Increasing Gender Diversity in Corporate Boards: Are Firms Catering to Investor Preferences?

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Abstract

We examine the drivers of increasing women's representation on boards in American firms. During 1998-2014, the proportion of firms with female directors on their boards almost doubled to approximately 78%, while the percentage of female directors increased almost five-fold to a share of 15%. Our analysis shows that the documented increase in female representation on corporate boards is driven by the increasing propensity of firms to add more female directors, rather than changing firms' characteristics. We use the catering theory to explain firms' propensity to increase (or decrease) their board gender diversity, and show that when the premium to have women on board is positive (negative), firms are more likely to add (replace) female directors. We further find that firms with more women on their boards are historically associated with higher valuation premium. Finally, we observe that the magnitude of board gender diversity changes is positively related to the change in the lagged gender diversity premium. Our results indicate that board gender diversity can increase value in firms, catering to the demand of investors for gender-diversified boards.

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Abstract

We examine the drivers of increasing women's representation on boards in American firms. During 1998-2014, the proportion of firms with female directors on their boards almost doubled to approximately 78%, while the percentage of female directors increased almost five-fold to a share of 15%. Our analysis shows that the documented increase in female representation on corporate boards is driven by the increasing propensity of firms to add more female directors, rather than changing firms' characteristics. We use the catering theory to explain firms' propensity to increase (or decrease) their board gender diversity, and show that when the premium to have women on board is positive (negative), firms are more likely to add (replace) female directors. We further find that firms with more women on their boards are historically associated with higher valuation premium. Finally, we observe that the magnitude of board gender diversity changes is positively related to the change in the lagged gender diversity premium. Our results indicate that board gender diversity can increase value in firms, catering to the demand of investors for gender-diversified boards.

1. Introduction

Women's underrepresentation in the boardroom as well as corporate leadership roles has received increasing attention in the last decade. Regulators and institutions are responding to the increased demand for higher percentage of women on corporate boards by implementing rules and quotas for a minimum representation of female directors. For example, a new law enacted in Norway in 2003 required that 40 percent of Norwegian firms' directors be women. Similarly, the European Commission approved a proposal that calls for at least 40 percent women non-executive directors on the boards of listed European companies by 2020. As part of a binding European Union Directive from 2013, large financial firms in the EU are required to set a target for the number of women on their board of directors. In India, a new norm set in October 2014 by

Securities and Exchange Board of India requires every listed company to have at least one female director on its board. In the US, however, there is no regulatory mandate for the proportion of women directors in corporate boards. Rather, gender diversity has been driven mainly by investors' demand for higher representation of women on corporate boards. For example, Facebook invited Sheryl Sandberg to join its board after CalSTRS strongly urged the company to add a woman to its all-male board. CalPERS and CalSTRS, the two largest public pension funds in the US, have funded Diverse Director Data Source to seek qualified female director candidates.

Anecdotal evidence as well as recent research has documented a steady increase in the representation of women on corporate boards in U.S. companies over the last two decades. We contend that if firms act as rational economic agents and make corporate decisions to benefit shareholders, then absent mandatory female quota in U.S. corporate boards, increasing board gender diversity in the U.S. implies that there are shareholder benefits from greater representation of female directors.[1] However, evidence on the impact of board gender diversity on performance is mixed. Adams and Ferreira (2009) find that board gender diversity does not enhance firm performance after controlling for the omitted variable bias. Ahern and Dittmar (2012) analyze the impact of mandatory gender quota imposed on Norwegian companies and find that firm performance deteriorates post-implementation of the quota. In contrast, Schmid and Urban (2015) examine the impact of change in board composition induced by an exogenous event and find that women directors have positive valuation effect. Similarly, Ghosh, Petrova, and Xiao (2015) differentiate the impact of female CEOs versus female directors, and using a more comprehensive

[1] In our data, the percentage of female directors has doubled (from 5% to 14%) over the period 1998 to 2014.

sample than previous studies, find that non-CEO female board directors have a positive impact on corporate performance.

The lack of consensus on the benefits of women directors notwithstanding, our data, based on a sample of firms from the S&P 1500 index, reveal that publicly traded U.S. firms have steadily added female directors to their boards for the past one and a half decades. The proportion of firms with women on their board of directors increased during 1998 - 2014 from 41 percent to 78 percent, while the proportion of female directors for the same firms increased from 5 percent to 14 percent. While the increase in board gender diversity is not surprising given the backdrop of the evolving regulatory environment, and societal and investor demand around the world, the underlying drivers of this trend, i.e. what contributes to increasing board gender diversity in the U.S. remains unexplored. Is the higher gender diversity a natural outcome of changing firm characteristics over time, or, are firms becoming more inclined to appoint women directors? The answer to this question will lend further insight into whether corporate board gender diversity is beneficial to firms. Absent mandated board gender representation, a higher propensity to appoint women on board implies that such decisions bring benefits to firms, assuming that firms act rationally.

We adopt Fama and French's (2001) approach in their analysis of disappearing dividends, to first examine the evolution over time of a set of previously identified firm characteristics that influence board gender diversity (Sugarman and Straus, 1988; Farrell and Hersch, 2005; Farrell, Friesen, and Hersch, 2008; Ferreira, 2010). Next, we run logistic and ordinary least square regressions annually and use the coefficients from the Fama-MacBeth regressions to confirm the significance of the variables associated with gender diversity. As Ghosh, Petrova, and Xiao (2015) point out, female CEOs and female directors have separate influence over the operation of a firm, and the appointment of a female CEO is a separate decision process from the appointment of a

female director. Therefore, we use only non-CEO female directors.[2] Since the decision to have women on board involves self-selection, we address the endogeneity bias in determining the percentage of female directors using Heckman two-stage regressions.

Next, to differentiate between the change in female board representation due to changing firm characteristics versus change in propensity to gender diversify board structure, we follow Fama and French's (2001) methodology. We set the first five years of our sample (1998 – 2002) as the base period, and apply the estimated average coefficients from the base period to the firm characteristics in subsequent years (2003 to 2014) to obtain the expected percentage of firms with women on board. We posit that the difference between actual percentage and expected percentage of firms with women on board for a given year measures the change in propensity to install women on corporate boards. We find that U.S. firms' propensity to recruit women directors increases over our study period, and that the improvement in board gender diversity derives largely from firms with no female directors adding women to their boards, rather than from firms already with female directors recruiting more of them. Further, the propensity to increase board gender diversity contributes more to the rise of gender diversity in corporate boards both in firms with and without women on board.

The extant literature has received several theories to explain the potential benefits of board gender diversity, among which resource dependence and governance are the most prevalent (Ferreira, 2010). Based on our finding that the rising propensity to have women directors is the main driver of increasing board gender diversity, we invoke catering theory to argue that firms make board gender diversity decisions to cater to investors' demand for greater female board

[2] The number of female CEOs is small in our sample, so our results are not altered if female CEOs are included.

representation. We construct a measure of gender diversity premium using an approach similar to Baker and Wurgler's (2004a) definition of dividend premium. We base our measure on market-to-book equity ratio and control for industry effects. Since board directorship data is available for a relatively short period of time, compared to dividend data, we are not able to perform time-series regressions as in Baker and Wurgler (2004a). Instead, we follow Li and Lie's (2006) framework and consider the decision to change board gender diversity at the firm level. Our analyses reveal that when board gender diversity premium is positive, firms are more likely to add female directors, and when board gender diversity premium is negative, firms are more likely to replace female directors with male directors. We also consider how gender diversity premium impacts change in gender diversity, and find the change in gender diversity to be positively related to the lagged gender diversity premium. These results are consistent with the prediction of the catering theory of board gender diversity.

To our knowledge, this paper is the first to examine the underlying motivation of increasing board gender diversity, and invoke the catering theory as an explanation. Our study contributes to the literature by providing a new approach to analyze the benefits of board gender diversity, and a new hypothesis to explain the changes in board gender diversity. Our analyses suggest that even without a regulatory mandate on board female representation, U.S. firms not only have steadily increased board gender diversity, they have also become more likely to increase board gender diversity.

The remainder of the paper is organized as follows. In Section 2, we review the related literature. In section 3, we describe our data and present evidence of increasing board gender diversity over time. We discuss our empirical methodology and analyze the propensity of firms to

increase board gender diversity in Section 4. In Section 5, we examine whether firms are catering to investor demands to increase board gender diversity. We conclude in Section 6.

2. Related Literature

The importance of gender diversity in modern corporations is a relatively new and fast-growing area of research. A large volume of academic and applied research has been devoted to examining the effect of gender diversity on firms' corporate decision making, performance and valuation.[3] A number of studies find a positive relation between female directors and performance/valuation (Carter, Simkins, and Simpson, 2003; Carter, D'Souza, Simkins, and Simpson, 2008; Erhardt, Werbel, and Shrader, 2003; Dezso and Ross, 2012; Schmid and Urban, 2015; Ghosh, Petrova, and Xiao, 2015), while others fail to find a significant relation (Farrell and Hersch, 2005; Rose 2007; Adams and Ferreira, 2009).[4] Post and Byron (2015) perform meta-analysis on 140 studies and find mixed empirical evidence on the impact of female board representation on firm performance.

Parsing out the true impact of board gender diversity on firms' financial performance is challenging. As Adams and Ferreira (2009) point out, the observed relation can be caused by gender diversity correlating with omitted firm-specific variables such as corporate culture. For example, a more progressive firm may perform better and have more female directors. Huang and Kisgen (2013) make a similar point in their study of female executives. Although using instrumental variables (IV) can address the causality issue, the IV approach identifies causality

[3] The practitioner literature generally builds their case for higher gender diversity in top management and boardroom through the positive correlation between better financial performance and gender diversity, such as in the studies by Catalyst (2011), Credit Suisse (2012, 2014) and McKinsey's (2007).

[4] For a more detailed review, please see Ferreira (2010) and Ghosh, Petrova, and Xiao (2015).

only under restrictive and often unrealistic assumptions (Ferreira, 2010). Two recent studies address reverse causality by using natural experiments where the passage of a law or an event triggers a shock to the system. Ahern and Dittmar (2012) take advantage of the Norwegian law enacted in 2003 imposing a 40 percent female quota on corporate boards and find that firms suffer a significant reduction in market value after adopting this quota.[5] On the other hand, using a large dataset of corporate boards in 53 countries, Schmid and Urban (2015) analyze stock market reaction to the exogenous departure of female board members due to death and illness. The authors find that the stock market reacts more negatively to this type of departures by female directors, with the effect being more intense when the departing women are replaced by men.

While existing research has focused on analyzing the impact of gender diversity, few studies examine what motivates firms to include female directors on the board. The dividend literature lends us the methodology to separate the propensity to install a female board member to increase board gender diversity from the effect of changing firm characteristics. Fama and French (2001) study the phenomenon of disappearing dividends - the dramatic decrease in the proportion of firms that pay cash dividends over the priod 1978 to 1999. While part of this decline is attributable to a reduction in the proportion of firms that shares the characteristics of dividend payers, firms' lower propensity to pay dividends was an equally important factor for the decline. Fama and French distinguish these two sources – changing firm characteristics and declining propensity to pay dividends - by first estimating a logistic model of the decision to pay dividends on a set of characteristics of dividend paying firms using data during the early years of their sample. Next, they use the coefficients from the logistic model to predict the percentage of dividend payers

[5] Ferreira (2010) notes that a waekness of Ahern and Dittmar's (2012) study is the absence of a randomly chosen control group.

in subsequent years. The difference between the actual and predicted percentage of payers in subsequent years represents firms' propensity to pay dividends. The authors find that the reduction in the predicted percentage of payers is comparable to the reduction in the propensity to pay. We apply this method to separate the increase in board gender diversity into two sources - due to changing firm characteristics, and the increase in propensity to diversify.

Fama and French (2001) considered the decreasing propensity to distribute dividends "puzzling". Baker and Wurgler (2004a) observe that firm's dividend payout decision changes in tandem with the fluctuations in the "dividend premium" in the market – the difference in market-to-book ratio between dividend payers and non-dividend-payers. They propose a "catering theory of dividends" to argue that a firm's dividend decision reflects the firm's catering to investors' demand for dividend. By regressing the time-series of firm dividend decisions on the lagged dividend premium, the authors find that, consistent with their hypothesis, the decline in a firm's propensity to pay dividends is related to the changes in its dividend premium. Li and Lie (2006) provide a stronger test for the catering theory by extending Baker and Wurgler's (2004a) method to the firm's decision to change dividends, and find corroborative evidence for catering theory.

We consider catering theory to be a potential explanation of firms' propensity to increase board gender diversity. We posit that the investors' demand for gender diversity drives a wedge between the equity valuation of firms with women on board and firms with all-male boards. Thus, similar to Li and Lie (2006), we argue that a firm favors increasing gender diversity when the valuation gap between all-male and mixed-gender boards – gender premium - is high, and decreasing board diversity when the valuation of diversity is low.

3. Data and Descriptive Statistics

3.1. Sample and variable construction

We obtain U.S. corporate board director data from the Institutional Shareholder Services (ISS, formerly RiskMetrics and Investor Responsibility Research Center, or IRRC) over the period of 1998 to 2014. IRRC started to collect director data for S&P 500, S&P MidCap, and S&P SmallCap firms in 1996.[6] The universe covers around 1,500 firms. We collect data on the director's gender, insider status, and whether the director is also the CEO of the firm. We aggregate director level data to firm level to compute board size, percent of independent directors, number and proportion of female directors, and CEO duality. Firm size, profitability, and valuation variables are obtained from Compustat. We measure firm size as the natural logarithm of total assets, profitability as return on equity (ROE), and valuation as Tobin's Q. Book equity is computed as stockholder's equity plus deferred taxes, investment tax credit, less preferred stock.[7] Tobin's Q is measured as total assets minus book value of equity plus market value of equity at fiscal year-end, divided by total assets. Risk is measured as the volatility of monthly stock returns over the previous 60 months before the fiscal year end. We require that at least 12 months of return data for each firm is available in CRSP. Data on director compensation and female executives are collected from Execucomp. We obtain director compensation following Farrell, Friesen, and Hersch (2008), who add cash, stock, and option components, averaged over all directors. Institutional ownership is obtained from Thomson Reuters Institutional (13f) Holdings's 34 master file, summed over all institutional owners for each firm and then normalized by shares outstanding.

[6] We start our sample from 1998 because the earlier data contains some errors. For example, the field of gender is the same for all directors in 1996.

[7] We use redemption value of preferred stock. When this data is not available we use liquidation value, or book value of preferred stock, in order of availability.

Following Hermalin and Weisbach (1988) and Fich and Shivdasani (2006), we exclude regulated industries such as finance and utilities with SIC codes between 6000 to 6999 and 4900 to 4949. Firms in these regulated industries may have systematic differences in their board composition with non-regulated firms. Furthermore, to reduce the influence of small firms, we require our sample firms to be listed on NYSE, AMEX, or NASDAQ, and have book value of equity greater than $250,000 and book value of asset greater than $500,000.

3.2. Descriptive statistics and the characteristics of firms with women on board

After merging data from all sources, our primary sample contains 17,823 firm-years from 1998 to 2014. Table 1 reports the summary statistics. Panel A contains all firm-years; Panel B presents the statistics for firm-years with no female directors on board, while Panel C displays the statistics for firm-years with at least one female director on board.[8] The average percentage of firm-years with at least one female director on board is 59 percent, and the average proportion of female representation on board is 9.2 percent. This is comparable to 8.5 percent of female representation on board seats in Adams and Ferreira (2009). Given that the percent of women in the labor force was approximately 57.2 percent (U.S. Bureau of Labor Statistics, 2013 the proportion of women on corporate boards severely under-represents women's participation in the labor market.

Comparing the firm characteristics in Panels B and C, we note that firms with at least one female director have larger boards than firms with no female director. This is consistent with the notion that a large board can accommodate more gender diversity than a smaller one. The average director compensation is approximately 43 percent higher for boards with women, which suggests

[8] Note that we exclude female CEOs serving on the board in our analysis. Including female CEOs do not change materially our results.

that competent female directors are scarce so they can choose to work for companies that compensate directors well. The Equality Index[9] proposed by Sugarman and Straus (1988) shows that firms with diversified boards are more likely to be headquartered in states that enjoy better gender equality. Among firms with female directors, 34.3 percent also have female executives, whereas the corresponding number for firms without women directors is only 22.5 percent. We observe a higher percentage of independent directors in firms with women on their boards, which suggests that women are more likely to serve as independent directors, a pattern also noted by Farrell and Hersch (2005). The higher institutional ownership in firms with gender-diverse boards is indicative of institutions' preference for boards with more female directors (Ferreira, 2010).

We note that firms with women on board are larger, which suggests that qualified female directors choose to work for larger firms with greater profile. However, the univariate relation may reflect both the link between larger firms and larger boards, and the potential that larger firms, being more visible, are under greater pressure to promote gender equality. In our sample, profitability, measured by ROE, is higher by 40.7 percent for firms with women on board. This result could be a reflection of profitable firms attracting female directors to their boards. Alternatively, gender diversity could lead to increased profitability. We find that Tobin' Q is higher for firms without female directors, consistent with Adams and Ferreira (2009). Finally, the volatility of returns of firms with women directors is lower by 21.5 percent than volatility of returns of firms with all male boards. This is consistent with the notion that women are risk averse and they either choose to work for safer companies, or their influence induces managers to make less

[9] Sugarman and Straus (1987) assign scores to gender equality in the economic, political, and legal spheres of life in each of the 50 U.S. states. The scores are combined to create an overall gender equality index, with a minimum of 19.2, indicating low gender equality, and a maximum of 59.9, indicating high gender equality. Following Huang and Kisgen (2013), we assign the gender equality score of a state to each firm that is headquartered in that state.

risky decisions. Note that lower volatility is also consistent with lower valuation, and hence lower Tobin's Q.

3.3. The time trend of board gender diversity and firm characteristics

Although U.S. corporations lag firms in the E.U. in female representation in corporate boards, our data reveal that significant progress has been made towards more gender diverse boards in the U.S. In unreported results, we find that in 1998, 41 percent of the firms in our sample had a female director, and the average percent of women in corporate boards was merely 5 percent. These numbers increased significantly by 2014 when 78 percent of the firms had at least one female director and the share of women on corporate boards was 14 percent. In comparison, Schmid and Urban (2015) report that the average proportion of women on corporate boards in their international sample increased from below 8 percent in 1998 to around 9 percent in 2010. Figure 1 depicts the time trend of these numbers over this period. Not only an increasing number of firms have appointed women on their boards, but they have also chosen to have more women in the board room. This leads us to believe that adding more female directors is not a symptom of tokenism.

In Table 2, we report the average (panel A) and median (panel B) characteristics of all firms, and firms without (N) and with (Y) female directors for each of the five time periods spanning our sample period. The first time period consists of the first five years (1998 – 2002) and is used as a base period. The rest of the years in our sample are evenly divided into four three-year intervals (2003- 5, 2006 – 8, 2009 – 11, 2012 – 14). The reported statistics show that not only has board gender diversity increased over time for all firms (in concord with the evidence presented in Figure 1), but also that the diversity has increased in boards that already had at least one female

director. The percentage of women directors in these boards increased consistently during the study period from 13.5 percent during 1998-2002 to 17.5 percent in 2012-2014.

Further examining the results in Table 2, we note that among firm characteristics, several board attributes have changed significantly over time. For example, the average director compensation (in natural logarithm) has increased by 24 percent, which is an increase of almost 250 percent in inflation-adjusted dollars. The median director compensation follows a similar trend. The proportion of firms with female executives has increased by 50 percent for all firms, but interestingly, the increase is much less (31 percent) among firms with women on board, which suggests a substitution effect between female executives and female directors.[10] The median share of female executives, presented in Panel B, remains at zero across all periods for all types of firms, indicating female executives are still in the minority. The percentage of independent directors increased by approximately 31 percent during 1998-2014, which reflects a continuing pressure to enhance board monitoring by installing independent directors. We observe a similar trend in institutional ownership, and also that firms without women directors have slightly higher percentage of shares owned by institutions. Lastly, average return volatility decreased by around 22 percent over the period examined, the decline being more pronounced for firms without female directors, although the average and median volatility of firms with women directors remained low.

The time trend of some of the firm characteristics such as director compensation, executive gender diversity and volatility are conducive to having more women directors. For example, increasing female executive share represents an increased labor pool for female directors. Similarly, increasing director compensation could attract competent female professionals to consider a

[10] Women serving on the board could have executive position in the firm, or be outsiders.

director job. The overall decrease of firm risk is also more attractive for risk-averse female directors. The trend in the median statistics indicates that the favorable changes in these characteristics over time are pervasive and not driven by a particular group of firms. These results suggest that changes in firm characteristics are likely to contribute to the increase of board gender diversity over time.

3.4. The time trend of board gender diversity by industry

Conventional wisdom and several studies reveal that different industries introduce a significant source of heterogeneity for board gender representation (e.g. Ferreira, 2010). Our data support this notion. We illustrate the evidence in Figure 2 where we plot the proportion of firms with women on board over 1998-2014 for the 12 main industry groups identified by Fama and French. The evolution of board gender diversity for each industry varies greatly. For example, in the business equipment industry, the percentage of firms with women directors increased by 187 percent - from 25 percent to 71 percent over 1998 - 2014. Although energy remains the industry with the lowest percentage of firms with female directors, women board representation among these firms has increased by 98 percent. One noteworthy observation is that, although there are large differences among industries in terms of the share of firms with women on board, this dispersion has been shrinking over the years. The bars show that the cross-industry standard deviation of the percentage of firms with women directors has decreased over the years, suggesting that the improvement in board gender diversity is not limited to a few industries, but rather represents a broad cross-industry phenomenon, including industries such as manufacturing and energy with a traditionally low female representation.

In Figure 3, we plot the time trend of the average proportion of female directors on board by industry. Similar to the trends evident in Figure 2, we observe that all industries have made

improvements in gender diversity by adding more women directors. Business equipment leads the increase in the proportion of female directors, going from a share of a meager 3 percent to 12 percent, a 262 percent increase. A similarly large increase in the share of females on corporate boards in seen in shops and durable goods. Although the increasing pattern of the share of women is similar to that of the increase of women board representation (having at least one female on board) we do not observe a convergence in the average percentage of women on corporate boards across industries. The dispersion in the proportion of female directors remains relatively stable over the entire period, with a noticeable downward trend only in the last four years. In summary, although all industries have increased their female board representation, the large variation of female share in the BODs among industries indicates that controlling for the industry effect is meaningful when we examine the determinants of board gender diversity.

4. Firm Propensity to Increase Board Gender Diversity

Our summary statistics suggest that there exist differences in characteristics between firms with and without women on board, and that these differences have evolved over time. In this section, we investigate firms' decisions to recruit women to their boards to increase the proportion of female directors and their relation to a set of contemporaneous firm characteristics. We perform three sets of Fama-MacBeth-style annual regressions on the cross-section of firms to obtain the time-series of coefficients on attributes that influence a firm's decision to enhance board gender diversity. Based on the summary statistics and previous literature findings, we predict that board size, directors' compensation, the percentage of independent directors, equality index, log of total assets, ROE, and tobin's Q are positively related to female directors' representation, while stock return volatility, and momentum are negatively related to female directors' representation, We exclude lagged board gender diversity although the choice of gender in the hiring decision of

directors has been reported to be state dependent (Farrell and Hersch, 2005). Our specification is similar to that in Fama and French's (2001) model of dividend decisions which does not include lagged dividend variables; rather, they estimate the regression model over the equilibrium states of firms in which utilities are maximized with the firm characteristics contemporaneously available. This model differs from the one in Farrell and Hersch (2005) where they analyze how a typical firm transits from the previous equilibrium to a new one based on the firm characteristics available in the previous state.[11]

We use 1998-2002 as our base period and estimate the expected board gender diversity each year from 2003-2014 by applying the averages of the coefficients estimated over the base period to the firm characteristics in the subsequent years. The difference between the actual and the expected board gender diversity captures the change in the propensity to embrace board gender diversity. Similar to the Fama and French (2001) model on changing dividend policy, our approach allows us to separate the shift in board gender diversity due to changing firm characteristics from the change in propensity to appointing women directors. If the improvement in board gender diversity is attributable largely to changing firm characteristics, we cannot argue that firms are more likely to have women on board. On the other hand, if the propensity to improve board gender diversity has materially increased over time, it is an indication that firms recognize the potential benefits from appointing women on corporate boards.

[11] In our board gender diversity change regressions in Section 5, we include lagged board gender diversity measures because the intuition behind modeling the change in gender diversity is the same as Farrell and Hersch (2005).

4.1. Modeling the choice to include women in boards

We estimate annual logistic regressions determining the probability of a firm choosing a woman to serve on its board and include as explanatory variables board size, director compensation, equality index, percent of independent directors, institutional ownership, natural logarithm of total assets, price momentum, return-on-equity (ROE), Tobin's Q, and stock return volatility.[12] Based on extant literature and univariate analyses, we expect all of the above independent variables except stock return volatility to have positive coefficients. We estimate the following model:

$$logit(F_{i,t}) = a_t + b_t X_{i,t} + c_t Z_{i,t} + \varepsilon_{i,t} \quad (1)$$

where $F_{i,t}$ indicates the firm year when the firm *i* has women on the board in year *t*. $X_{i,t}$ are the firm characteristics, and $Z_{i,t}$ are the industry dummies.

Table 3 reports the coefficients from the above annual logistic regressions. The dependent variable is FEMALE_DIR, an indicator variable equal to one if the firm has at least one female director during the year. For each of the six periods, we report the average of the annual coefficients estimated from the model. We note that over the entire period (1998-2014), board size, equality index, percent of independent directors, log of total assets, ROE and stock return volatility have the predicted signs and are statistically significant at conventional levels. These results persist in the five sub-periods, with the exception of stock return volatility which is insignificant during the periods 2003-2005 and 2012-2014. In un-tabulated results, we find that Tobin's Q is positive and significant when industry dummies are not included in the model, which suggests that the impact of Tobin's Q on gender diversity is an industry effect. We also find

[12] We exclude percent female executives in the regression because a female director can also be an executive, which causes a mechanical correlation. Including this variable does not change our results materially. We also considered other firm characteristics identified in prior literature, such as CEO duality, firm past price performance, debt to asset ratio, etc., but these variables were not significant and therefore we did not include them in the final model.

director compensation to be negative and significant without industry dummies, which indicates that males are more likely to obtain directorships on high paying boards. Finally, we also control for industry effects by including indicator variables for different industry groups, with the comparison group being "other" industry. The coefficients on industry dummies suggest that the probability to have women on board is significantly lower for firms in consumer durables, manufacturing, energy, business equipment and telecommunication. In contrast, the probability of female directors is significantly higher for firms in consumer non-durables, shops, and healthcare.

4.2.Ordinary least square regressions on the proportion of female directors on board

Besides the decision to appoint a female director, the proportion of female directors in the board is also a decision of great import. Given the share of women in the workforce and executive positions, having only one female director on board seems to be a more symbolic gesture than a genuine attempt to enhance board gender diversity. Torchia, Calabo and Huse (2011) find that having one female director as a token fails to enhance innovation. In contrast, a positive relationship between female directors and performance is observed in firms with three female directors. We model the choice of proportion of female directors to differentiate between firms that opt for low female director representation and firms that meaningfully gender-diversify their board composition. We use the following OLS model:

$$P_{i,t} = a_t + b_t X_{i,t} + c_t Z_{i,t} + \varepsilon_{i,t} \quad (2)$$

where the dependent variable $P_{i,t}$ is the proportion of female directors on board, and $X_{i,t}$ and $Z_{i,t}$ are firm characteristics and industry dummies. We use the same set of independent variables as in the model for the number of female directors.

Table 4 reports the Fama-MacBeth coefficients from the annual OLS regressions determining the percentage of female directors. The results regarding firm characteristics are similar to those reported in Table 3. Specifically, firms with larger boards and larger asset base, headquartered in states with high equality index, larger percentage of independent directors, and higher profitability tend to hire more women directors. Further, comparing the industry coefficients with the logistic regressions, we note that the results remain consistent for manufacturing, energy, business equipment, telecommunication, shops and healthcare, but are inconsistent for consumer non-durables and durables. Seemingly, the decisions to include women directors and the proportion of women on board are separate for some industries.

4.3.Heckman two-stage regressions

Since a significant proportion of firms do not have any female directors on their board, OLS regression estimates based on the entire cross-section of firms would underestimate the proportion of female directors for the firms that have women on board. On the other hand, OLS estimates based only on firms with female directors may suffer from selection bias as the decision to recruit women directors is endogenous. In this subsection, we use a Heckman selection model to test if the endogeneity is significant. The first-stage regression uses a probit model to determine firm's choice to have female directors. The second-stage regression is formulated as follows:

$$P_{j,t} = a_t + b_t X_{j,t} + c_t Z_{j,t} + \lambda_t M_{i,t} + \epsilon_{j,t} \quad (3)$$

where *P*, *X* and *Z* are defined as before, but the firm index *j* only represents firms with women on board. $M_{j,t}$ is the inverse Mills ratio computed from the first-stage regression.

The average coefficients from the second-stage Heckman OLS regressions for different time periods are reported in Table 5.[13] The inverse Mills ratio is significant, indicating the importance of addressing selection bias in our analyses. After the endogenous selection effect is controlled for, all previously significant firm characteristics (with the exception of board size) - state-level economic, political and legal gender equality (captured by the gender equality index), proportion of independent directors, size, profitability and risk remain important determinants of the proportion of female directors. The industry effects are similar, as well.

4.4.The propensity for board gender diversity

To capture the propensity for board gender diversity we use the average coefficients estimated during our base period of 1998 to 2002 using logit, OLS and Heckman selection models and reported in column 2 of Tables 3 to 5, respectively. We use the estimated coefficients to predict the following annually from 2003-2014 (1) the percentage of firms with at least one female director; (2) the proportion of female directors; and (3) the proportion of female directors when accounting for sample-selection bias.[14, 15] Following this method, the predicted percentage captures the effect of changing firm characteristics on board gender diversity, whereas the difference between the actual and predicted percentage represents firms' propensity to change board diversity. The actual versus predicted values, based on the logit, OLS and Heckman selection

[13] In untabulated results, we find the average first stage regression coefficients obtained through a probit model are different from the logistic regression in size, but still similar in significance.

[14] Using an alternative (shorter or longer) base period does not change our results. The models in Tables 3-5 are estimated based on the same set of variables to ensure the same set of firm characteristics are used, but restricting only to the significant ones for each model does not change our results.

[15] The inverse Mills ratio used in the second-stage regression with the Heckman selection model is estimated from the first-stage probit regression. We recompute the inverse Mills ratio with the base period coefficients and plug the *expected* inverse Mills ratio in the second-stage OLS regression. Using the *actual* inverse Mills ratio estimated from the original first-stage probit model does not change our results.

models are reported in Table 6 in Panels A, B and C, respectively. We also report the *p*-values from the two-sample *t*-test of equality of actual and expected board diversity measures. Figure 4 displays graphically the expected and unexpected portion of the board gender diversity through time.

In Panel A of Table 6, we find that the proportion of firms with women on board increased from 55.3 percent in 2003 to 78.2 percent in 2014, which represents a 41.5 percent increase over the entire period and 1.7 percent per annum. The change in the expected percentage based on changing firm characteristics over the same period is 12.8 (56.7 – 43.8) percent which represents a 29.3 percent increase, whereas the unexpected change is 10.1 (21.5 – 11.5) percent, implying an 87.8 percent improvement. The unexpected change makes up 43.9 percent (10.1/22.9) of the actual increase in board gender diversity. If we treat the realized and the expected percentage as two independent samples, the *p*-values for the two-sample *t*-tests indicate that the means are significantly different.[16] In untabulated results, we compare the expected percentage in year *t* computed with the estimated coefficients in year *t* with the expected percentage obtained by applying the average coefficients estimated over the base period. The expected percentage based on the current year's estimates incorporates both changing firm characteristics and propensity to increase board gender diversity. Therefore, this test can provide insight on the significance of the propensity component of the realized percentage of firms with female directors. We can relax the independence assumption in this case and use paired *t*-tests. The *p*-values from the paired *t*-tests are also well below the conventional level. In figure 4A, we plot the expected vs. unexpected share of firms with women on board over time. The total in each year sums up to the actual percentage

[16] We also conducted Wilcoxon rank sum tests and the p-values are essentially zero.

of firms with women on board. The increasing unexpected percentage of firms with women directors over time indicates an upward trend in the propensity to have women on board.

In Panel B of Table 6, we present the estimates when we extend the Fama and French (2001) methodology to the proportion of female directors. As previously noted, the percentage of female directors has increased from 8.1 percent in 2003 to 13.9 percent in 2014, a 72.5 percent increase. We find that the percentage increase due to changing characteristics is from 5.3 percent in 2003 to 7.4 percent in 2014, a 39.4 percent increase. This leaves 64.4 percent of the 5.8 percent (13.9 - 8.1) increase in the percentage of female directors as the unexpected component, which represents the higher propensity to increase the proportion of female directors'. The unexpected percentage of female directors increases from 2.8 percent to 6.6 percent over 2003-2014, a 135.5 percent increase in propensity. *p*-values of the two-sample *t*-test and unreported paired *t*-test *p*-values indicate these propensity estimates are significantly different from zero. Figure 4B depicts these results graphically. The increasing trend in the unexpected portion of the percentage of female directors is even more striking than the trend reported in Figure 4A, suggesting that not only more firms increasingly add the first female director to their boards, but also more firms have larger proportion of women on their BODs.

Finally, from Panel C in Table 6, we note that when controlling for sample selection bias the propensity to increase board gender diversity is of similar magnitude, but it increases at a slower pace.[17] This suggests that firms with female directors have been slowly increasing the proportion of female directors, and that our results in Panel B are driven by the firms adding female directors for the first time. Of the 3.2 percent increase in the percentage of female board members

[17] Note that the annual actual percentages of female directors in Panel B and C are different, since the statistics in Panel C are based only on firms with at least one female director.

over 2003-2014 (17.8 - 14.6), only 0.8 percent is contributed by changing firm characteristics, leaving most of the change in the proportion of females to be explained by the propensity of increasing board gender diversity. The reported two-sample *t*-test *p*-values and unreported paired *t*-test *p*-values show that the propensity estimates are significant. Figure 4C visually confirms the muted time trend of increasing proportion of female directors for firms with women on board.

In summary, the results in Table 6 provide the decomposition of the increasing trend in board gender diversity over 1998-2014. We note that the larger share of this increase is driven by the increasing propensity to diversify board gender, as opposed to changing firm characteristics. Next, we examine the drivers of firms' increasing propensity to gender diversify their BODs.

5. Are Firms Catering to Investor Demands?

Why has propensity to recruit women directors increased over time? As rational economic agents, firms would recruit women directors when they see perceived benefits associated with that strategy. As previously noted, there is no consensus on whether female directors enhance shareholders' value. We posit that firms' decision to hire women to serve on corporate boards is driven in part by the investor demand for greater gender diversity, which in turn induces greater diversity premium for firms with more diverse boards. Our hypothesis is similar in spirit to Baker and Wurgler (2004a) who invoke the catering theory to argue that managers tend to pay dividends when the market puts a relative high premium on dividend-paying stocks and omit dividends when investors prefer non-dividend-paying stocks, such that dividend payments follow the time-varying pattern of dividend premium. Li and Lie (2006) extend the catering theory to show that firms are more likely to increase dividends when the dividend premium is high and more likely to reduce dividends and repurchase shares when dividend premium is low. Baker, Greenwood, and Wurgler

(2009) characterize catering as the managerial behavior of increasing (decreasing) the supply of an attribute that investors are (not) willing to pay a premium for, notwithstanding the fact that the attribute may not enhance fundamental value. Notable studies that invoke this concept to explain managerial decisions include earnings management (Rajgopal, Shivakumar, and Simpson, 2007), stock market mispricing and investment decisions (Polk and Sapienza, 2009) and managing nominal stock price (Baker, Greenwood, and Wurgler, 2009).

There is growing anecdotal evidence that investors are pressuring firms to increase board gender diversity. For example, Facebook appointed Sheryl Sandberg to its board under investors' demand to add a female director on their all-male board. Similarly, the funding of Diverse Director Data Source by CalPERS and CalSTRS to seek female director candidates is in response to the mounting pressure these institutions are facing to promote gender diversity in corporate boards. Finally, the regulatory climate in several countries (e.g. Norway, Germany, Spain, India, etc.) is rapidly shifting towards more women directors, and firms are facing increasing societal, investor, and regulatory demand for board gender diversity. Although there is yet no directly adverse regulatory consequences for U.S. firms with all-male boards, investors' preference for women directors should boost (put pressure on) the valuation of firms with diversified (non-diversified) boards. If firms cater to the board diversity premium, we expect them to add more female directors. Our analyses next focus on the implications of catering theory for board gender diversity.

Our empirical methodology differs from Baker and Wurgler (2004a) in two respects. First, instead of the market-to-book asset ratio we use the price-to-book equity ratio, which is a valuation measure popular among practitioners in the investment community. Second, because the data on board characteristics do not go back far enough, we cannot use time-series regressions. Specifically, our sample contains 17 years of data, which is insufficient to make robust statistical inference in a

time-series regression. Furthermore, the percentage of firms with women on board increases slowly but gradually over time, and this lack of variation can lead to spurious regressions. To overcome this empirical challenge, we investigate the relation between the change in board gender diversity and the gender diversity premium (as defined below). This empirical design is motivated by Li and Lie (2006) who extend Baker and Wurgler's (2004a) study to posit and provide significant evidence that dividend changes are driven by the dividend premium.

5.1. Gender diversity premium

Since female directors' representation varies across industries, we first measure the gender diversity effect at the industry level by computing for each industry the difference in valuation between firms with and without female directors. We define the industry level gender diversity premium, *GEND_PR_IND*, as the difference in the natural logarithm of the value-weighted market-to-book equity ratio (M/B) of all firms with female directors and the natural logarithm of value-weighted M/B of all firms with no female directors in a given industry each year. To derive a market-wide gender diversity premium and reduce the impact of skewness caused by large differences in gender diversity across industries, we obtain the median of the gender diversity premiums across all industries each year. This constitutes our measure for market-wide gender diversity premium, *GEND_PR*.

$$\text{GEND\_PR\_IND}_{\text{k,t}} = \ln\left(\sum_{i=1}^{n} \omega_{i,t} M/B_{i,t}\right) - \ln\left(\sum_{j=1}^{m} \omega_{j,t} M/B_{j,t}\right) \quad (4)$$

$$\text{GEND\_PR}_t = \text{Median}\left(\text{GEND\_PR\_IND}_{\text{k,t}}\right) \quad (5)$$

where n is number of firms with female directors and m is number of firms without female directors in a given industry, and ω is the weight. .

The time-series of gender diversity premium is reported for the main industry groups in Table 7. We note that the median gender diversity premium is positive throughout the sample period, which is consistent with the generally increasing trend of board gender diversity over this period. The average median premium is 18.4 percent in the logarithmic term, equivalent to 20.2 percent valuation premium in market-to-book equity terms. The consistently positive gender premium represents the perceived benefit that induces firms to embrace gender diversity in their boards. Since we do not have a sufficiently long series of data to estimate the regression coefficients for propensity for gender diversity on lagged diversity premium, we compute the time-series correlation between the lagged change in gender diversity premium and the three propensity measures. The correlation coefficients are 0.49, 0.58, and 0.68, for the propensity measures derived from the logistic, OLS, and Heckman 2nd stage regressions, respectively, and they are all significant at conventional level.[18] These correlation coefficients indicate a positive association between diversity premium and firms' propensity for board gender diversity.

5.2.Catering and the decision to change board gender diversity

In this section, we analyze changes in board gender diversity in more detail by separating between increases and decreases in diversity, and whether the change is purely circumstantial or represents an active decision. First, we categorize the instances when a firm has a higher (lower) proportion of female directors on board than the previous year as *increase* (*decrease*) in board gender diversity. However, consider the case when a male director retires/leaves and his seat is still vacant at the time of filing the proxy statement. The proportion of female directors increases but not due to an active decision by the firm, so we classify this change in board diversity as a

[18] The contemporaneous correlation coefficients are 0.04, 0.04, and 0.12, which suggests that the impact of gender diversity premium on diversity propensity is not likely to be driven by spurious correlation.

passive change. Similarly, a decrease in gender diversity can be the result of adding a male director, rather than replacing a female director with a male director. The former is a *passive decrease*, whereas the latter is an *active decrease*. As such, we classify a change in board diversity as an *active increase* when the firm decides to increase the number of female directors no less than the increase in the board size, and *passive increase* otherwise, and vice versa. Finally, when the board remains unchanged relative to the previous year, the firm-year is categorized as *Diversity Unchanged*.

In Table 8 we present the annual distribution of proportion of firms categorized by changes in board gender diversity. We note that over the study period, on average, 21 percent of firms increase their board gender diversity each year, 15 percent decrease their board gender diversity, 27 percent maintain the level of board gender diversity, and the remaining 37 percent of firms do not have any women directors. Furthermore, 19 percent of the firms actively increase diversity each year, whereas only about 3 percent of the firms actively decrease diversity each year. This pattern is consistent with the overall improvement in board gender diversity over our study period.

Next, we conduct a multinomial logistic regression analysis to identify the factors that influence firms' decision to actively increase or decrease female board representation. We employ two sets of regressions. In the first set, the dependent variable is the change in board gender diversity, *BGD_CHANGE*, (0- no change, 1-decrease and 2-increase), while in the second one the dependent variable is the type of change (active or passive), *BGD_CHANGE_TYPE*, (0- no change, 1-passive decrease, 2-active decrease, 3-passive increase, 4-active increase). The results are reported in Table 9. In Panel A, we display the regression coefficients when including the industry-

level gender diversity premium as an explanatory variable, while in Panel B we include the market-wide gender diversity premium, along with industry dummies.[19] The specifications are:

$$logit(C_{i,t+1}) = a_t + b_t X_{i,t} + c_t GI_{i,t} + \varepsilon_{i,t} \quad (6)$$

$$logit(C_{i,t+1}) = a_t + b_t X_{i,t} + c_t Z_{i,t} + d_t G_t + \varepsilon_{i,t} \quad (7)$$

where $C_{i,t+1}$ is an indicator variable representing either change (increase or decrease) or type of change (active or passive) in board gender diversity, $X_{i,t}$ and $Z_{i,t}$ are lagged firm characteristics and industry dummies, respectively, and $GI_{i,t}$ and G_t are the lagged industry-level and lagged market-wide gender diversity premium, respectively. We include lagged proportion of female directors, because changes in board gender diversity are state dependent (Farrell and Hersch, 2005). To elaborate, firms with a high proportion of female directors are less likely to add more of them. We also include a lagged dummy variable indicating the presence of female executives. Firms with female executive may be more likely to install women on their boards. However, if female executives substitute for female directors to satisfy the intended change in gender diversity, the existence of female executive may deter addition of female directors. Overall, the influence of female executives is an empirical issue.

The main variable of interest is the gender diversity premium. Based on the catering theory, we expect the coefficient on this variable to be negative in the models examining the determinants of decrease in gender diversity, and positive in the models examining increase in gender diversity. In Panels A and B of Table 9, we report the estimated coefficients for models 6 and 7, respectively. Consistent with the implications of the catering hypothesis, in both panels, the gender diversity premium is significant with the predicted sign for increases in gender diversity, and the impact of

[19] Results without the dummies do not change materially. We exclude industry dummy coefficients in the table for brevity.

control variables are intuitive and in conformity with extant evidence. Specifically, female directors are more likely in larger boards, in firms located in states with higher equality index, and in firms with larger number of female executives, whereas boards with greater representation by female directors are less likely to appoint more women to their boards. However, gender diversity premium is not significant in the model for decreasing gender diversity. Next, given that decreases in board gender diversity are predominantly passive while increases are predominantly active, we investigate whether diversity premium has differential impact on types of change in board composition. In Panel A (controlling for industry-wide gender diversity premium), we observe that diversity premium is significant with the expected sign for active decreases, and both active and passive increases. The control variables have the predicted signs, as well.

In Panel B (controlling for market-wide gender diversity premium), gender diversity premium is insignificant for both active and passive decreases in gender diversity, but positive and significant for active increases in gender diversity. These results are consistent with the predication of the catering theory that when deciding on changes in gender representation on their boards, firms tend to follow the direction of change in the aggregate gender diversity premium. The odds ratio for the market-wide gender diversity premium in the active increase cases is 1.006, and that in the active decrease cases is (– 0.993). This implies that when the gender diversity premium improves by 1 percent, the probability of increase in board gender diversity is higher by 0.6 percent, and the probability of decrease in board gender diversity reduces by 0.7 percent, compared to the base case of no change. Considering that the standard deviation of the market-wide gender diversity premium is 10 percent, the impact of gender diversity premium is economically meaningful.

5.3.Catering and the magnitude of board gender diversity change

Finally, we test if the magnitude of change in board gender diversity is influenced by the catering incentive. We define two measures for the magnitude of change: (1) the change in the share of female directors from the previous year; and, (2) the change in the number of female directors from the previous year divided by the board size in the previous year. We regress these variables on the set of firm characteristics previously identified, including the industry or market-wide gender premium as a control variable, with the following specifications:

$$CH_{i,t+1} = a_t + b_t X_{i,t} + c_t GI_{i,t} + \varepsilon_{i,t} \quad (8)$$

$$CH_{i,t+1} = a_t + b_t X_{i,t} + c_t Z_{i,t} + d_t G_t + \varepsilon_{i,t} \quad (9)$$

where $CH_{i,t+1}$ represents the magnitude of change in board gender diversity, $X_{i,t}$ and $Z_{i,t}$ are lagged firm characteristics and industry dummies, $GI_{i,t}$ is the lagged industry-level gender diversity premium, and G_t is the lagged market-wide gender diversity premium.

The regression coefficients are reported in Table 10. The catering theory implies that the change in board gender diversity is directly related to the diversity premium. The results confirm this prediction in both models when controlling for firm characteristics and industry or market-wide gender premium. The coefficient of the gender diversity premium is significantly positive, indicating that increase in gender diversity premium is associated with improvement in board gender diversity.

6. Conclusion

Board gender diversity has been at the front and center of corporate finance issues amid a global movement advocating for gender equality. However, there is no consensus in the existing

academic literature whether gender diversity is beneficial for the firms and their shareholders. In this paper we provide a different perspective based on the simple fact that board gender diversity has been steadily increasing over the years. We provide evidence that this increase in board gender diversity is driven by the increasing propensity of firms to install female directors on their boards, rather than changing firm characteristics. If we believe firms are rational economic agents, their willingness to appoint more women on board should be the result of maximizing shareholder utility. Since the true benefit of having women on board is multifaceted and unmeasurable, our inference does not rely on drawing conclusion from a small set of firm objectives. Our study is less sensitive to the particularities of the sample because the methodology depends on the aggregate behavior in the cross-section of firms, instead of the variation between firms as the regression methodology rely on. We investigate if catering can be one of the incentives for firms to improve board gender diversity. The catering incentive is consistent with the external pressure put on firms by investors, which can drive up the difference in the valuation of firm equity between firms with and firms without women on board. Our results are supportive of the catering explanation, which offers a new angle to understand firm gender diversity decisions.

In all, our paper makes important contribution to the literature. It is the first one to document the increased propensity of firms to install female directors and to present evidence that this trend is driven by firms catering to the investors' demand for more women on corporate boards. Furthermore, our results demonstrate that firms are reacting to calls for more women on board even without quota-based policy initiatives in the U.S. Investors demand has a positive impact on the gender diversity decisions firms make. Our study suggests that if we allow an economic environment in which firms make rational decisions, progress in gender diversity can still be made absent of regulatory enforcement.

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Table 1: Descriptive statistics

Table 1 provides descriptive statistics of the data used in the analysis. In Panel A we present data for all firms, while in Panels B and C we present the statistics for firms without and firms with female directors, respectively. *FEMALE_DIR* is an indicator variable equal to one, if the firm has at least one female director, and 0 otherwise. *FEMALE_DIR_PCTG* is the number of women on board divided by the board size. *BOARD_SIZE* is the total number of directors sitting on the board. *DIRCOMP* is the logarithm of the average of total cash, stock, and option compensation paid to the directors plus one. *EQUALITY_INDEX* is a state-level gender equality index following Sugarman and Straus (1988) and measuring economic, political and legal gender equality. *FEMALE_EXEC* is an indicator variable equal to one, if the firm has at least one non-CEO female executive, and zero otherwise. *INDEP_DIR_PCTG* is the number of independent directors divided by the size of the board. *INSTOWNER* is the percentage of shares owned by institutional investors. *LNTA* is the natural logarithm of firm's total assets. *MOMENTUM* is the cumulative firm stock returns over the previous 12 months. *ROE* is firm's EBITDA divided by book equity, where book equity is measured as shareholder's equity plus deferred tax and investment credit, less preferred stock. *TOBINSQ* is the market value of assets divided by book value of assets, where market value of assets is given by total assets minus book value of equity plus market value of equity. *VOL* is measured as monthly stock return volatility over the previous 60 months. *DIRCOMP*, *INSTOWNER*, and *VOL* are winsorized at 99%, and the rest of the financial variables are winsorized at 1% and 99%. *DIRCOMP* and total assets are inflation adjusted and are in 2003 dollars.

Variable	N	Mean	STD	Min	Median	Max
Panel A: All firms (*ALL*) (#=17823)						
FEMALE_DIR	17823	0.591	0.492	0.000	1.000	1.000
FEMALE_DIR_PCTG	17823	0.092	0.093	0.000	0.100	0.667
BOARD_SIZE	17823	8.956	2.301	3.000	9.000	25.000
DIRCOMP	16984	4.602	0.858	0.000	4.751	7.101
EQUALITY_INDEX	17709	43.664	8.205	19.200	44.300	59.900
FEMALE_EXEC	17823	0.295	0.456	0.000	0.000	1.000
INDEP_DIR_PCTG	17823	0.710	0.166	0.000	0.750	1.000
INSTOWNER	17823	0.731	0.197	0.010	0.756	1.310
LNTA	17823	7.367	1.477	4.389	7.205	11.797
MOMENTUM	17823	0.136	0.485	-0.898	0.086	4.238
ROE	17800	0.327	0.322	-0.934	0.277	3.128
TOBINSQ	17823	1.985	1.377	0.571	1.569	14.785
VOL	17823	0.436	0.193	0.129	0.392	1.665
Panel B: Firms with no female directors on board (*N*) (#=7290)						
BOARD_SIZE	7290	7.760	1.884	3.000	7.000	20.000
DIRCOMP	6734	4.385	1.001	0.000	4.517	7.101
EQUALITY_INDEX	7246	43.515	8.654	19.200	44.600	59.900
FEMALE_EXEC	7290	0.225	0.418	0.000	0.000	1.000
INDEP_DIR_PCTG	7290	0.661	0.174	0.000	0.700	1.000
INSTOWNER	7290	0.713	0.213	0.010	0.742	1.310
LNTA	7290	6.718	1.181	4.389	6.601	11.566
MOMENTUM	7290	0.132	0.560	-0.898	0.057	4.238
ROE	7278	0.264	0.281	-0.934	0.243	3.128
TOBINSQ	7290	2.049	1.550	0.571	1.575	14.785
VOL	7290	0.500	0.213	0.142	0.449	1.665
Panel C: Firms with female directors on board (*Y*) (#=10533)						
FEMALE_NONCEO_DIR_PCTG	10533	0.155	0.069	0.043	0.125	0.667
BOARD_SIZE	10533	9.783	2.198	4.000	10.000	25.000
DIRCOMP	10250	4.744	0.715	0.000	4.868	7.101
EQUALITY_INDEX	10463	43.767	7.878	19.200	43.300	59.900
FEMALE_EXEC	10533	0.343	0.475	0.000	0.000	1.000
INDEP_DIR_PCTG	10533	0.743	0.152	0.000	0.778	1.000
INSTOWNER	10533	0.744	0.184	0.010	0.764	1.310
LNTA	10533	7.815	1.495	4.389	7.690	11.797
MOMENTUM	10533	0.138	0.426	-0.898	0.101	4.238
ROE	10522	0.371	0.342	-0.934	0.303	3.128
TOBINSQ	10533	1.940	1.242	0.571	1.568	14.785
VOL	10533	0.392	0.163	0.129	0.357	1.665

Table 2: Sample firm characteristics over time

Table 2 provides summary statistics of our sample firm characteristics over the five sub-periods identified for all firms (ALL), firms without (N) and with (Y) female directors on their boards. In Panel A we present mean values for each firm characteristic, while in Panel B we provide median statistics for the same characteristics. All variables are as previously defined in Table 1.

Variable	Women on Board	1998-2002	2003-2005	2006-2008	2009-2011	2012-2014
Panel A: Mean characteristics						
Number of Firms	ALL	5738	3008	2799	3100	3178
	N	3118	1271	1023	1062	816
	Y	2620	1737	1776	2038	2362
FEMALE_DIR_PCTG	ALL	0.061	0.085	0.099	0.108	0.130
	N	0	0	0	0	0
	Y	0.135	0.147	0.157	0.164	0.175
BOARD_SIZE	ALL	8.917	8.900	8.952	8.982	9.057
	N	7.846	7.814	7.659	7.670	7.592
	Y	10.190	9.694	9.698	9.665	9.564
DIRCOMP	ALL	4.086	4.386	4.880	4.959	5.048
	N	3.971	4.233	4.758	4.844	4.937
	Y	4.212	4.496	4.949	5.018	5.086
EQUALITY_INDEX	ALL	43.556	43.775	43.758	43.772	43.565
	N	43.594	43.797	43.437	43.298	43.156
	Y	43.511	43.759	43.944	44.019	43.706
FEMALE_EXEC	ALL	0.236	0.288	0.310	0.336	0.353
	N	0.189	0.227	0.246	0.274	0.268
	Y	0.292	0.332	0.347	0.368	0.382
INDEP_DIR_PCTG	ALL	0.610	0.694	0.753	0.782	0.796
	N	0.582	0.672	0.722	0.751	0.755
	Y	0.642	0.710	0.771	0.799	0.811
INSTOWNER	ALL	0.615	0.761	0.844	0.813	0.735
	N	0.599	0.767	0.855	0.818	0.748
	Y	0.633	0.757	0.837	0.810	0.730
LNTA	ALL	7.182	7.327	7.431	7.444	7.604
	N	6.715	6.695	6.741	6.696	6.767
	Y	7.738	7.790	7.828	7.834	7.894
MOMENTUM	ALL	0.082	0.214	-0.018	0.227	0.205
	N	0.087	0.229	-0.003	0.242	0.182
	Y	0.077	0.203	-0.027	0.218	0.213
ROE	ALL	0.326	0.300	0.341	0.325	0.344
	N	0.272	0.247	0.274	0.256	0.255
	Y	0.391	0.338	0.380	0.360	0.375
TOBINSQ	ALL	2.108	2.020	1.903	1.786	1.994
	N	2.158	2.060	1.950	1.852	1.998
	Y	2.049	1.990	1.876	1.752	1.993
VOL	ALL	0.490	0.477	0.357	0.422	0.383
	N	0.546	0.541	0.408	0.461	0.423
	Y	0.423	0.430	0.328	0.402	0.369

Panel B: Median characteristics

FEMALE_DIR_PCTG	ALL	0.000	0.091	0.100	0.111	0.125
	N	0	0	0	0	0
	Y	0.111	0.125	0.133	0.143	0.143
BOARD_SIZE	ALL	9.000	9.000	9.000	9.000	9.000
	N	7.000	8.000	8.000	7.000	7.000
	Y	10.000	9.000	10.000	9.000	9.000
DIRCOMP	ALL	4.110	4.459	4.916	5.007	5.084
	N	3.974	4.329	4.770	4.865	4.948
	Y	4.224	4.542	4.979	5.052	5.117
EQUALITY_INDEX	ALL	43.300	44.300	44.300	45.800	44.300
	N	45.800	45.800	42.800	44.300	43.300
	Y	42.800	42.800	44.600	45.800	44.300
FEMALE_EXEC	ALL	0.000	0.000	0.000	0.000	0.000
	N	0.000	0.000	0.000	0.000	0.000
	Y	0.000	0.000	0.000	0.000	0.000
INDEP_DIR_PCTG	ALL	0.625	0.714	0.778	0.800	0.833
	N	0.600	0.700	0.750	0.778	0.778
	Y	0.667	0.727	0.800	0.818	0.857
INSTOWNER	ALL	0.637	0.780	0.852	0.839	0.751
	N	0.618	0.789	0.870	0.849	0.771
	Y	0.654	0.772	0.843	0.836	0.744
LNTA	ALL	6.989	7.131	7.307	7.284	7.452
	N	6.602	6.595	6.628	6.553	6.664
	Y	7.619	7.647	7.726	7.703	7.789
MOMENTUM	ALL	-0.011	0.165	-0.017	0.167	0.167
	N	-0.038	0.172	-0.017	0.177	0.128
	Y	0.014	0.160	-0.016	0.163	0.179
ROE	ALL	0.299	0.267	0.283	0.265	0.268
	N	0.261	0.236	0.249	0.224	0.227
	Y	0.338	0.291	0.304	0.286	0.286
TOBINSQ	ALL	1.502	1.669	1.593	1.500	1.667
	N	1.506	1.717	1.615	1.524	1.654
	Y	1.491	1.647	1.581	1.484	1.669
VOL	ALL	0.427	0.424	0.334	0.398	0.360
	N	0.487	0.494	0.381	0.435	0.401
	Y	0.373	0.383	0.304	0.377	0.343

Table 3: Logistic regressions determining the probability to have a female director on board

In Table 3 we present the regression statistics from conducting a logistic regression, determining the probability for a firm to have a female director on its board. The dependent variable is *FEMALE_DIR*, an indicator variable equal to one, if the firm has at least one female director, and 0 otherwise. We control for industry effects by including indicator variables for the main identified industries, represented in our sample – consumer non-durables, consumer durables, manufacturing, energy, chemicals, business equipment, telecommunications, shops, and healthcare. The omitted (comparison) industry group is *OTHER* (other industry). We estimate logistic regressions annually during the 1998 to 2014 period. We compute the time-series averages of the coefficients and the t-statistics for each of the identified 5 time periods. We report the average coefficients by period and include p-values in parentheses underneath the coefficients. All variables are as previously defined in Table 1.

Variable	1998-2014	1998-2002	2003-2005	2006-2008	2009-2011	2012-2014
INTERCEPT	-7.066	-5.924	-6.739	-8.011	-7.459	-7.958
	(0.000)	(0.000)	(0.006)	(0.002)	(0.000)	(0.010)
BOARD_SIZE	0.426	0.328	0.374	0.511	0.482	0.499
	(0.000)	(0.000)	(0.008)	(0.000)	(0.001)	(0.000)
DIRCOMP	-0.068	0.020	0.115	0.030	-0.161	-0.402
	(0.203)	(0.678)	(0.072)	(0.660)	(0.043)	(0.095)
EQUALITY_INDEX	0.013	0.005	0.014	0.022	0.019	0.011
	(0.000)	(0.060)	(0.020)	(0.009)	(0.009)	(0.029)
INDEP_DIR_PCTG	2.427	1.548	1.394	2.650	2.441	4.689
	(0.000)	(0.001)	(0.008)	(0.003)	(0.018)	(0.014)
INSTOWNER	0.007	0.316	0.046	0.003	-0.017	-0.520
	(0.948)	(0.014)	(0.876)	(0.993)	(0.897)	(0.159)
LNTA	0.286	0.252	0.284	0.209	0.322	0.387
	(0.000)	(0.000)	(0.002)	(0.035)	(0.003)	(0.070)
MOMENTUM	-0.113	-0.055	-0.106	-0.343	-0.082	-0.020
	(0.069)	(0.445)	(0.680)	(0.183)	(0.572)	(0.870)
ROE	0.625	0.402	0.554	0.694	0.635	0.990
	(0.000)	(0.019)	(0.084)	(0.068)	(0.055)	(0.069)
TOBINSQ	0.014	0.040	0.020	0.016	-0.031	0.009
	(0.203)	(0.042)	(0.182)	(0.691)	(0.400)	(0.797)
VOL	-0.972	-1.428	-0.883	-2.020	-0.607	0.383
	(0.001)	(0.002)	(0.165)	(0.026)	(0.043)	(0.666)
CONSUMER NON-DURABLES	0.529	0.416	0.691	0.827	0.251	0.533
	(0.000)	(0.013)	(0.116)	(0.032)	(0.008)	(0.053)
CONSUMER DURABLES	-0.014	0.278	-0.234	-0.067	0.065	-0.306
	(0.870)	(0.156)	(0.087)	(0.761)	(0.372)	(0.285)
MANUFACTURING	-0.482	-0.230	-0.574	-0.474	-0.594	-0.706
	(0.000)	(0.026)	(0.007)	(0.063)	(0.003)	(0.021)
ENERGY	-0.835	-0.775	-0.538	-0.777	-0.940	-1.187
	(0.000)	(0.005)	(0.168)	(0.040)	(0.020)	(0.027)
CHEMICALS	0.044	0.312	-0.319	0.305	0.307	-0.565
	(0.713)	(0.077)	(0.087)	(0.278)	(0.262)	(0.201)
BUSINESS EQUIPMENT	-0.182	-0.042	-0.257	-0.032	-0.302	-0.368
	(0.002)	(0.710)	(0.027)	(0.725)	(0.129)	(0.001)
TELECOMMUNICATION	-0.734	-0.035	-0.328	-0.844	-1.677	-1.249
	(0.002)	(0.879)	(0.627)	(0.149)	(0.000)	(0.025)
SHOPS	0.462	0.333	0.556	0.570	0.459	0.476
	(0.000)	(0.058)	(0.032)	(0.020)	(0.058)	(0.019)
HEALTHCARE	0.439	0.656	0.317	0.318	0.343	0.413
	(0.000)	(0.002)	(0.004)	(0.024)	(0.048)	(0.075)
OBSERVATIONS	992	1007	977	916	1015	1032

Table 4: Ordinary least square regressions determining the proportion of female directors on board

In Table 4 we present the regression statistics from conducting an OLS regression, determining the proportion of female directors on board. The dependent variable is *FEMALE_DIR_PCTG* and presents the number of women on board divided by the board size. We control for industry effects by including indicator variables for the main identified industries, represented in our sample – consumer non-durables, consumer durables, manufacturing, energy, chemicals, business equipment, telecommunications, shops, and healthcare. The omitted (comparison) industry group is *OTHER* (other industry). We estimate regressions annually during the 1998 to 2014 period. We compute the time-series averages of the coefficients and the t-statistics for each of the identified 5 time periods. We report the average coefficients by period and include p-values in parentheses underneath the coefficients. All variables are as previously defined in Table 1.

Variable	1998-2014	1998-2002	2003-2005	2006-2008	2009-2011	2012-2014
INTERCEPT	-0.115	-0.063	-0.093	-0.140	-0.161	-0.153
	(0.000)	(0.000)	(0.047)	(0.001)	(0.013)	(0.011)
BOARD_SIZE	0.006	0.004	0.005	0.008	0.008	0.008
	(0.000)	(0.000)	(0.018)	(0.003)	(0.008)	(0.006)
DIRCOMP	-0.002	0.002	0.004	0.003	-0.006	-0.015
	(0.314)	(0.209)	(0.124)	(0.200)	(0.060)	(0.028)
EQUALITY_INDEX	0.001	0.000	0.001	0.001	0.001	0.001
	(0.000)	(0.010)	(0.005)	(0.005)	(0.013)	(0.004)
INDEP_DIR_PCTG	0.087	0.052	0.052	0.078	0.105	0.170
	(0.000)	(0.000)	(0.022)	(0.003)	(0.025)	(0.008)
INSTOWNER	-0.003	0.001	-0.004	0.002	-0.002	-0.013
	(0.293)	(0.793)	(0.658)	(0.816)	(0.033)	(0.140)
LNTA	0.010	0.007	0.009	0.008	0.013	0.014
	(0.000)	(0.000)	(0.016)	(0.006)	(0.001)	(0.001)
MOMENTUM	-0.004	-0.002	-0.001	-0.011	-0.002	-0.005
	(0.069)	(0.268)	(0.860)	(0.241)	(0.713)	(0.553)
ROE	0.022	0.015	0.030	0.022	0.017	0.032
	(0.000)	(0.009)	(0.025)	(0.023)	(0.003)	(0.043)
TOBINSQ	0.000	0.001	0.000	-0.001	-0.002	0.001
	(0.917)	(0.144)	(0.543)	(0.309)	(0.423)	(0.037)
VOL	-0.026	-0.042	-0.030	-0.052	-0.001	0.008
	(0.001)	(0.003)	(0.130)	(0.020)	(0.780)	(0.493)
CONSUMER NON-DURABLES	0.035	0.031	0.039	0.038	0.033	0.034
	(0.000)	(0.003)	(0.021)	(0.001)	(0.002)	(0.006)
CONSUMER DURABLES	-0.003	0.005	-0.010	-0.002	0.001	-0.013
	(0.233)	(0.227)	(0.028)	(0.192)	(0.897)	(0.127)
MANUFACTURING	-0.017	-0.007	-0.021	-0.020	-0.022	-0.024
	(0.000)	(0.012)	(0.012)	(0.016)	(0.010)	(0.001)
ENERGY	-0.032	-0.019	-0.024	-0.040	-0.042	-0.046
	(0.000)	(0.009)	(0.006)	(0.008)	(0.005)	(0.001)
CHEMICALS	0.017	0.014	0.009	0.024	0.033	0.010
	(0.000)	(0.003)	(0.194)	(0.010)	(0.001)	(0.359)
BUSINESS EQUIPMENT	-0.008	-0.001	-0.009	-0.005	-0.015	-0.017
	(0.000)	(0.780)	(0.053)	(0.156)	(0.045)	(0.014)
TELECOMMUNICATION	-0.015	0.003	-0.014	-0.011	-0.039	-0.027
	(0.005)	(0.392)	(0.453)	(0.341)	(0.012)	(0.000)
SHOPS	0.025	0.018	0.026	0.029	0.029	0.026
	(0.000)	(0.022)	(0.013)	(0.017)	(0.012)	(0.003)
HEALTHCARE	0.012	0.023	0.011	0.011	0.008	-0.001
	(0.000)	(0.003)	(0.051)	(0.118)	(0.166)	(0.867)
OBSERVATIONS	992	1007	977	916	1015	1032

Table 5: Heckman two-stage regressions determining the proportion of female directors on board

In Table 5 we present the regression statistics from conducting Heckman two-stage regressions, determining the proportion of female directors on board. In the first stage, a probit regression is used to determine the probability of having a female on the BOD, while in the second stage, we estimate an OLS regression including the inverse Mills ratio, calculated based on the estimated parameters in the first stage. The dependent variable in the second stage is *FEMALE_DIR_PCTG* and presents the number of women on board divided by the board size. We control for industry effects by including indicator variables for the main identified industries, but suppress the coefficients of the industry dummy variables in the table for brevity. We estimate regressions annually during the 1998 to 2014 period and compute the time-series averages of the coefficients and the t-statistics for each of the identified 5 time periods. We report the average coefficients by period and include p-values in parentheses underneath the coefficients. All variables are as previously defined in Table 1.

Variable	1998-2014	1998-2002	2003-2005	2006-2008	2009-2011	2012-2014
STAGE TWO						
INTERCEPT	-0.055	-0.091	-0.013	-0.036	-0.070	-0.039
	(0.005)	(0.100)	(0.488)	(0.554)	(0.157)	(0.099)
BOARD_SIZE	0.001	0.002	-0.002	0.000	0.001	0.001
	(0.422)	(0.300)	(0.046)	(0.877)	(0.589)	(0.496)
DIRCOMP	-0.001	0.002	0.002	0.004	-0.004	-0.014
	(0.414)	(0.232)	(0.458)	(0.207)	(0.159)	(0.005)
EQUALITY_INDEX	0.001	0.000	0.001	0.001	0.001	0.001
	(0.000)	(0.012)	(0.010)	(0.024)	(0.013)	(0.000)
INDEP_DIR_PCTG	0.081	0.075	0.051	0.055	0.093	0.134
	(0.000)	(0.002)	(0.032)	(0.082)	(0.030)	(0.015)
INSTOWNER	-0.007	0.003	-0.010	-0.010	-0.012	-0.015
	(0.061)	(0.756)	(0.334)	(0.007)	(0.127)	(0.115)
MILLS	0.073	0.102	0.071	0.064	0.058	0.053
	(0.000)	(0.001)	(0.007)	(0.066)	(0.001)	(0.006)
LNAT	0.009	0.008	0.008	0.007	0.011	0.012
	(0.000)	(0.006)	(0.032)	(0.003)	(0.007)	(0.001)
MOMENTUM	(-0.003)	(-0.002)	(0.002)	(-0.009)	(-0.002)	(-0.008)
	(0.152)	(0.568)	(0.481)	(0.396)	(0.702)	(0.439)
ROE	0.021	0.019	0.033	0.019	0.012	0.024
	(0.000)	(0.006)	(0.010)	(0.031)	(0.031)	(0.027)
TOBINSQ	0.000	0.000	-0.001	0.000	-0.001	0.002
	(0.638)	(0.620)	(0.457)	(0.604)	(0.567)	(0.021)
VOL	-0.024	-0.065	-0.030	-0.021	0.018	0.008
	(0.017)	(0.004)	(0.113)	(0.079)	(0.126)	(0.433)
CONSUMER NON-DURABLES	0.045	0.048	0.048	0.041	0.047	0.039
	(0.000)	(0.001)	(0.010)	(0.017)	(0.001)	(0.003)
CONSUMER DURABLES	-0.003	0.007	-0.012	-0.007	0.002	-0.010
	(0.389)	(0.416)	(0.053)	(0.444)	(0.708)	(0.060)
MANUFACTURING	-0.015	-0.007	-0.020	-0.020	-0.015	-0.018
	(0.000)	(0.038)	(0.005)	(0.003)	(0.042)	(0.003)
ENRGY	-0.033	-0.024	-0.024	-0.040	-0.041	-0.042
	(0.000)	(0.003)	(0.010)	(0.005)	(0.006)	(0.003)
CHEMICALS	0.024	0.020	0.017	0.025	0.038	0.022
	(0.000)	(0.004)	(0.051)	(0.038)	(0.004)	(0.078)
BUSINESS EQUIPMENT	-0.005	0.001	-0.003	-0.005	-0.012	-0.011
	(0.020)	(0.882)	(0.324)	(0.340)	(0.011)	(0.022)
TELECOMMUNICATION	0.004	0.013	-0.006	0.013	-0.002	-0.006
	(0.370)	(0.049)	(0.701)	(0.353)	(0.834)	(0.161)
SHOPS	0.028	0.025	0.030	0.029	0.033	0.026
	(0.000)	(0.021)	(0.009)	(0.002)	(0.011)	(0.003)
HEALTHCARE	0.016	0.035	0.013	0.012	0.009	-0.002
	(0.001)	(0.006)	(0.112)	(0.162)	(0.151)	(0.747)
OBSERVATIONS	598	482	566	583	668	770

Table 6: Female board representation: distinguishing the effect of changing firm characteristics from the increasing propensity to add women on corporate boards

In Table 6 we present statistics for observed, expected and unexpected female representation on corporate boards. We use 1998-2002 as our benchmark period to estimate *Expected percentage* for women representation. The actual versus predicted (expected) values, based on the logit, OLS and Heckman selection models are reported in Panels A, B and C, respectively, annually over the period 2003-2014. In Panel A, the variable of interest is the percentage of firms with women on board (*FEMALE_DIR*), while in Panels B and C the variable of interest is *FEMALE_DIR_PCTG*, the percentage of women on corporate boards. *Unexpected percentage* is obtained as the difference between *Actual percentage* and *Expected percentage* of the variable of interest. P-values from the two-sample t-test of equality of *Actual* and *Expected percentage* are provided in the last column on the right.

Year	*Actual percentage*	*Expected percentage*	*Unexpected percentage*	*P-Value*
Panel A: Actual vs. expected percentage of firms with women on board. The expected percentage is estimated based on the logistic regression model reported in Table 3.				
2003	55.3%	43.8%	11.5%	0.000
2004	57.7%	46.4%	11.3%	0.000
2005	60.8%	49.1%	11.6%	0.000
2006	63.4%	52.8%	10.6%	0.000
2007	62.2%	53.8%	8.5%	0.000
2008	65.1%	54.7%	10.4%	0.000
2009	63.7%	51.5%	12.1%	0.000
2010	65.4%	52.1%	13.4%	0.000
2011	68.5%	52.6%	15.8%	0.000
2012	71.5%	53.1%	18.4%	0.000
2013	74.2%	54.1%	20.1%	0.000
2014	78.2%	56.7%	21.5%	0.000
Average	65.5%	51.7%	13.8%	
Panel B: Actual vs. expected percentage of women on boards. The expected percentage is estimated based on the OLS regression model reported in Table 4.				
2003	8.1%	5.3%	2.8%	0.000
2004	8.5%	5.6%	2.8%	0.000
2005	9.0%	6.1%	2.9%	0.000
2006	9.7%	6.6%	3.1%	0.000
2007	10.0%	6.9%	3.1%	0.000
2008	10.3%	7.0%	3.3%	0.000
2009	10.3%	6.5%	3.7%	0.000
2010	10.6%	6.6%	4.0%	0.000
2011	11.5%	6.7%	4.8%	0.000
2012	12.1%	6.7%	5.3%	0.000
2013	13.0%	6.9%	6.2%	0.000
2014	13.9%	7.4%	6.6%	0.000
Average	10.6%	6.5%	4.0%	

Panel C: Actual vs. expected percentage of women on boards, in BODs with at least one female director. The expected percentage is estimated based on a two-stage Heckman selection regression model reported in Table 5.

2003	14.6%	12.1%	2.5%	0.000
2004	14.7%	12.2%	2.5%	0.000
2005	14.8%	12.3%	2.5%	0.000
2006	15.2%	12.3%	3.0%	0.000
2007	16.1%	12.6%	3.4%	0.000
2008	15.8%	12.6%	3.2%	0.000
2009	16.1%	12.4%	3.7%	0.000
2010	16.2%	12.5%	3.7%	0.000
2011	16.7%	12.5%	4.2%	0.000
2012	16.9%	12.5%	4.3%	0.000
2013	17.6%	12.6%	4.9%	0.000
2014	17.8%	12.9%	4.9%	0.000
Average	16.0%	12.5%	3.6%	

Table 7: Industry-level and market-wide gender diversity premium

In Table 7 we present time-series of the gender diversity premium measure by the main industry groups. We define the industry level gender diversity premium (*GEND_PR_IND*) as the difference in the log of the value-weighted market-to-book equity ratio (M/B) of all firms with female directors and the log of M/B for all firms with no female directors in a given industry each year. The last column on the right presents statistics for the median of the industry gender diversity premiums across all industries each year, which represents our market-wide gender diversity premium measure (*GEND_PR*). We color code annual changes of *GEND_PR_IND*; colors change from red to green (and vice versa) as *GEND_PR_IND* goes from low to high (and vice versa) each year.

YEAR	NONDUR	DURAB	MANU	ENRGY	CHEM	EQUIP	TELCOM	SHOPS	HEALTH	OTHER	MEDIAN
1998	0.179	0.524	0.506	0.480	0.853	0.165	-0.829	-0.280	0.642	-0.254	0.330
1999	0.774	0.887	-0.238	0.355	1.414	-0.207	-1.198	0.266	-0.183	-0.086	0.090
2000	0.977	0.021	0.159	-0.015	1.276	-0.339	0.109	0.605	0.263	-0.623	0.134
2001	0.291	-0.185	0.413	0.107	0.759	0.233	0.276	-0.059	0.370	-0.340	0.255
2002	0.284	-0.393	0.347	0.126	0.571	0.401	-0.120	0.456	0.357	0.144	0.316
2003	0.953	-0.152	0.322	0.188	0.624	0.052	0.063	-0.374	0.239	-0.161	0.125
2004	0.603	0.110	0.274	0.103	0.248	0.137	-0.249	-0.102	0.057	-0.077	0.106
2005	0.772	0.059	0.071	-0.358	0.527	0.393	-0.992	0.138	-0.052	-0.358	0.065
2006	0.478	0.561	0.427	0.087	0.698	0.278	-0.924	0.195	-0.167	-0.397	0.236
2007	0.500	0.643	-0.004	0.183	0.397	0.013	0.144	0.048	-0.246	-0.377	0.096
2008	-0.594	0.496	0.386	0.308	0.990	0.112	-0.004	0.168	0.246	0.034	0.207
2009	-1.015	0.226	0.454	0.119	0.722	0.007	-0.257	0.203	-0.277	0.105	0.112
2010	1.120	1.140	0.525	-0.047	0.723	-0.076	0.402	0.274	-0.389	-0.129	0.338
2011	1.205	0.451	0.508	-0.123	0.590	0.187	0.083	0.166	-0.222	0.173	0.180
2012	0.848	0.575	0.424	-0.307	0.693	0.282	-0.525	0.331	-0.021	0.302	0.316
2013	0.717	-0.009	0.414	-0.235	0.869	0.180	-0.476	0.209	-0.103	0.381	0.194
2014	-0.168	0.085	0.152	-0.176	1.180	-0.067	-0.215	0.069	-0.028	0.376	0.020
Average	0.466	0.296	0.303	0.047	0.773	0.103	-0.277	0.136	0.029	-0.076	0.184
Stdev	0.600	0.408	0.210	0.233	0.305	0.200	0.476	0.244	0.281	0.295	0.101

Table 8: Gender diversity premium and the percent of firms with gender diversity changes

In Table 8 we present the annual distribution of firms based on the gender diversity changes observed in their boards. We define an *increase* (*decrease*) in board gender diversity of a firm in a given year when a firm has a *higher* (*lower*) proportion of female directors on board than the previous year. We further classify an increase in board gender diversity of a firm in a given year as an *active increase*, when a firm increases its number of female directors *more* than it increases of number of its BODs, and *passive* increase otherwise. Similarly, a decrease in board gender diversity can be the result of *adding* a male director, rather than *replacing* a female director with a male director. We classify the former changes in board diversity to be *passive decreases*, and the latter *active decreases*. Finally, when no changes in the board relative to the previous year are observed the firm is classified in the *Diversity Unchanged* category.

Year	Lagged Premium	Firms with Board Gender Diversity Changes						
		Diversity Decrease	Active Diversity Decrease	Passive Diversity Decrease	Diversity Unchanged	Diversity Increase	Passive Diversity Increase	Active Diversity Increase
1999	0.330	12.4%	2.0%	10.5%	16.7%	21.5%	1.8%	19.7%
2000	0.090	10.1%	2.3%	7.8%	22.5%	17.8%	1.0%	16.8%
2001	0.134	12.7%	2.2%	10.4%	22.2%	18.5%	1.5%	17.0%
2002	0.255	13.0%	2.7%	10.3%	20.2%	20.0%	1.8%	18.2%
2003	0.316	15.4%	1.8%	13.6%	19.8%	21.4%	1.5%	19.9%
2004	0.125	15.9%	3.5%	12.4%	24.2%	20.5%	2.0%	18.5%
2005	0.106	16.4%	2.5%	13.9%	23.5%	22.3%	2.1%	20.1%
2006	0.065	17.0%	2.5%	14.5%	25.7%	22.0%	1.8%	20.3%
2007	0.236	14.1%	3.6%	10.4%	24.7%	18.8%	1.1%	17.7%
2008	0.096	16.5%	1.8%	14.7%	30.8%	17.0%	2.5%	14.5%
2009	0.207	16.8%	2.7%	14.1%	30.5%	19.5%	0.8%	18.7%
2010	0.112	16.0%	3.7%	12.3%	32.2%	18.5%	0.9%	17.6%
2011	0.338	14.5%	2.6%	11.9%	32.6%	21.0%	1.3%	19.7%
2012	0.180	17.2%	3.0%	14.2%	31.6%	22.4%	1.3%	21.1%
2013	0.316	15.6%	2.6%	13.0%	35.3%	24.4%	1.8%	22.5%
2014	0.194	16.9%	3.5%	13.5%	36.7%	25.8%	1.8%	23.9%
Avg	19.4%	15.0%	2.7%	12.3%	26.8%	20.7%	1.6%	19.1%

Table 9: Multinomial logistic regressions of firm decision to increase or decrease board gender diversity

In Table 9 we present the results from a multinomial logistic regression analysis, determining the drivers of firms' choice to increase or decrease female board representation. We present the results from two sets of regressions. In the first one, the dependent variable is board gender diversity change, *BGD_CHANGE*, (0- no change, 1-decreasing and 2-increasing). We present the results from this model in columns (1) – (2) of the table. In the second set of regressions, the dependent variable is board gender diversity change type, *BGD_CHANGE_TYPE*, (0- no change, 1-passive decreasing, 2-active decreasing, 3-passive increasing, 4-active increasing). We present the results from this model in columns (3) – (6). In Panel A, we display the regression statistics when including the industry-level gender diversity premium, *GEND_PR_IND*, while in Panel B we include as right hand side variables the market-wide gender diversity premium, *GEND_PR*, along with industry dummies (coefficients not reported for brevity). All firm characteristics are lagged and measured at the end of the previous year.

Variable	Gender Diversity Change		Gender Diversity Change Relative to Board Size Change			
Panel A: Controlling for industry level gender diversity premium (*GEND_PR_IND*)						
	Decreasing (1)	Increasing (2)	Active Decreasing (3)	Passive Decreasing (4)	Passive Increasing (5)	Active Increasing (6)
INTERCEPT	-2.041	-1.544	-7.278	-1.509	-0.512	-1.972
	(0.000)	(0.000)	(0.000)	(0.000)	(0.516)	(0.000)
GEND_PR_IND	-0.093	0.137	-0.330	-0.024	0.376	0.119
	(0.200)	(0.049)	(0.015)	(0.765)	(0.054)	(0.093)
FEMALE_DIR_PCTG	2.388	-11.202	4.024	1.938	-17.365	-10.675
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
BOARD_SIZE	-0.050	0.092	0.328	-0.151	-0.447	0.133
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
DIRCOMP	-0.074	0.056	-0.075	-0.069	-0.010	0.067
	(0.073)	(0.159)	(0.373)	(0.120)	(0.913)	(0.106)
EQUALITY_INDEX	0.002	0.009	0.006	0.001	-0.003	0.010
	(0.581)	(0.007)	(0.398)	(0.712)	(0.693)	(0.003)
FEMALE EXEC	0.000	0.221	0.311	-0.065	0.338	0.215
	(0.999)	(0.000)	(0.004)	(0.281)	(0.020)	(0.000)
INDEP_DIR_PCTG	-0.072	0.038	0.108	-0.035	-1.051	0.156
	(0.714)	(0.838)	(0.778)	(0.870)	(0.024)	(0.409)
INSTOWNER	-0.055	-0.066	0.425	-0.117	-0.316	-0.025
	(0.731)	(0.672)	(0.185)	(0.494)	(0.447)	(0.876)
LNTA	0.222	0.124	0.027	0.271	0.587	0.086
	(0.000)	(0.000)	(0.570)	(0.000)	(0.000)	(0.000)
MOMENTUM	-0.131	-0.143	-0.029	-0.149	0.079	-0.164
	(0.040)	(0.020)	(0.814)	(0.029)	(0.603)	(0.009)
ROE	0.008	0.074	-0.124	0.035	0.453	0.043
	(0.924)	(0.368)	(0.453)	(0.702)	(0.032)	(0.607)
TOBINSQ	0.032	0.005	-0.029	0.040	0.008	0.000
	(0.155)	(0.807)	(0.549)	(0.093)	(0.878)	(0.991)
VOL	0.58	0.46	1.47	0.34	-0.02	0.48
	(0.001)	(0.009)	(0.000)	(0.080)	(0.969)	(0.007)
PSEUDO R2	0.149		0.198			
OBSERVATIONS	9630		9630			

Panel B: Controlling for market-wide gender diversity premium (*GEND_PR*)						
	Decreasing	Increasing	Active Decreasing	Passive Decreasing	Passive Increasing	Active Increasing
INTERCEPT	-2.024	-1.651	-6.987	-1.559	-0.704	-2.066
	(0.000)	(0.000)	(0.000)	(0.000)	(0.404)	(0.000)
FEMALE_DIR_PCTG	2.316	-11.445	4.051	1.884	-17.669	-10.906
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
BOARD_SIZE	-0.053	0.093	0.347	-0.158	-0.443	0.135
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
DIRCOMP	-0.068	0.047	-0.093	-0.055	-0.024	0.058
	(0.109)	(0.243)	(0.269)	(0.227)	(0.799)	(0.164)
EQUALITY_INDEX	0.001	0.008	0.005	0.001	-0.003	0.009
	(0.685)	(0.021)	(0.458)	(0.827)	(0.769)	(0.012)
FEMALE EXEC	0.009	0.214	0.309	-0.052	0.287	0.210
	(0.873)	(0.000)	(0.005)	(0.397)	(0.053)	(0.000)
GEND_PR_IND	-0.216	0.587	-0.695	-0.136	-0.202	0.626
	(0.463)	(0.033)	(0.233)	(0.665)	(0.790)	(0.025)
INDEP_DIR_PCTG	-0.138	0.114	0.114	-0.115	-0.774	0.213
	(0.494)	(0.549)	(0.773)	(0.594)	(0.106)	(0.273)
INSTOWNER	-0.054	-0.050	0.276	-0.095	-0.384	-0.006
	(0.737)	(0.753)	(0.395)	(0.584)	(0.361)	(0.970)
LNTA	0.238	0.136	0.035	0.288	0.602	0.097
	(0.000)	(0.000)	(0.467)	(0.000)	(0.000)	(0.000)
MOMENTUM	-0.133	-0.143	-0.015	-0.159	0.051	-0.163
	(0.037)	(0.020)	(0.904)	(0.021)	(0.736)	(0.010)
ROE	-0.012	0.061	-0.086	-0.004	0.431	0.033
	(0.886)	(0.467)	(0.609)	(0.966)	(0.045)	(0.703)
TOBINSQ	0.034	0.003	-0.058	0.048	0.003	-0.001
	(0.142)	(0.879)	(0.259)	(0.050)	(0.957)	(0.976)
VOL	0.67	0.52	1.36	0.47	0.18	0.52
	(0.000)	(0.004)	(0.000)	(0.018)	(0.712)	(0.005)
PSEUDO R2	0.153			0.205		
OBSERVATIONS	9630			9630		

Table 10: Ordinary least square regressions determining whether the magnitude of board gender diversity changes is influenced by the catering incentive

In Table 10 we present the results from OLS regressions determining whether the magnitude of board gender diversity changes is influenced by the catering incentive. In Models 1 and 2 the dependent variable is the change in the share of female directors from the previous year, while in Models 3 and 4 the dependent variable is the change in the number of female directors from the previous year divided by the board size in the previous year. We regress these variables on the set of firm characteristics previously identified, including as a RHS variable the industry (market-wide) gender premium in Models 1 and 2 (Models 3 and 4). We control for industry effects, but do not report the coefficients on the industry dummy variables for brevity.

Variable	Change of the percent of women on board (Model 1)	Change of the number of female directors (Model 2)	Change of the percent of women on board (Model 3)	Change of the number of female directors (Model 4)
	Panel A: Including *GEN_PR_IND* as RHS variable		Panel B: Including *GEN_PR* as RHS variable	
INTERCEPT	-0.005	0.010	-0.009	0.004
	(0.382)	(0.072)	(0.124)	(0.441)
FEMALE_DIR_PCTG	-0.119	-0.110	-0.124	-0.117
	(0.000)	(0.000)	(0.000)	(0.000)
BOARD_SIZE	0.001	-0.002	0.001	-0.002
	(0.009)	(0.000)	(0.021)	(0.000)
DIRCOMP	0.003	0.003	0.003	0.003
	(0.000)	(0.001)	(0.000)	(0.001)
EQUALITY_INDEX	0.000	0.000	0.000	0.000
	(0.025)	(0.009)	(0.033)	(0.010)
FEMALE EXEC	0.004	0.004	0.004	0.003
	(0.000)	(0.001)	(0.000)	(0.003)
GEN_PR_IND	0.003	0.002	0.018	0.017
(*GEN_PR in M3 & M4*)	(0.025)	(0.070)	(0.000)	(0.001)
INDEP_DIR_PCTG	-0.001	-0.001	0.002	0.002
	(0.875)	(0.805)	(0.553)	(0.549)
INSTOWNER	-0.001	-0.003	-0.001	-0.002
	(0.712)	(0.310)	(0.770)	(0.401)
LNTA	0.000	0.002	0.000	0.002
	(0.748)	(0.000)	(0.634)	(0.000)
MOMENTUM	0.000	0.001	0.000	0.001
	(0.811)	(0.364)	(0.839)	(0.457)
ROE	0.003	0.004	0.003	0.004
	(0.028)	(0.004)	(0.048)	(0.017)
TOBINSQ	-0.001	-0.001	-0.001	0.000
	(0.039)	(0.119)	(0.075)	(0.281)
VOL	-0.01	-0.02	-0.01	-0.01
	(0.000)	(0.000)	(0.000)	(0.000)
PSEUDO R2	0.040	0.032	0.042	0.034
OBSERVATIONS	8857	8857	8857	8857

Figure 1: percentage of firms with women on board vs. average percentage of women on board

The percentage of firms with women on board is based on the number of all firms in a given year having at least one female director on board divided by the total number of firms in our sample. The average percentage of women on board is calculated as the average of the firms' ratio of the number of female directors divided by board size each year. The y-axis on the left (right) is for percentage of firms with women on board (average percent of women on board).

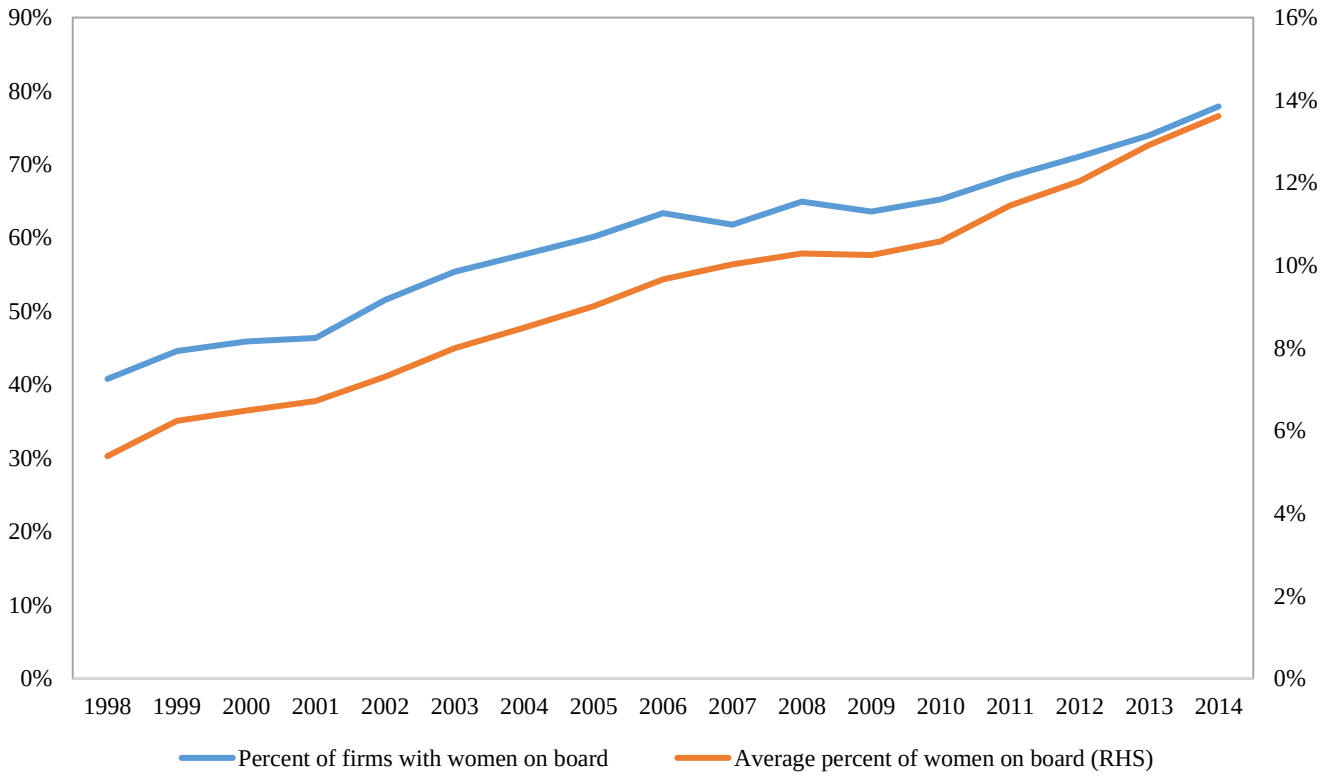


Figure 2: percentage of firms with women on board by industry

Figure 2 displays the percentage of firms with at least one female director within an industry for each of the Fama and French twelve industry sectors: NONDUR (consumer non-durables), DURAB (consumer durables), MANU (manufacturing), ENERGY (oil, gas, and coal extraction and products), CHEM (chemical and materials), EQUIP (business equipment), TELCOM (telephone and television transmission), SHOPS (wholesale, retail, and some services), HEALTH (healthcare, medical equipment, and drugs) and OTHER (contains industries, not included in any other groups). Our sample excludes regulated industries (finance and utilities). DISP is the cross-industry standard deviation of percent of firms with women on board, expressed in percentage terms.

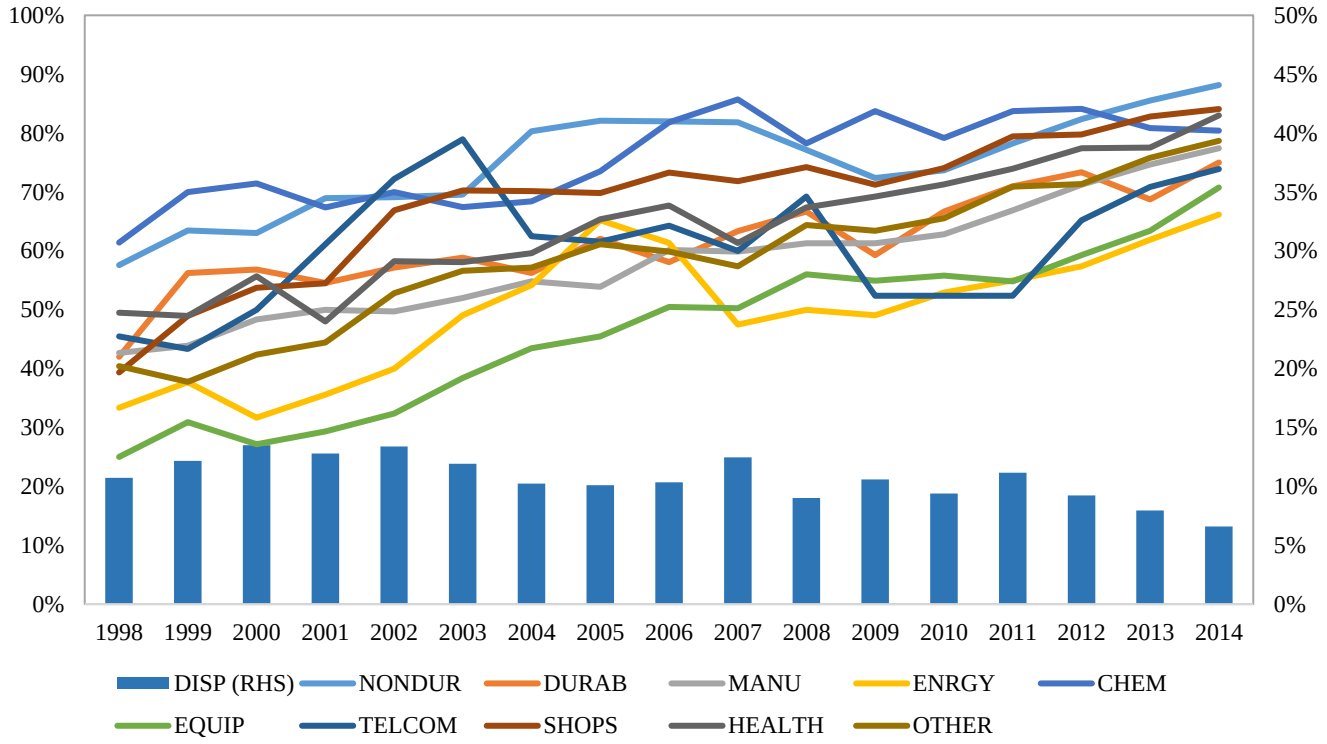


Figure 3: Average proportion of female directors on board and dispersion by industry

Figure 3 displays the average share of female directors on board for each of the Fama and French twelve industry sectors. All industry groups are as detailed in Figure 2. DISP is the cross-industry standard deviation of the average proportion of female directors on board, expressed in percentage terms.

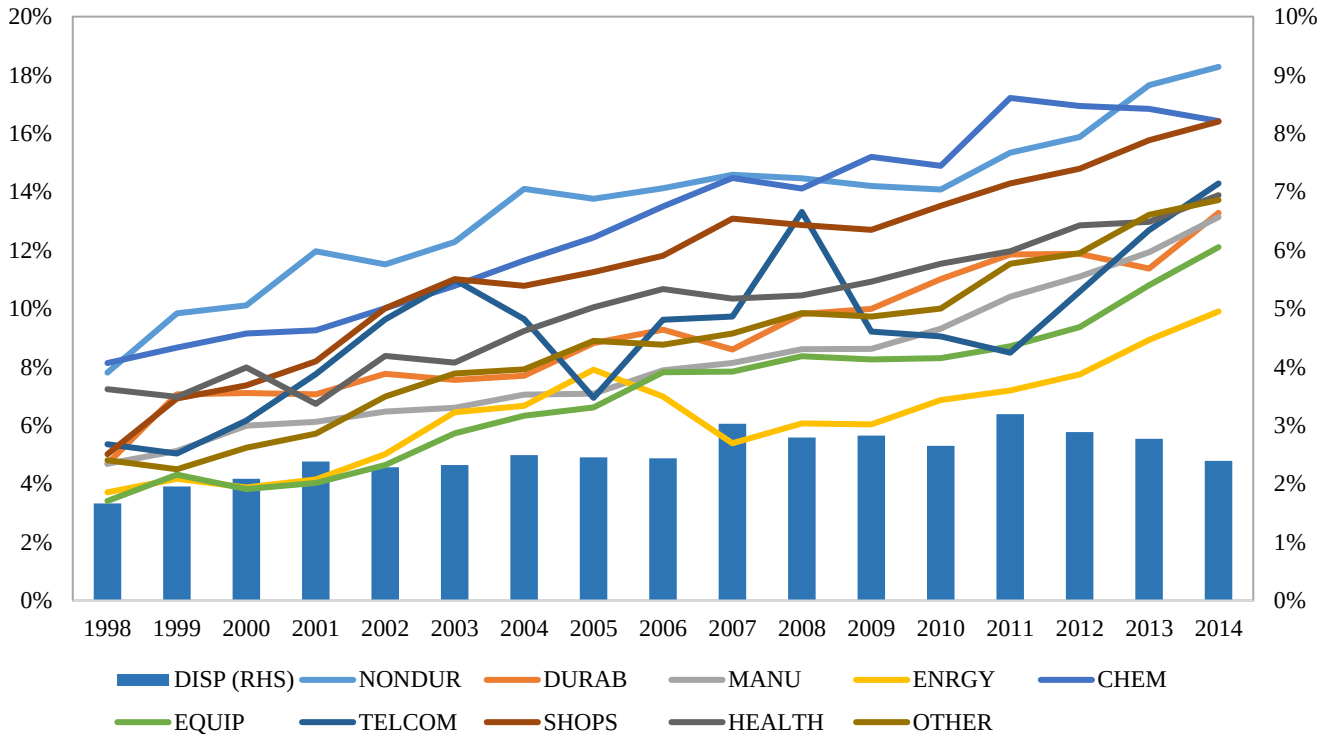


Figure 4A: Expected and unexpected percentage of firms with women on board based on the results reported in Table 6, Panel A

Figure 4A plots the estimated statistics presented in Table 6, Panel A graphically. It shows the expected vs. unexpected share of firms with women on board over time. We plot the logistic regression predicted percent of firms with women on board for years 2003 to 2014 with 1998 to 2003 as the base period for coefficient estimation. Then we stack on top the unexpected percent of firms, making the total to be the actual percent of firms with women on board.

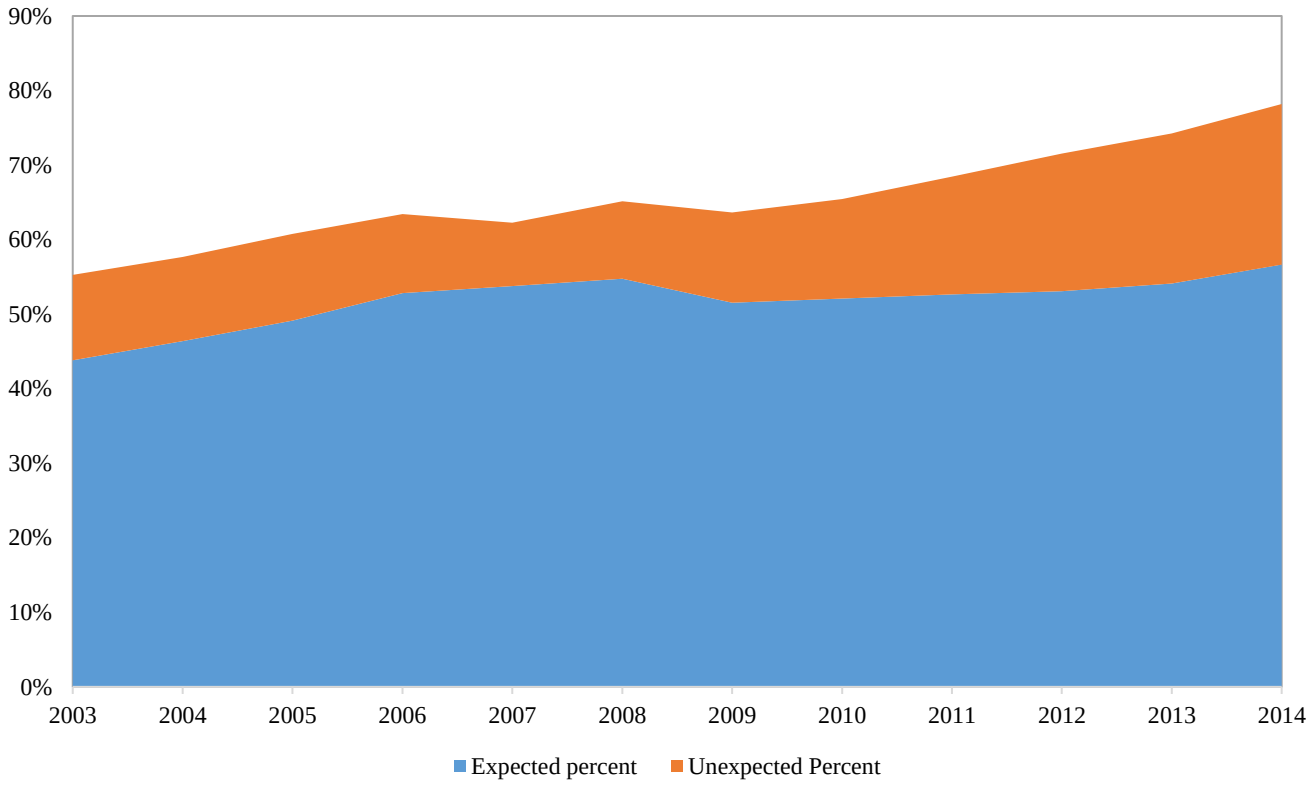


Figure 4B: Expected and unexpected percentage of firms with women on board based on the results reported in Table 6, Panel B

Figure 4B plots the estimated statistics presented in Table 6, Panel B graphically. It shows the expected vs. unexpected share of female directors over time. We plot the predicted share of female directors for years 2003 to 2014, based on a OLS model with 1998-2003 as the base period for coefficient estimation. Then we stack on top the unexpected percent of firms, making the total to be the actual percent of firms with women on board.

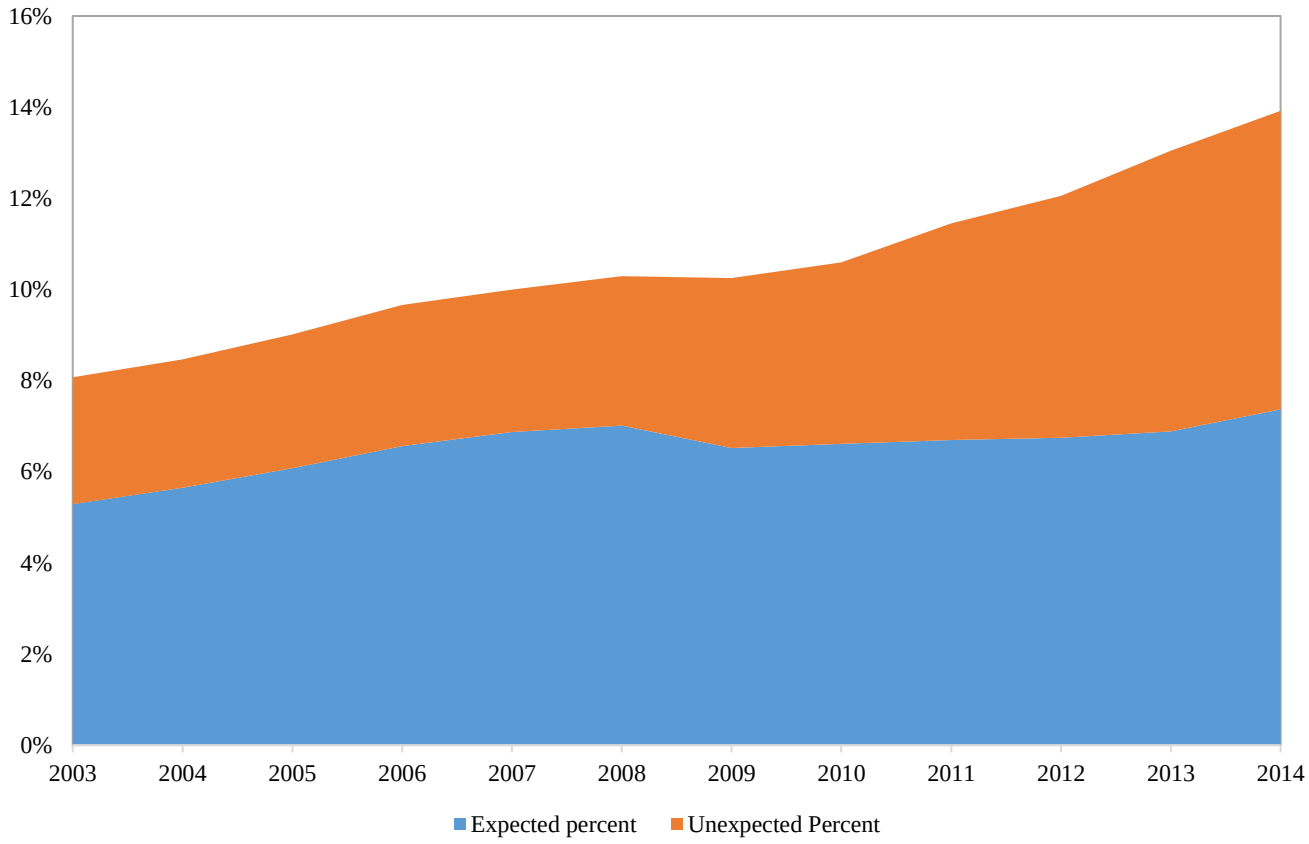
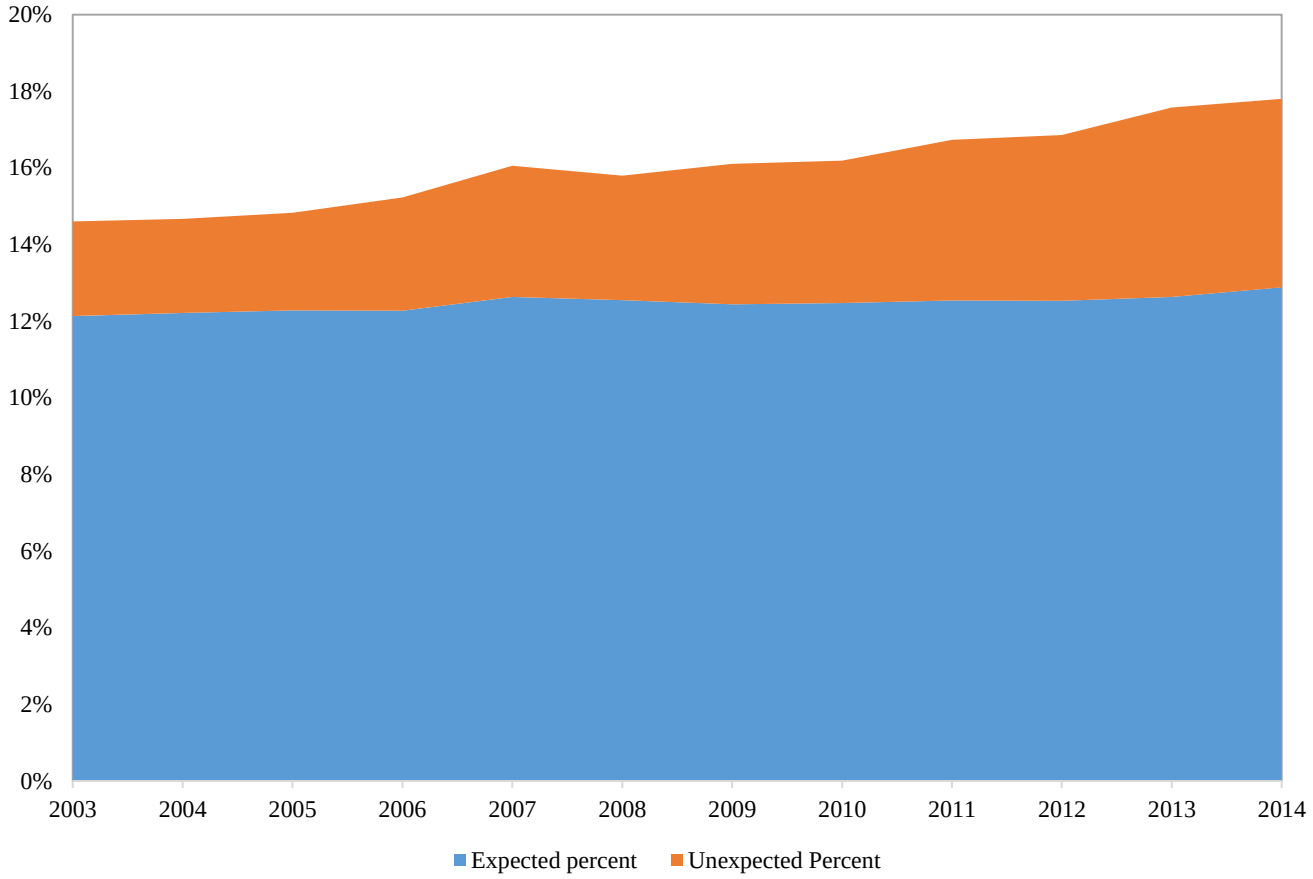


Figure 4C: Expected and unexpected percentage of firms with women on board based on the results reported in Table 6, Panel C

Figure 4C plots the estimated statistics presented in Table 6, Panel C graphically. It shows the expected vs. unexpected share of female directors over time. We plot the predicted share of female directors (in firms with at least one female director) for years 2003 to 2014, based on a two-step Heckman selection model with 1998-2003 as the base period for coefficient estimation. Then we stack on top the unexpected percent of firms, making the total to be the actual percent of firms with women on board.



Appendix A: Variables Definitions

Variable	Description
Firm Characteristics	
INSTOWNER	The percentage of shares owned by institutional investors.
LNTA	The natural logarithm of firm's total assets.
MOMENTUM	The cumulative firm stock returns over the previous 12 months.
ROE	Firm's EBITDA divided by book equity, where book equity is measured as shareholder's equity plus deferred tax and investment credit, less preferred stock.
TOBINSQ	The market value of assets divided by book value of assets, where market value of assets is given by total assets minus book value of equity plus market value of equity.
VOL	Monthly stock return volatility over the previous 60 month.
Board Characteristics	
BOARD_SIZE	The total number of directors sitting on the board.
DIRCOMP	The logarithm of the average of total cash, stock, and option compensation paid to the directors plus one.
FEMALE_DIR	An indicator variable equal to one, if the firm has at least on female director, and 0 otherwise.
FEMALE_DIR_PCTG	The number of women on board divided by the board size.
FEMALE_EXEC	An indicator variable equal to one, if the firm has at least one non-CEO female executive, and zero otherwise.
FEMALE_NONCEO_DIR_PCTG	The number of non-CEO female directors divided by the board size.
INDEP_DIR_PCTG	The number of independent directors divided by the size of the board.
Other Characteristics	
EQUALITY_INDEX	A state-level gender equality index following Sugarman and Straus (1988) and measuring economic, political and legal gender equality.
GEND_PD	The median of the industry gender diversity premiums (GEND_PD_IND) across all industries.
GEND_PD_IND	The difference in the log of the value-weighted market-to-book equity ratio (M/B) of all firms with female directors and the log of M/B for all firms with no female directors in a given industry.