification (4) that has two sets of triple-difference effects. The first set, reported in the first row of Table 7, shows triple-difference effects for the 2003 to 2006 period, relative to the earlier 1999 to 2002 period. These estimates show no indication of differential effects in the period preceding the quota. The

<sup>20</sup>Indeed, some management scholars argue that employment downsizing often fails to generate the benefits sought by management (e.g., Cascio 2002). A number of studies find that layoffs are associated with low stock prices or accounting performance (Worrell, Davidson, and Sharma 1991; Lin and Rozeff 1993; Cascio, Young, and Morris 1997; Palmon, Sun, and Tang 1997; Hallock 1998), but it is difficult to separate the effects of a layoff from the effects of the adverse economic conditions that caused it.

<sup>21</sup>See footnote 3 for details. As a measure of investors' perceptions, stock price movements may underestimate women's ability to lead companies (Wolfers 2006). Nevertheless, Adams, Gray, and Nowland (2011) find that shareholders react more positively to new appointments of female directors than to male directors at Australian firms (outside of a quota setting).

TABLE 7—ANALYSIS OF PRE-EXISTING TRENDS, DDD SPECIFICATION, 1999–2009

	Operating profit/ Assets	Log employment	Log labor costs	Decrease in employment > 3 percent
<i>Norway</i> × <i>Listed</i> × <i>Post2003</i>	−0.010 (0.021)	−0.165 (0.126)	0.107 (0.120)	0.124 (0.076)
<i>Norway</i> × <i>Listed</i> × <i>Post2006</i>	−0.040** (0.017)	0.307*** (0.093)	0.190** (0.092)	−0.166** (0.070)
Observations	11,403	10,063	10,063	8,266
Number of firms	1,463	1,347	1,347	1,116
R <sup>2</sup>	0.06	0.11	0.24	0.03

*Notes:* This table tests for preexisting trends. Results are reported from firm-panel regressions of firms' profitability (operating profits divided by assets), log employment, log labor costs, and layoffs (net decreases in employment of more than 3 percent) using the triple-difference framework reported in Table 3, column 5, augmented to include a placebo indicator for listed, Norwegian firms after 2003. Standard errors, adjusted for clustering at the firm level, are reported in parentheses.

\*\*\*Significant at the 1 percent level.

\*\*Significant at the 5 percent level.

estimates are statistically insignificant. They are also substantially smaller than, and inconsistent in sign, relative to the post-quota estimates reported in the second row of Table 7. As in the previous tables, the post-quota effects are computed relative to the 2003 to 2006 period and reveal significant declines in profits and layoffs.<sup>22</sup>

*Distance from Compliance.*—We also test the prediction that firms furthest from compliance in 2006 should display the greatest effects of the law. About half the firms in the affected group had no women on their boards in 2006, when the quota became law. In analyses described in detail in online Appendix B, we show that these firms, which were effectively required to add a greater number of women to their boards before the 2008 deadline, exhibited greater effects. The patterns hold both when we limit the sample to the affected firms and estimate differential effects of the quota based on firms' distance to compliance and when we estimate an expanded version of our main triple-difference model that allows for heterogeneous effects based on whether the board included any women before the law was adopted (see online Appendix Table A7).<sup>23</sup> These analyses suggest that our main findings

<sup>22</sup> Adding the pre-period data has little effect on the main triple-difference estimates for the post-2006 period. We also estimated separate quota effects year-by-year; the individual post-quota coefficients were not statistically distinguishable from one another.

<sup>23</sup> The first of these identification strategies is closest to the approach used in Ahern and Dittmar (2012), though that paper uses variation in female director share in 2002 instead of 2006. The major limitation of this approach is that firms with female directors before the quota were unusual and may have had different time trends in outcomes for reasons unrelated to the quota. For example, Appendix Table A.I in Ahern and Dittmar (2012) shows that firms with any female directors in 2002 were larger, had more leverage, and were located in different industries. Similar correlations also hold for firms with any female directors in 2006. Estimation that uses this variation and does not allow for differential time trends by industry, size, and other factors risks uncovering spurious relationships. For example, Ahern and Dittmar (2012) conclude that assets increased after the quota. When we estimate the within-Norway regression model (reported in panel A of online Appendix Table A7) for log assets, we also find positive and significant estimates for *Post2006* for both groups of firms and a larger estimate (0.635 compared with 0.540) for those with no women in 2006. However, this relation reverses in the triple-difference model (reported

are indeed attributable to the gender quota, rather than another, unobserved shock affecting listed firms in Norway after 2006. Nevertheless, it is also important to recognize the limitations of this approach. Even if the quota is exogenous, the *timing* of compliance is not. It is likely that the firms that complied during or before the voluntary period found it less costly to do so and differ from noncomplier firms in other dimensions as well. For this reason, our main analysis relies on identification based on the imposition of the quota, rather than on the observed timing of compliance.

*Unrelated Effects of Recession.*—Our results indicate that listed companies in Norway responded differently to the recent global recession than did other listed and unlisted companies inside and outside Norway. We link these patterns to the quota but another possibility is that there is something else about listed Norwegian companies that make them less likely to lay off workers in recessions. Additional analyses (presented in online Appendix B) enable us to rule out specific hypotheses for why Norwegian companies might respond differently. The results are robust to excluding firms with any (even indirect) government ownership (see online Appendix Table A8), which might have political motivations for expanding employment, or firms in the petroleum industry, which high oil prices may have buffered from the recession. More protection from unionization is also unlikely to explain the results, as unionized labor is less common in Norway (57 percent) than in the other Nordic countries (82 percent in Sweden, 76 percent in Denmark, and 76 percent in Finland).

To examine whether other possible (but unidentified) differences might affect how Norwegian companies' labor policies respond to recession, we collected additional data from the pre-quota period and estimated our triple-difference model using data from the previous global recession that started around 2001. This exercise, which is explained in detail in online Appendix B, provides a general falsification check to test whether the differential changes in profits and employment were linked to the quota. The lack of an effect in this earlier period supports our interpretation that the relative changes in profits and employment amid the recent global downturn indeed reflect the impact of the quota (estimates in Table A9 in the online Appendix).

### III. Are the Results about Gender or Other Effects of the Quota?

The Norwegian gender quota for corporate directors brought meaningful differences in corporate strategy, specifically in corporations' labor and layoff policies. Although the quota concerned gender, the results we have discussed so far could potentially be attributed to changes in other characteristics of the newly appointed women or other consequences of compliance with the quota.

---

in panel B), where the  $Post2006 \times Norway \times Listed$  coefficient estimates are negative for firms with no women, positive for firms with some women in 2006, and not statistically different.

### A. Director Ability?

Compliance with the gender quota forced firms to appoint directors they would not otherwise select and may have altered other characteristics of companies' board members, such as their age and executive experience. If scarce female talent was the reason for low female representation before the quota, then the binding constraint imposed by the quota could have induced firms to hire less qualified women who were younger and less experienced than the men they replaced. The fact that the quota increased labor costs but did not affect revenue or nonlabor costs suggests that the effects of the quota are not simply due to an overall decrease in director quality. Nonetheless, it is possible that changes in director age and experience could explain the reluctance of the new boards to undertake layoffs.

We explore this hypothesis first by examining data from Thomson ONE Banker on a wide range of director characteristics, which are available for 94 of the 104 public Norwegian firms in our main analytic sample in 2009. Table A10 in the online Appendix summarizes the average values, by gender, for over a dozen background and demographic characteristics.<sup>24</sup> Male and female board members have similar educational and industry experience, though women were 2 to 5 percent more likely to have experience in education, law, or the public sector and 9 percent less likely to have worked in engineering. Although women average less previous board experience, the difference is not statistically significant, and they tend to be currently serving on more boards, possibly as a result of the quota. The only sizable differences are for age and CEO experience. Female board members are about five years younger than males, on average, and are significantly less likely to have worked as a CEO. Though large, these cross-sectional differences between male and female sitting board members need not reflect the impact of the quota on boards' overall age and experience profiles. Specifically, if relatively young women are replacing relatively young men, then average board member age may be stable, even as female representation increases.

We investigate the importance of declining age and experience as a mechanism for the effects of the quota using three types of evidence.

First, we examine the time trends in average board member age and executive experience for affected companies around the time of the quota using annual information from the Norwegian Register of Business Enterprises from 2002 through 2009. Figure A1 in the online Appendix separately plots the average age of all directors, male directors, and female directors of listed Norwegian companies over time.

<sup>24</sup>These data also shed some light on the separate question of whether women appointed to board seats after the quota were similar to women appointed previously. If the quota brought women with very different backgrounds to business leadership, then it is unlikely that the impact of the quota tells us much about the impact of increases in female leadership that are not driven by government policy. Columns 4 to 6 of Appendix Table A10 compare female board members, serving in 2009, who were first appointed to their boards before and after the quota. It turns out that the women are broadly similar. Differences in CEO experience, education, and other board positions are small and not statistically significant. The only statistically significant differences (other than the mechanical difference in age that would be expected if all women were initially appointed to boards at the same age) are increases in directors with work experience in education (from 0 to 5 percent) and information technology (from 4 to 12 percent). The increasing representation of people with backgrounds in information technology is also present for male board members (columns 7 to 9). In all, women appointed to board positions after the quota have similar education, professional experience, and other characteristics to women appointed before the quota took effect.

The averages of these firm-year-level values are presented with 95 percent confidence intervals. The figure confirms that women on boards are younger, on average, than men in 2009, and shows that a gender gap is present throughout the period. A naïve analysis might thus conclude that the quota lowered board age, but that is not what happened. The average age of female directors does not change over the period and neither does the average age of *all* directors; the increasing share of female directors is offset by the rising average age of male directors. Director age is also stable throughout its distribution, not just its mean. Between 2003 and 2009, the tenth percentile of the age distribution is level at 37, the median is level at 49, and the ninetieth percentile decreases only slightly from 62 to 61.

The annual trend in directors' executive experience displays a similar pattern. Because our director panel does not contain information on CEO experience, Figure A2 in the online Appendix uses data reported in Ahern and Dittmar (2012; Table 2) to plot the shares of directors at affected firms whose outside occupation was CEO and who had any prior CEO experience, for the years 2001 to 2009. There was a steady decline in the share of directors with any CEO experience in the early part of the decade, but this trend ended by the time the quota was mandated in 2006. Indeed, the share remains relatively stable after the quota (59 percent in 2006 and 58 percent in 2009). There is even more stability in the share of directors who are currently CEOs. In fact, that share is slightly higher in 2008 than in 2001 (26 percent versus 25 percent) and slightly lower in 2009 (24 percent). The fact that the average director age and executive experience is stable through the quotas' adoption provides a first indication that declining director age and experience are not likely candidates to explain the impact of the quota.

Second, we analyze the importance of director age and board experience by estimating an expanded version of equation (2)—the specification that relies on within-Norway variation by listed status—that includes controls for average board member age, board size, the average number of other board seats, and the share of new directors (i.e., those who were not directors at the same firm in the previous year). Adding these controls leaves the coefficients on *Listed*  $\times$  *Post2006* virtually unchanged (see Table A11 in the online Appendix). This is similar to results reported by Ahern and Dittmar (2012, online Appendix Table XII) for Tobin's Q: controlling for age and experience decreases the magnitude of the coefficient on director gender by less than 10 percent (from  $-0.593$  to  $-0.541$ ).

Third, we conduct an additional test using our main sample, which reveals that the effects of the quota on profitability and employment were *not* concentrated among corporate boards that were younger and less experienced. Table 8, panel A, reports tests that repeat the main triple-difference estimates but allow for differential effects for affected firms with older and younger boards in 2009 (based on whether average board member age is above or below the median value of 51). Panel B does the same by CEO experience (for which the median is 25 percent). The pattern of the quota's effects is similar across all board types, and the point estimates for layoffs are even larger for older and more experience boards. Although these cuts by age and experience are potentially endogenous, the relative stability of the estimates does not support age or experience as the primary channels for the quota's effect.

TABLE 8—DIFFERENTIAL EFFECTS OF THE QUOTA BY DIRECTOR AGE AND EXPERIENCE IN 2009, DDD SPECIFICATION

	Operating profit/ Assets	Log employment	Log labor costs	Decrease in employment > 3 percent
<i>Panel A. Differential effects by average director age</i>				
<i>Norway × Listed × Post2006</i> × <i>High director age</i>	−0.030* (0.017)	0.338*** (0.124)	0.164 (0.109)	−0.198*** (0.069)
<i>Norway × Listed × Post2006</i> × <i>Low director age</i>	−0.052** (0.022)	0.270** (0.105)	0.121 (0.093)	−0.186** (0.078)
Observations	8,901	7,811	7,811	6,872
Number of firms	1,620	1,517	1,517	1,347
R <sup>2</sup>	0.05	0.16	0.24	0.04
<i>Panel B. Differential effects by average director experience</i>				
<i>Norway × Listed × Post2006</i> × <i>High director experience</i>	−0.036* (0.019)	0.274** (0.128)	0.070 (0.110)	−0.207*** (0.077)
<i>Norway × Listed × Post2006</i> × <i>Low director experience</i>	−0.044** (0.020)	0.336*** (0.107)	0.210** (0.097)	−0.180*** (0.070)
Observations	8,901	7,811	7,811	6,872
Number of firms	1,620	1,517	1,517	1,347
R <sup>2</sup>	0.05	0.15	0.24	0.04

*Notes:* This table tests for heterogeneous effects based on average director age and experience at affected firms in 2009. Results are reported from firm-panel regressions of firms' profitability (operating profits divided by assets), log employment, log labor costs, and layoffs (net decreases in employment of more than 3 percent) on an indicator for whether the firm is affected by the gender representation law interacted with an indicator for board age (in panel A) or experience (in panel B), the associated pairwise interactions, and a set of controls for firm and year fixed effects, industry-specific time trends, board size, and average number of other board seats. High (low) director age is defined as average age being at least (less than) the median of 51. High (low) director experience is defined as at least (less than) one-quarter of directors having CEO experience (the median share). Standard errors, adjusted for clustering at the firm level, are reported in parentheses.

\*\*\*Significant at the 1 percent level.

\*\*Significant at the 5 percent level.

\*Significant at the 10 percent level.

### B. Declining Corporate Activity?

Another alternate explanation for the observed changes in profits and employment is that boards affected by the quota were somewhat dysfunctional during the transition period. One might imagine that the quota could lead boards to be relatively inactive either because of contentiousness between senior male board members and their new female colleagues or because the new directors were more tentative than those they replaced. For example, it is possible that new directors, particularly new directors selected because of an external mandate, would feel hesitant about major corporate activities, including downsizing.

In order to test if the employment results are due to a general reduction in corporate activity following the quota, rather than an intentional reduction in layoffs, we compare rates of mergers and acquisitions, joint ventures, and minority stake purchases in the three-year windows before and after the quota was implemented. We separately calculate these rates for listed Nordic companies (drawn from our group of affected firms and the matched control sample) inside and outside of Norway.

TABLE 9—M&amp;A ACTIVITY AMONG LISTED FIRMS BEFORE AND AFTER THE QUOTA

	Merger or acquisition	Joint venture	Minority stake
Norway			
Before quota	0.442	0.058	0.154
After quota	0.452	0.096	0.183
Change in Norway	0.010	0.038	0.029
Other countries			
Before quota	0.468	0.031	0.116
After quota	0.478	0.051	0.089
Change in other countries	0.010	0.020	−0.027
Difference-in-differences	−0.001 (0.081)	0.018 (0.035)	0.056 (0.052)

*Notes:* This table reports the shares of listed companies that undertook a merger or acquisition, entered a joint venture, or invested a minority stake in another company at least once during the three-year periods before (2003–2005) and after (2007–2009) the quota was adopted. Statistics are listed separately for companies in Norway and companies in other Nordic countries, followed by the Norway-other, after-before difference-in-differences estimates and standard errors in the last line.

The results, reported in Table 9, do not support the inactivity hypothesis. Within Norway, activity levels actually increased modestly after the quota for each of the three measures. Furthermore, the changes in activity levels are all statistically indistinguishable between the listed companies affected and unaffected by the quota. We similarly find no indication of inactivity when we include private companies in the sample, and estimate a triple-difference model in which we compare changes in activity between listed and unlisted companies in Norway and elsewhere in the three-year periods before and after the quota. The quota does not appear to have reduced corporate activity. This indicates that the relative reduction in layoffs for affected firms was not the result of their boards being incapable of taking such actions.<sup>25</sup>

### C. Director Entrenchment?

Another possibility is that the quota scheme entrenches female directors. Because female directors are required by law and replacements might be scarce, existing female directors may feel secure in their positions, leading them to feel less pressure to represent shareholders than do their male counterparts. Bertrand and Mullainathan (2003) find that the average manager is reluctant to downsize—one feature of what they call “the quiet life.” One possibility is that male and female directors have the same preferences—both would reduce layoffs if there were no personal consequences to them—but only female directors act on these preferences because they are harder to replace.

Data on actual turnover rates provide little support for this theory. The share of departing board members in public Norwegian companies was similar in the years

<sup>25</sup>The employment growth is also not due to increased merger activity. As described in Section IIA, there is no change in assets associated with the quota. Ahern and Dittmar’s (2012) analysis finds some indication of firms size increasing after the quota. As discussed above, that relation disappears when we control for baseline trends (see footnote 23).

before (19 to 22 percent between 2002 and 2005) and after (18 and 24 percent in 2007 and 2008) the quota. Annual turnover rates for female board members fluctuated between 9 and 30 percent between 2002 and 2006 and were 16 and 23 percent in 2007 and 2008, showing no evidence of entrenchment.

#### *D. Gender Difference in Corporate Leadership?*

If not director inexperience, inactivity, or entrenchment, then what led the quota and the new female directors to change firms' labor policies? Without any evidence that the quota's impact is driven by other factors, it is natural to consider a possible connection to board member gender itself, which was the intended target of the quota and its largest direct outcome. A growing literature in economics, management, and social psychology points to fundamental differences in the leadership styles of male and female executives.<sup>26</sup> Traditional stereotypes associate corporate leadership with masculinity (Koenig et al. 2011) and with masculine traits, such as power, confidence, aggression, and objectivity (Offermann and Beil 1992). Rather than adopting characteristically male behavior, there is evidence in the management literature of successful female leaders adopting a distinctive, "transformational" style (Rosener 1990; Bass and Avolio 1994; Dezsö and Ross 2012).<sup>27</sup> For example, whereas men are more likely to assert themselves in a controlling manner, women tend to take greater account for the rights of others (Eagly and Carli 2007).

To better understand gender differences among corporate leaders, Adams and Funk (2012) surveyed the universe of resident directors and CEOs of publicly traded companies in Sweden in 2005.<sup>28</sup> Gender equality and board structure in Sweden are similar to Norway. The results are summarized in Figure A3 in the online Appendix. Relative to male directors at the same firm, female directors report significantly different values than do their male colleagues. Female directors care less about self-enhancement values (achievement and power) and more about self-transcendent values (universalism and benevolence). Women board members are also more independent-minded, valuing self-direction and stimulation more than men, and tradition and conformity less than men. All of these differences (except achievement) are sizable in magnitude, measuring about one-third of a standard deviation, and statistically significant.

These differences in male and female directors' values and preferences may explain the quota's effect on firms' outcomes. For example, female directors, motivated by their more self-transcendent values, may lead their firms to decisions that

<sup>26</sup>Most economic studies of gender differences in preferences focus on students, workers, or the general population, so it is unclear whether the conclusions extend to the selected group of men and women at the top of the corporate world. There are many reasons to be skeptical. For example, women who choose to enroll in business school have unusually high levels of testosterone (Sapienza, Zingales, and Maestripieri 2009), which may affect how managers lead their organizations (Levi, Li, and Zhang 2010). Women who act too "feminine" may be denied promotion (Branson 2006), and women who do make it to the top in a predominantly male environment may adapt their behavior such that gender differences disappear (Adams and Funk 2012).

<sup>27</sup>In their meta-analysis of 44 studies of leadership style, Eagly, Johannesen-Schmidt, and van Engen (2003) find women score 0.10 standard deviations higher in the transformational dimension than men.

<sup>28</sup>Their survey instrument consisted of Schwartz's (1992) 40-question Portrait Value Questionnaire plus a question designed to measure risk aversion. The Schwartz value survey is among the most advanced used by psychologists, has been replicated in many countries, and produces consistent and reliable results.

are more stakeholder-oriented, such as maintaining their payrolls in periods of low demand, even at the expense of short-run profits. Indeed, Adams, Licht, and Sagiv (2011) show that directors who value benevolence and universalism are more likely to side with stakeholders when presented with vignettes based on actual legal cases in which there was a tension between the interests of shareholders and those of other stakeholders. The large gender gaps in conformity and tradition, possibly related to women's exclusion from male social networks (e.g., Ibarra 1992), may shed some light on Adams and Ferreira's (2009) finding that female directors are tougher monitors of CEOs; women may be more willing to challenge established practices. Dollar, Fisman, and Gatti (2001) find a similar pattern in government, where greater female representation in parliament is associated with less corruption.

Another possibility is that female directors are maximizing long-run shareholder value by avoiding layoffs. Although retaining workers lowers short-run operating performance, it could improve long-run profits by increasing morale and avoiding recruiting and training costs when demand rebounds. Under this interpretation, the new women on these boards are encouraging their firms to adopt strategies that view employees as assets with specific human capital to be developed, rather than as costs to be cut. This interpretation is consistent with women being more patient than men (Silverman 2003; Frederick 2005; Castillo et al. 2011) and being more likely to use implicit contracts to provide workers with job security.<sup>29</sup>

To further explore gender differences in corporate leadership, we also examine the quota's effect on corporate leverage as an indicator of corporate risk-taking. Although among the general population women are typically more risk averse than men (Byrnes, Miller, and Schaffer 1999; Eckel and Grossman 2008), women in the boardroom are not, and may even be more risk loving. In fact, women assign less value than men to security (Adams and Funk 2012), suggesting that having female directors is less likely to affect a firm's financial leverage or the risk profile of investment. We examine women's effect on leverage using the various difference-in-differences and triple-difference approaches previously described. The results are in Table 10.

In the triple-difference model, we find a negative association between the gender quota and firms' debt-to-assets ratios, consistent with female board members preferring safer financial strategies. This result is not, however, statistically significant or consistent across estimation approaches. Furthermore, the magnitude of the response—equivalent to about a tenth of a standard deviation—is modest when considering the large shifts in board composition. The weak association with leverage suggests that risk aversion may not be a distinctive part of women's approach to corporate decision making.

#### IV. How Do Directors Affect Corporate Strategy?

Our analysis indicates that exogenous changes in board composition caused by quotas led to shifts in corporate strategy. But what are board members

<sup>29</sup>This interpretation would be analogous to family firms that have been shown to protect workers' jobs in periods of reduced demand (Sraer and Thesmar 2007; Bassanini et al. forthcoming).

TABLE 10—CHANGES IN DEBT/ASSETS

	DD: Within Norway by listed		DD: Within listed by Norway		DDD: By Norway and listed	
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Norway × Listed × Post2006</i>					−0.010 (0.020)	−0.008 (0.020)
<i>Norway × Post2006</i>			−0.003 (0.017)	−0.003 (0.017)	0.002 (0.008)	0.000 (0.009)
<i>Listed × Post2006</i>	0.002 (0.015)	0.001 (0.015)			0.005 (0.009)	0.003 (0.010)
Controls for board size and average number of other board seats		X		X		X
Observations	2,814	2,814	3,414	3,414	8,521	8,521
Number of firms	606	606	592	592	1,612	1,612
<i>R</i> <sup>2</sup>	0.07	0.07	0.08	0.08	0.03	0.03

*Notes:* This table summarizes the results from firm-panel regressions of firms' financial leverage (total debt divided by assets) on indicators for whether a firm is affected by the gender representation law using the three different samples of comparison firms and specifications reported in Table 3. Standard errors, adjusted for clustering at the firm level, are reported in parentheses.

actually doing to affect corporate outcomes? In this section, we explore potential underlying mechanisms.

The primary function of a company's board of directors is to hire executives to run the firm's day-to-day operations, to advise management, and to approve changes in corporate control. In existing studies, the role of the board in actively setting corporate strategy is unclear. In a classic descriptive analysis of boards, Mace (1971) concludes that boards of large- and medium-sized US corporations serve largely as a sounding board for the CEO and top management but do not establish corporate objectives, strategies, or policies. Yet later studies, such as Demb and Neubauer (1992) and MacAvoy and Millstein (1999), describe boards as playing a more active role. Even when boards do not set strategy directly, they can guide it indirectly when hiring the top executives who will make these decisions. Examining how the new board members in Norway are able to reduce layoffs may shed greater light on boards' role in setting strategy more broadly.

One way for board members to influence the company's direction may be to appoint like-minded individuals to top executive positions, that is, men or women with similar, more stakeholder-oriented preferences or more patience.<sup>30</sup> Indeed, using data for S&P 1500 companies in the United States, Matsa and Miller (2011) show that greater female representation on corporate boards increases the likelihood that the CEO will be a woman and increases women's representation among the company's other top five executives. To investigate the role of CEO turnover in Norway, we supplement our data on CEOs with administrative data from the

<sup>30</sup>More female board members may also indirectly increase the demand for female managers. Even when it results from a quota, exposure to female leaders has been shown to improve perceptions of female leaders among decision makers (Beaman et al. 2009).

Norwegian government. Between 2003 and 2009, we find 144 cases of CEO turnover from one year to the next, representing 70 out of the 104 listed firms. Turnover rates in listed firms actually declined slightly (by about 1 percentage point, not statistically significant) in the years immediately following the quota, whereas those in unlisted firms were stable. This is consistent with the lack of an overall association between board diversity and CEO turnover reported by Adams and Ferreira (2009).

Even without increasing the rate of turnover, gender-diverse boards may be selecting new chief executives with different characteristics. For example, in the period before the quota, all replacement CEOs were male. After the quota, 2 (5 percent) were female. This increased hiring of female CEOs is suggestive; it is quantitatively small, but the supply of Norwegian female executives was also likely reduced by the spike in demand for female directors after the quota. Even among potential male CEO candidates, the gender-diverse boards may be selecting executives who share their values, which unfortunately are not observable in any of our datasets.

To test if CEO changes are a means through which female directors influence policy, we separate listed Norwegian firms into those with a CEO change (34 firms) between December 2005 and December 2007 from those without (69 firms). We select this time period to capture CEO turnover events occurring after the quota but early enough that they are not likely to be caused by changes in corporate outcomes caused by the quota.<sup>31</sup> We estimate heterogeneous effects of the quota for our main outcomes, allowing for differences based on whether the board selected a new CEO after the quota took effect. We do this by interacting the main effects of interest in our triple-difference model with indicators for having a CEO change and for not having one. In order to ensure that counterfactual time trends for each set of Norwegian listed firms is based on the appropriate set of control firms, we also add a separate regressor to each model that interacts the post-quota period indicator with an indicator for being a listed Norwegian firm with a CEO change or one of its matched control firms. In all cases, the estimates for these control variables are quantitatively small and statistically insignificant.

The estimated effects of the quota, separated by CEO turnover, are reported in Table 11. Across all outcomes, the estimated effects are larger for firms with CEO changes. In the triple-difference model (panel A), the decline in profits is 5.9 percentage points for firms with CEO changes compared with 3.0 for those without. There are also differential changes in employment, labor costs, and layoffs between firms with CEO turnover and those without. The estimates are essentially unchanged if we add an additional post-2006 control for CEO turnover in any company (including the comparison firms). These results, reported in panel B, imply that the estimates in panel A are not being caused by characteristics of CEO turnover that are unrelated to the quota.

The pattern of differential effects suggests that selecting a firm's executives is one way in which female board members influence their firms' corporate decisions. Consistent with this interpretation, only two of the 39 new CEOs hired at these firms had ever served as a CEO of a publicly traded firm before the quota period.

<sup>31</sup> If some of the CEO changes precede firms' compliance with the board quota, our estimates may understate the impact of the CEO change channel.

TABLE 11—HETEROGENEOUS EFFECTS BASED ON CEO CHANGE, DDD SPECIFICATION

	Operating profit/ Assets	Log employment	Log labor costs	Decrease in employment > 3 percent
<i>Panel A. Full sample</i>				
<i>Norway × Listed × Post2006 × CEO change</i>	−0.059** (0.027)	0.383*** (0.138)	0.234* (0.132)	−0.240*** (0.083)
<i>Norway × Listed × Post2006 × No change</i>	−0.030* (0.016)	0.266** (0.105)	0.096 (0.089)	−0.167** (0.068)
Observations	8,901	7,811	7,811	6,872
Number of firms	1,620	1,517	1,517	1,347
R <sup>2</sup>	0.05	0.16	0.24	0.04
<i>Panel B. Full sample controlling for all CEO changes</i>				
<i>Norway × Listed × Post2006 × CEO change</i>	−0.058** (0.028)	0.381*** (0.140)	0.242* (0.134)	−0.259*** (0.085)
<i>Norway × Listed × Post2006 × No change</i>	−0.031* (0.016)	0.267** (0.106)	0.093 (0.089)	−0.158** (0.068)
Observations	8,901	7,811	7,811	6,872
Number of firms	1,620	1,517	1,517	1,347
R <sup>2</sup>	0.05	0.15	0.24	0.04
<i>Panel C. Sample of CEO changes unrelated to performance and matched controls</i>				
<i>Norway × Listed × Post2006</i>	−0.062 (0.040)	0.505** (0.226)	0.397* (0.217)	−0.213* (0.119)
Observations	1,307	1,152	1,152	1,019
Number of firms	238	224	224	202
R <sup>2</sup>	0.04	0.16	0.25	0.05

*Notes:* Panel A reports separate estimates of the impact of quotas for Norwegian listed firms whose CEO changed between December 2005 and December 2007 and those whose CEO did not change. Results are reported from firm-panel regressions using an augmented version of the triple-difference framework reported in Table 3, column 6. To ensure that the proper counterfactual is estimated, the CEO change and No change variables are defined for the matched controls based on the status of their matched listed firm, not their own realized value. Panel B adds a control for CEO changes at unaffected as well as affected firms. In panel C, the sample is restricted to affected firms with a CEO change that was classified as unrelated to firm performance, based on firms' disclosures and press accounts, and these firms' matched controls. Standard errors, adjusted for clustering at the firm level, are reported in parentheses.

\*\*\*Significant at the 1 percent level.

\*\*Significant at the 5 percent level.

\*Significant at the 10 percent level.

Rather than the boards using CEO turnover to influence strategy, a possible alternative interpretation is that poor accounting performance led these firms to replace their CEOs. To evaluate this possible interpretation, we researched the circumstances surrounding the exiting CEOs' separations from these firms. Although it is inherently difficult to classify if a separation was forced or voluntary (Eisfeldt and Kuhnen 2010), we were able to use firms' disclosures and press accounts to verify 15 cases in which the CEO left the firm for reasons unrelated to firm performance, such as a bona fide illness, retirement, or better opportunities elsewhere. In these cases, we also find large effects, though with some loss of precision (which is not surprising, given the smaller sample size). The results for the triple-difference model are reported in panel C. Profits decline by 6.2 percentage points, employment increases by 0.51 log points, labor costs increase by 0.40 log points, and layoffs decline by 21 percentage points.

We conclude that selecting a firm's executives is one way in which female board members influence their firms' corporate decisions. Nevertheless, we find that increased female board representation enabled by the quota also affects policies, even when firms' CEOs did not change (see panel A). This suggests a viable, albeit potentially more modest, role in which boards influence corporate strategy by advising and directing current managers, at least in Norway. Although the managers were retained at these firms, it may also be that the board's authority to select new management is what ultimately induced these executives to change corporate policy.

## V. Conclusions

Governments across Europe have adopted or are considering using quotas to increase gender diversity on corporate boards. This paper studies the first national quota for female board representation introduced in Norway in 2006. Within three years, the female share of corporate directorships doubled from 18 to 40 percent. Using financial data for publicly listed firms in Norway, and a matched control sample of unlisted firms in Norway and all firms in other Nordic countries, we find that short-run corporate profitability declined after the quota was adopted. Profits decreased because of increased labor costs from fewer layoffs and higher relative employment. These results show that gender quotas can affect corporate strategy. Although the impact of any particular quota may depend on the economic, social, and cultural context, the fact that we document important effects in Norway is itself meaningful. Nordic countries are highly ranked in international comparisons of gender equality (e.g., Guiso et al. 2008); the effects of gender quotas may be larger in countries with more traditional gender roles or less public commitment to gender equality.

It is natural to ask if the effects of the quota in this paper can shed light on female corporate leadership styles. As women take leadership positions in more corporations around the world, an important question is how, if at all, this demographic shift will affect industry. This paper shows that profitability fell and employment rose after women were brought onto corporate boards *because* of a quota. Although the Norwegian experience may not predict what will happen when women rise to boards without a quota, there are indications that female corporate leaders exhibit similar values and preferences outside of Norway as well—in environments without quota restrictions. In the United States, for example, businesses owned by women were less likely to lay off workers during the recent recession than were similar male-owned businesses (Matsa and Miller 2012). Differences may not be limited to labor strategy; US companies with more female board representation also spend more on environmental and corporate social responsibility (Post, Rahman, and Rubow 2011; Marquis and Lee 2013). Indeed, International Survey Research (2004) finds that US female senior executives attach the greatest importance to what they describe as the “communal” aspects of the workplace, such as working relationships, customer quality focus, and communication. In contrast, they find male senior executives are driven more by personal-reward factors, such as career development and compensation.

Although we find what appear to be large differences in managerial style between male and female corporate leaders today, these differences may diminish over time.

As more women ascend the ranks of corporate hierarchies, and as the supply of available female talent increases, gender differences in leadership style may diminish if shareholders are better able to select women who match their preferences from the larger pool of candidates. Over time, the presence of additional women on boards may also influence the equilibrium behavior of women and the men serving with them. For example, Adams and Ferrerira (2009) find that male board members have better attendance records when serving on diverse boards, and Boyd, Epstein, and Martin (2010) find that male judges vote differently when they serve on judicial panels with women.<sup>32</sup> The long-term effects of greater gender diversity in corporate leadership present an important area for future research.

## REFERENCES

- Abadie, Alberto, David Drukker, Jane Leber Herr, and Guido Imbens.** 2004. "Implementing Matching Estimators for Average Treatment Effects in Stata." *Stata Journal* 4 (3): 290–311.
- Adams, Renée B., and Daniel Ferreira.** 2009. "Women in the Boardroom and Their Impact on Governance and Performance." *Journal of Financial Economics* 94 (2): 291–309.
- Adams, Renée B., and Patricia Funk.** 2012. "Beyond the Glass Ceiling: Does Gender Matter?" *Management Science* 58 (2): 219–35.
- Adams, Renée B., Stephen Gray, and John Nowland.** 2011. "Does Gender Matter in the Boardroom? Evidence from the Market Reaction to Mandatory New Director Announcements." Unpublished.
- Adams, Renée B., Benjamin Hermalin, and Michael Weisbach.** 2010. "The Role of Boards of Directors in Corporate Governance: A Conceptual Framework and Survey." *Journal of Economic Literature* 48 (1): 58–107.
- Adams, Renée B., Amir N. Licht, and Lilach Sagiv.** 2011. "Shareholders and Stakeholders: How Do Directors Decide?" *Strategic Management Journal* 32 (12): 1331–55.
- Ahern, Kenneth, and Amy Dittmar.** 2012. "The Changing of the Boards: The Impact on Firm Valuation of Mandated Female Board Representation." *Quarterly Journal of Economics* 127 (1): 137–97.
- Akerlof, George A., and Rachel E. Kranton.** 2000. "Economics and Identity." *Quarterly Journal of Economics* 115 (3): 715–53.
- Andreoni, James, and Lise Vesterlund.** 2001. "Which is the Fair Sex? Gender Differences in Altruism." *Quarterly Journal of Economics* 116 (1): 293–312.
- Association to Advance Collegiate Schools of Business International.** 2010. *Business School Data Trends and 2010 List of Accredited Schools*. Tampa: AACSB International.
- Athey, Susan, Christopher Avery, and Peter Zemsky.** 2000. "Mentoring and Diversity." *American Economic Review* 90 (4): 765–86.
- Bass, Bernard, and Bruce J. Avolio.** 1994. "Shatter the Glass Ceiling: Women May Make Better Managers." *Human Resource Management* 33 (4): 549–60.
- Bassanini, Andrea, Thomas Breda, Eve Caroli, and Antoine Reberrioux.** Forthcoming. "Working in Family Firms: Less Paid but More Secure?" *Industrial and Labor Relations Review*.
- Beaman, Lori, Raghavendra Chattopadhyay, Esther Duflo, Rohini Pande, and Petia Topalova.** 2009. "Powerful Women: Does Exposure Reduce Bias?" *Quarterly Journal of Economics* 124 (4): 1497–540.
- 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 (3): 228–55.
- Bertrand, Marianne, and Kevin F. Hallock.** 2001. "The Gender Gap in Top Corporate Jobs." *Industrial and Labor Relations Review* 55 (1): 3–21.
- Bertrand, Marianne, and Sendhil Mullainathan.** 2003. "Enjoying the Quiet Life? Corporate Governance and Managerial Preferences." *Journal of Political Economy* 111 (5): 1043–75.
- Bertrand, Marianne, and Antoinette Schoar.** 2003. "Managing with Style: The Effect of Managers on Firm Policies." *Quarterly Journal of Economics* 118 (4): 1169–1208.

<sup>32</sup> Furthermore, if women's leadership styles are influenced by internal or external costs for violating expectations about appropriate feminine behavior (Blau and Ferber 1986; Jamieson 1995; Akerlof and Kranton 2000), then these norms could change as women's representation increases.

- Blau, Francine D., and Marianne A. Ferber.** 1986. *The Economics of Women, Men, and Work*. Englewood Cliffs: Prentice Hall.
- Blau, Francine D., and Lawrence M. Kahn.** 2000. "Gender Differences in Pay." *Journal of Economic Perspectives* 14 (4): 75–99.
- Bloom, Nicholas, and John Van Reenen.** 2010. "Why Do Management Practices Differ across Firms and Countries?" *Journal of Economic Perspectives* 24 (1): 203–24.
- Boyd, Christina L., Lee Epstein, and Andrew D. Martin.** 2010. "Untangling the Causal Effects of Sex on Judging." *American Journal of Political Science* 54 (2): 389–411.
- Branson, Douglas M.** 2006. *No Seat at the Table: How Corporate Governance Keeps Women out of America's Boardrooms*. New York: New York University Press.
- Broome, Lissa L., John M. Conley, and Kimberly D. Krawiec.** 2011. "Dangerous Categories: Narratives of Corporate Board Diversity." *North Carolina Law Review* 89 (3): 759–808.
- Byrnes, James P., David C. Miller, and William D. Schaffer.** 1999. "Gender Differences in Risk Aversion: A Meta-Analysis." *Psychological Bulletin* 125 (3): 367–83.
- Cascio, Wayne F.** 2002. *Responsible Restructuring: Creative and Profitable Alternatives to Layoffs*. San Francisco: Berrett-Koehler Publishers.
- Cascio, Wayne F., Clifford E. Young, and James R. Morris.** 1997. "Financial Consequences of Employment-Change Decisions in Major U.S. Corporations." *Academy of Management Journal* 40 (5): 1175–89.
- Castillo, Marco, Paul J. Ferraro, Jeffrey L. Jordan, and Ragan Petrie.** 2011. "The Today and Tomorrow of Kids: Time Preferences and Educational Outcomes of Children." *Journal of Public Economics* 95 (11): 1377–85.
- Catalyst.** 2010. *Women in U.S. Management*. New York: Catalyst.
- Chattopadhyay, Raghendra, and Esther Duflo.** 2004. "Women as Policy Makers: Evidence from a Randomized Policy Experiment in India." *Econometrica* 72 (5): 1409–43.
- Croson, Rachel, and Uri Gneezy.** 2009. "Gender Differences in Preferences." *Journal of Economic Literature* 47 (2): 448–74.
- Dale-Olsen, H., P. Schöne, and M. Verner.** 2011. "Diversity among Directors—The Impact on Performance of a Quota for Women on Company Boards." Unpublished.
- Demb, Ada, and F. Friedrich Neubauer.** 1992. *The Corporate Board: Confronting the Paradoxes*. New York: Oxford University Press.
- Dezsö, Cristian L., and David Gaddis Ross.** 2012. "Does Female Representation in Top Management Improve Firm Performance? A Panel Data Investigation." *Strategic Management Journal* 33 (9): 1072–89.
- Dollar, David, Raymond Fisman, and Roberta Gatti.** 2001. "Are Women Really the 'Fairer' Sex? Corruption and Women in Government." *Journal of Economic Behavior & Organization* 46 (4): 423–29.
- Eagly, Alice H., and Linda L. Carli.** 2007. *Through the Labyrinth: The Truth About How Women Become Leaders*. Boston: Harvard Business School Press.
- Eagly, Alice H., Mary C. Johannesen-Schmidt, and Marloes L. van Engen.** 2003. "Transformational, Transactional, and Laissez-Faire Leadership Styles: A Meta-Analysis Comparing Women and Men." *Psychological Bulletin* 129 (4): 569–91.
- Eckel, Catherine C., and Philip J. Grossmann.** 2008. "Men, Women and Risk Aversion: Experimental Evidence." In *Handbook of Experimental Economics Results*, Vol. 1, edited by Charles R. Plott and Vernon L. Smith, 1061–73. Amsterdam: North-Holland.
- Edmans, Alex.** 2011. "Does the Stock Market Fully Value Intangibles? Employee Satisfaction and Equity Prices." *Journal of Financial Economics* 101 (3): 621–40.
- Eisfeldt, Andrea L., and Camelia M. Kuhnen.** 2010. "CEO Turnover in a Competitive Assignment Framework." Unpublished.
- Federal Glass Ceiling Commission.** 1995. *Good for Business: Making Full Use of the Nation's Human Capital*. U.S. Department of Labor. Washington, DC, March.
- Frederick, Shane.** 2005. "Cognitive Reflection and Decision Making." *Journal of Economic Perspectives* 19 (4): 25–42.
- Goldin, Claudia, and Cecilia Rouse.** 2000. "Orchestrating Impartiality: The Impact of 'Blind' Auditions on Female Musicians." *American Economic Review* 90 (4): 715–42.
- Graham, John R., and Krishna Narasimhan.** 2004. "Corporate Survival and Managerial Experiences during the Great Depression." Unpublished.
- Guiso, Luigi, Ferdinando Monte, Paola Sapienza, and Luigi Zingales.** 2008. "Culture, Gender, and Math." *Science* 320 (5880): 1164–65.
- Hallock, K.** 1998. "Layoffs, Top Executive Pay, and Firm Performance." *American Economic Review* 88 (4): 711–23.

- Holzer, Harry, and David Neumark.** 2000. "Assessing Affirmative Action." *Journal of Economic Literature* 38 (3): 483–568.
- Ibarra, Herminia.** 1992. "Homophily and Differential Returns: Sex Differences in Network Structure and Access in an Advertising Firm." *Administrative Science Quarterly* 37 (3): 422–47.
- International Survey Research.** 2004. *Motivating Men and Women at Work: Relationships vs. Rewards. International Survey Research.* Chicago, October.
- Jamieson, Kathleen Hall.** 1995. *Beyond the Double Bind: Women and Leadership.* New York: Oxford University Press.
- Katz, Lawrence F.** 1986. "Efficiency Wage Theories: A Partial Evaluation." In *NBER Macroeconomics Annual*, Vol. 1, edited by Stanley Fischer, 235–76. Cambridge, MA: MIT Press.
- Koenig, Anne M., Alice H. Eagly, Abigail A. Mitchell, and Tiina Ristikari.** 2011. "Are Leader Stereotypes Masculine? A Meta-Analysis of Three Research Paradigms." *Psychological Bulletin* 137 (4): 616–42.
- Kunze, Astrid.** 2011. "Why Are So Few Women on Top Ranks?" Unpublished.
- Levi, Maurice, Kai Li, and Feng Zhang.** 2010. "Deal or No Deal: Hormones and the M&A Game." *Management Science* 56 (9): 1462–83.
- Lin, Ji-Chai, and Michael S. Rozeff.** 1993. "Capital Market Behavior and Operational Announcements of Layoffs, Operational Closings, and Pay Cuts." *Review of Quantitative Finance and Accounting* 3 (1): 29–45.
- MacAvoy, Paul W., and Ira M. Millstein.** 1999. "The Active Board of Directors and Its Effect on the Performance of the Large Publicly Traded Corporation." *Journal of Applied Corporate Finance* 11 (4): 8–20.
- Mace, Myles L.** 1971. *Directors: Myth and Reality.* Boston: Harvard Business School Press.
- Malmendier, Ulrike, Geoffrey Tate, and Jon Yan.** 2011. "Overconfidence and Early-Life Experiences: The Effect of Managerial Traits on Corporate Financial Policies." *Journal of Finance* 66 (5): 1687–1733.
- Marini, Margaret Mooney.** 1990. "Sex and Gender: What Do We Know?" *Sociological Forum* 5 (1): 95–120.
- Marquis, Christopher, and Matthew Lee.** 2013. "Who Is Governing Whom? Executives, Governance and the Structure of Generosity in Large U.S. Firms." *Strategic Management Journal* 34 (4): 483–97.
- Matsa, David A., and Amalia R. Miller.** 2011. "Chipping Away at the Glass Ceiling: Gender Spillovers in Corporate Leadership." *American Economic Review* 101 (3): 635–39.
- Matsa, David A., and Amalia R. Miller.** 2012. "Workforce Reductions at Women-Owned Businesses in the United States." Unpublished.
- Matsa, David A., and Amalia R. Miller.** 2013. "A Female Style in Corporate Leadership? Evidence from Quotas: Dataset." *American Economic Journal: Applied Economics.* <http://dx.doi.org/10.1257/app.5.3.136>.
- Miller, Amalia R.** 2011. "The Effects of Motherhood Timing on Career Path." *Journal of Population Economics* 24 (3): 1071–1100.
- Nygaard, Knut.** 2011. "Forced Board Changes: Evidence from Norway." Norwegian School of Economics and Business Administration Discussion Paper SAM 5/2011.
- Offermann, Lynn R., and Cheryl Beil.** 1992. "Achievement Styles of Women Leaders and Their Peers: Toward an Understanding of Women and Leadership." *Psychology of Women Quarterly* 16 (1): 37–56.
- Palmon, Oded, Huey-Lian Sun, and Alex P. Tang.** 1997. "Layoff Announcements: Stock Market Impact and Financial Performance." *Financial Management* 26 (3): 54–68.
- Pande, Rohini.** 2003. "Can Mandated Political Representation Increase Policy Influence for Disadvantaged Minorities? Theory and Evidence from India." *American Economic Review* 93 (4): 1132–51.
- Parsons, Donald O.** 1972. "Specific Human Capital: An Application to Quit Rates and Layoff Rates." *Journal of Political Economy* 80 (6): 1120–43.
- Pinto Ribeiro, Samuel, Stefano Memghinello, and Koen De Backer.** 2010. "The OECD ORBIS Database: Responding to the Need for Firm-Level Micro-Data in the OECD." Organisation for Economic Co-operation and Development (OECD) Working Paper 2010/1.
- Post, Corinne, Noushi Rahman, and Emily Rubow.** 2011. "Green Governance: Boards of Directors' Composition and Environmental Corporate Social Responsibility." *Business & Society* 50 (1): 189–223.
- Randøy, Trond, Steen Thomsen, and Lars Oxelheim.** 2006. "A Nordic Perspective on Corporate Board Diversity." Nordic Innovation Center Project 05030.

- Reiersen, Hedvig B., and Beate Sjøfjell.** 2008. "Report from Norway: Gender Equality in the Board Room." *European Company Law* 5 (4): 191–95.
- Rosener, Judy B.** 1990. "Ways Women Lead." *Harvard Business Review* 68 (6): 119–25.
- Rubinstein, Ariel.** 2006. "A Sceptic's Comment on the Study of Economics." *Economic Journal* 116 (510): C1–9.
- Ryan, Michelle K., and S. Alexander Haslam.** 2005. "The Glass Cliff: Evidence that Women are Over-Represented in Precarious Leadership Positions." *British Journal of Management* 16 (2): 81–90.
- Sapienza, Paola, Luigi Zingales, and Dario Maestripieri.** 2009. "Gender Differences in Financial Risk Aversion and Career Choices are Affected by Testosterone." *Proceedings of the National Academy of Sciences* 106 (36): 15268–73.
- Schwartz, Shalom H.** 1992. "Universals in the Content and Structure of Values: Theoretical Advances and Empirical Tests in 20 Countries." In *Advances in Experimental Social Psychology*, Vol. 25, edited by Mark P. Zana, 1–66. San Diego: Academic Press.
- Silverman, Irwin W.** 2003. "Gender Differences in Delay of Gratification: A Meta-Analysis." *Sex Roles* 49 (9–10): 451–63.
- Smith, Jeffrey A., and Petra E. Todd.** 2005. "Does Matching Overcome LaLonde's Critique of Nonexperimental Estimators?" *Journal of Econometrics* 125 (1–2): 305–53.
- Sraer, David, and David Thesmar.** 2007. "Performance and Behavior of Family Firms: Evidence from the French Stock Market." *Journal of the European Economic Association* 5 (4): 709–51.
- Wolfers, Justin.** 2006. "Diagnosing Discrimination: Stock Returns and CEO Gender." *Journal of the European Economic Association* 4 (2–3): 531–41.
- Worrell, Dan L., Wallace N. Davidson, III, and Varinder M. Sharma.** 1991. "Layoff Announcements and Stockholder Wealth." *Academy of Management Journal* 34 (3): 662–78.