

The Effect of Female Director Representation on Workplace Gender Diversity and Women’s Earnings

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Abstract

Women have faced substantial barriers in the labor market, leading to differences in the hiring and compensation outcomes of female versus male workers. Corporate directors are uniquely positioned to attenuate these barriers through the authority vested in them and their advising role within the firm, but relatively little empirical work has been conducted to identify the general impact of directors on employee-related outcomes. We use administrative data from the U.S. Census linked to public data on boards of directors to estimate the effect of female director representation on workplace gender diversity and women’s earnings at multiple levels within a firm’s hierarchy. Using a difference-in-differences estimator that correctly accounts for variation in treatment timing, we find evidence that female director representation is associated with greater workplace gender diversity and increased compensation outcomes of female workers. We observe a stronger effect when the female director is on the compensation committee.

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Comment on Tables

This paper uses confidential microdata from the U.S. Census Bureau. In recent years, the Census Bureau has become increasingly concerned about the accidental disclosure of confidential information and has imposed limits on the number of data points that can be extracted over the course of the project. To avoid prematurely hitting that threshold, we have opted to produce our tables using the sign and significance of our coefficients. (Tables that do include values were produced outside the Census Bureau's Research Data Center.) We appreciate your understanding.

1 Introduction

Human capital is an increasingly important driver of firm value in the modern economy (Zingales, 2000; Regier and Rouen, 2023). As such, inequality among workers, both within and across firms, has become a central theme in labor and finance research (Mueller et al., 2017a,b; Nishesh et al., 2024). A major focus of inequality research is on how the obstacles faced by women in the labor market have contributed to differences in the hiring and compensation outcomes of female versus male workers (Barrett, 1982; Goldin, 1990; McDowell et al., 1999; Goldin, 2006, 2014). One well-studied mechanism of this observed inequality is the decision to leave the labor market to raise children (Mincer and Polachek, 1974; Lundberg and Rose, 2000; Anderson et al., 2002; Goldin and Katz, 2002), and another possible mechanism is discrimination (Neumark et al., 1996; Goldin and Rouse, 2000; Booth and Leigh, 2010). Less-studied within this line of work—which borrows insights from labor and finance research—is the relative lack of female representation in firm-wide leadership roles, which may prevent companies from developing work environments that attract and retain female workers (Athey et al., 2000; Bloom et al., 2011; Tate and Yang, 2015). In this paper, we investigate this third mechanism by using employee-level data from the U.S. Census to measure the effect of female director representation on workplace gender diversity and women’s earnings at multiple levels within a firm’s hierarchy.

We choose to study corporate boards of directors in light of their authority and influence over both management practices and firm policies. Directors monitor and advise management in an effort to maximize shareholder wealth (Fama, 1980). Directors’ main monitoring functions include compensating executives in a way that increases firm value and replacing executives who under-perform (Jensen and Murphy, 1990; Coles et al., 2006; Jenter and Kanaan, 2015). Directors’ advising functions largely depend on their personal expertise, skills, and experiences (Ellis et al., 2018; Chen et al., 2020). Kim and Starks (2016) suggest that female directors often contribute unique skills that their male counterparts do not possess, which potentially improves the advising ability of the board and, as a result, increases

firm value. Given the increasing participation of women in the workforce (Goldin, 2006; BLS, 2020), directors can play an important advisory role regarding how a company can attract and retain female employees. Female directors—having ample experience as women in the workforce—are in a unique position to provide such advice. Furthermore, the director primacy model of corporate governance posits that boards have considerable freedom to exercise business judgment (Bainbridge, 2008, 2012), suggesting that the counsel they provide is likely to be acted upon by management.

Some female directors are especially well-known for their proactive efforts to enact programs and policies that benefit women in the workforce. For instance, Betsy Atkins, who has served as a director of Volvo Cars and Wynn Resorts, often interacts with and mentors the female employees at Volvo and has organized networking events for the female employees of Wynn (Stoll, 2018). One of Atkins’s fellow female board members, Dee Dee Myers, has said, “Betsy ... and I not only bring our unique perspectives and experiences to our roles, but we also bring new skills, and that has been helpful as the board develops and rolls out strategies to address a range of challenges, from improving workplace diversity and inclusion, to compliance, compensation and communications” (Nasdaq, 2019). These anecdotes highlight a few examples of female directors actively working to remove the barriers faced by women in the labor market, but it is not clear if these efforts have lasting economic impact on a firm’s employees or if they generalize across firms. Whether or not the presence of a female director results in widespread improvements in women’s labor market outcomes is the empirical question of focus in this paper.

The implementation of regulatory requirements for diverse boards of directors has motivated an empirical literature studying the consequences of board diversity, but research on the topic has led to mixed evidence regarding the effect of these policies on firm performance and labor market outcomes. Several prominent studies that focus on either the Norwegian or Californian board gender quota laws find evidence of reduced firm value and profitability among firms that are mandated to increase female director representation (Ah-

ern and Dittmar, 2012; Matsa and Miller, 2013; Greene et al., 2020). In addition, Bertrand et al. (2018) find little evidence that Norway’s board gender quota affected women other than those appointed to directorships. This finding suggests female representation on corporate boards might not necessarily lead to widespread improvements in the employment and compensation outcomes of women. Eckbo et al. (2021), however, show that the effect of Norway’s quota on firm value was actually statistically insignificant, and they describe several of the difficulties in establishing causality via board gender quota mandates. Studies that have considered the effects of board gender diversity outside of quota law settings have focused on firm-level outcomes, such as corporate risk-taking, acquisition activity, and R&D investment, and board-level outcomes, such as board activeness and meeting attendance (Adams and Ferreira, 2009; Huang and Kisgen, 2013; Levi et al., 2014; Sila et al., 2016; Schwartz-Ziv, 2017; Bernile et al., 2018). Due to data limitations, however, relatively little research has been conducted on the impact of board gender diversity on the composition and compensation outcomes of rank-and-file workers. The purpose of this paper is to fill this gap in the literature.

We estimate the relationship between female director representation and the labor market outcomes of both female and male workers using data from the U.S. Census and BoardEx. Specifically, we analyze data drawn from the Longitudinal Employer-Household Dynamics (LEHD) database, which matches wage employees to their employers, from 2001–2019. These data allow us to measure workplace gender diversity and employee wages at different levels of an organization’s hierarchy. We combine these data with detailed information about members of boards of directors, drawn from the BoardEx database. These data allow us to identify the timing of changes to board gender composition. We use these linked data to determine how female representation on corporate boards impacts employee-related outcomes.

We focus our analysis on firms for which we observe extensive margin changes in board gender diversity between 2001 and 2019. Of the firms in our sample, approximately 31% add at least one woman to their previously all-male boards of directors. In contrast, approx-

imately 31% of the firms have all-male boards of directors every year in the sample period, and the remaining 38% had at least one woman on the board when they are first observed in the data. We estimate the effect of first-time female director appointments on workplace gender diversity and women’s earnings by using the estimator proposed by [Callaway and Sant’Anna \(2021\)](#), which properly accounts for the variation in treatment timing across firms that appoint female directors for the first time. This choice in estimator avoids erroneous comparisons of late-appointing firms to early-appointing firms that may bias two-way fixed effects (TWFE) estimates, which is important as our main control group is composed of firms that appoint female directors for the first time in later years ([Deshpande and Li, 2019](#)).

We find evidence that the first-time appointment of a female to the board of directors leads to an increase in female representation among the rank-and-file employees of the firm. This increase in female representation is especially strong among the top earners of the firm. Among these top-earning females, however, we do not find evidence that a change in board gender composition leads to an increase in annual earnings relative to top-earning men. Meanwhile, at the lower end of the firm’s earnings distribution, we do not find that adding a woman to the board leads to changes in female representation, though we do find evidence that female earnings increase relative to male earnings. We also estimate similar effects of female director representation on workplace gender diversity when we use the unexpected deaths of male directors as a quasi-random shock to the timing of board compositional changes.

We then analyze the committee assignments of first-time female director appointees to explore the role that female directors play in shaping policies that benefit and attract female workers. The three core committees on the board of directors are the audit committee, the nomination committee, and the compensation committee. Directors on the compensation committee are especially well-positioned to influence the outcomes of the firms’ employees, as they are tasked with setting the pay of top executives and advising management regarding the broader compensation practices within the firm. Consistent with this, we find that the

impact of first-time female director appointments on the overall female representation in the workplace is positive and highly significant when that director is placed on the compensation committee. In contrast, the impact on overall female representation is weaker when a first-time female director appointee is placed on the audit or nomination committees.

Importantly, our inferences are not sensitive to the choice in control group. Specifically, our inferences hold regardless of whether the control group is composed of eventually-treated firms (those that eventually appointment women to their boards, but who do so later than the focal firm), never-treated firms (those that never appoint a female director in our sample period), or both. Despite this consistency in results, one may worry that firms that appoint a female director in a given year are different from firms that have not yet (or never) appoint female directors in other important ways that may coincide with business practices and firm policies that impact employee-related outcomes. This concern does not appear to be a meaningful issue in our setting. In particular, we find that firms that never appoint female directors and firms that eventually appoint female directors appear to be very similar in observable outcomes in the years before the first female director appointment (i.e., we find evidence of common pre-trends in the outcomes of interest). Furthermore, we conduct tests that show that the timing of first-time female director appointments is not predictable based on the firm’s performance or financial position or based on the composition of its workforce. This finding helps to mitigate the possible concern that our results are driven by some alternative trend in the firm’s life-cycle that simultaneously leads to the decision to appoint a female director and a change in employee-related outcomes. Taken together, our evidence suggests that the appointment of a women to the board of directors for the first time is an integral step in altering the outcomes of female employees within the firm.

We make several important contributions to the literature. We are among the first to consider the effects of board gender composition on the outcomes of rank-and-file employees. [Bertrand et al. \(2018\)](#) consider these effects in the context of Norway’s board gender quota law, and they conclude that the mandate “had very little discernible impact on women in

business beyond its direct effect on the women who made it into boardrooms.” In contrast, we find evidence that increased female representation on corporate boards does impact the outcomes of the non-director female workers in the firm. One potential reason for the difference in results is that at the time of the Norwegian mandate, Norway already had relatively progressive policies related to maternity leave and other family support. This and the presence of other pre-existing female-friendly policies among Norwegian firms potentially reduced the scope for the newly appointed female directors of Norwegian firms to implement policy and organizational changes that improved outcomes for female workers. The United States, on the other hand, does not guarantee parental leave, nor are there legal mandates that impose female-friendly workplace policies, which means that female directors in the U.S. likely have greater scope to enact policies that improve the working environments for the women in their firms.

Other research has used alternative settings to study the effects of female leadership on employee outcomes in the U.S. context. [Matsa and Miller \(2011\)](#) estimate a positive relation between female director representation and the hiring of female executives, but they do not consider the impact on workplace gender diversity at other levels of the organization. [Tate and Yang \(2015\)](#) consider the effect of female managers in reducing gender pay gaps among newly-hired rank-and-file workers, and they conclude that female leadership contributes to female-friendly cultures in the workplace. Our work expands upon this existing literature, as we study additional employment outcomes beyond gender pay gaps, including workforce composition, and as we examine effects at different levels of the organization’s hierarchy. Furthermore, our focus on board gender diversity, as opposed to C-suite gender diversity, allows us to relate our findings to some of the recent external pressures for increased female director representation within corporate boards ([Gormley et al., 2023](#)).

Our paper is also related to two concurrent working papers that explore the effects of board diversity on employee-related outcomes. [Cai et al. \(2022\)](#) use data from LinkedIn and find evidence of increased workplace diversity, based on gender and race, following the

appointment of a diverse director (i.e., a woman or a racial minority). They do not, however, find any evidence that the appointment of a diverse director impacts gender or racial pay gaps. [Bian et al. \(2023\)](#) present evidence that California-based companies respond to the passage of the state’s board gender quota law by implementing gender bias in job ads, wherein they appear to use more masculine language to attract male candidates. They interpret these findings as evidence of backlash against female labor market participants in response to board gender quotas. Our use of Census data allows us to overcome several of the limitations of these studies, and it allows us to address some of the remaining gaps in the literature. First, our measures of workplace gender diversity and employee compensation are not biased by the self-selection concerns inherent in data that relies on social media profiles to estimate workforce compositions. In addition, our assessment of staggered voluntary female director appointments, as opposed to mandated appointments, highlights the importance of female director representation, as the employee-related outcomes of firms that *just added* women to their boards differ significantly from those that *eventually* do so.

Finally, our results highlight the role directors play in advising management on behalf of an important stakeholder group—the company’s employees. The lived experience of female directors puts them in a unique position to influence the working conditions of female workers. Whereas prior research on director expertise and skill has largely focused on their financial, educational, and professional attainments, we posit that an additional source of expertise that female directors bring to the boardroom is their decades-long experience being a woman in the workplace. This lived experience likely provides them with an important perspective as to how an organization can remove the barriers that have prevented many women from achieving professional parity with their male counterparts.

2 Background and Related Literature

To set up the motivational framework for study, we discuss some of the existing research on the unique barriers that women face in the labor market. We then discuss the studies that have examined the role of corporate leaders, specifically corporate directors, in removing these barriers.

2.1 Barriers Faced by Women in the Labor Market

Although women have made great strides in the workforce in the last 50 years, a lack of parity in labor market outcomes between male and female workers continues to exist. For example, the gender pay gap is still prevalent and is not fully explained by occupational segregation or other observable differences between men and women (Olivetti and Petrongolo, 2016; Blau and Kahn, 2017; Fortin et al., 2017; Blau and Kahn, 2020). Furthermore, women continue to be under-represented in mid-level management positions (OECD, 2017), and they hold less than 10% of the positions as top executives (Matsa and Miller, 2011; Huang and Kisgen, 2013). This disparity in leadership representation persists even though women have surpassed men in college enrollment rates (Charles and Luoh, 2003; NSC, 2020).

Several different explanations exist for the disparities in labor market outcomes between men and women. One of the most common supply-side explanations is the decision of many women to self-select out of the labor force for long periods of time to raise children (Lundberg and Rose, 2000; Anderson et al., 2002; Bertrand et al., 2010; Miller, 2011). Another explanation is the belief that women, on average, tend to be less competitive than men (Niederle and Vesterlund, 2007), which may make them less likely to compete for promotions. While some studies find evidence in support of this notion (Buser et al., 2014), others suggest that gender differences in competitiveness may be rooted more in culture than in biology (Gneezy et al., 2009). Similarly, while some attribute gender pay gaps to differences in the negotiation tendencies of men and women, Leibbrandt and List (2015) find that women are just as

willing as men to negotiate for higher wages in settings where wage negotiation is standard.

In addition to supply-side barriers, women may face demand-side barriers in the form of statistical or taste-based discrimination, which can reduce their likelihood of being hired in certain settings (Neumark et al., 1996; Bagues and Esteve-Volart, 2010; Sin et al., 2017). Conditional on being hired, women may face an uphill battle in their career development if they have inequitable access to mentors (Athey et al., 2000). The refusal of some male leaders to mentor women provides an additional explanation for why women are under-represented in management positions, especially at the highest levels of the organization (Waldman, 2017). Along these lines, recent research finds that some men exhibit a negative preference for working with and for women, in part because they believe that they will have a more difficult time receiving promotions if they have more female coworkers and managers (LaViers and Sandvik, 2022). Taken together, there is ample evidence that women have faced (and continue to face) unique barriers in the labor market; barriers that can potentially be mitigated by the proactive efforts of a company’s leaders, such as its directors.

2.2 Corporate Directors’ Role in Removing Barriers

While legislation and regulations have been enacted to address some of these barriers,¹ women still face significant headwind in the labor market. This begs the question as to what organizational leaders can do to further mitigate these obstacles. Kowalewska (2020) suggests that increased female representation on corporate boards can lead to two types of trickle-down benefits for other women within the firm. First, female directors can create new opportunities for women through targeted hiring practices and mentorship programs (Athey et al., 2000; Gorman, 2005; Kurtulus and Tomaskovic-Devey, 2012). Second, female directors may help enact policies that facilitate a more female-friendly workplace. For example, Dobbin et al. (2011) show that firms with a greater proportion of female leaders are more likely to adopt firm-wide diversity programs. In addition, Dancaster and Baird (2016) show

¹Consider, for example, anti-discrimination laws in the U.S., the Norwegian board gender quota, California Senate Bill No. 826, and the Cope-Zimmermann law in France.

that female leadership is a strong predictor of the uptake of work-care arrangements such as work-from-home flexibility and leeway in workday start and end times.

While other business leaders, such as executives in the C-suite, are in a position to remove the labor market barriers faced by women, corporate directors are potentially better suited to do so. Executives are generally younger than directors (Fracassi and Tate, 2012; Adams et al., 2018), and they are likely still climbing the corporate ladder; as a result, executives may be more reluctant than directors to oppose the status quo. Also, corporate directors often have prior experience as CEOs, and many of them are already retired (Kang et al., 2018), which suggests that directors are less at risk of damaging their career outlooks by advocating for greater parity among male and female employees. In addition, directors often sit on multiple boards at once (Ferris et al., 2003), which gives them the opportunity to learn from the policy implementation practices of other companies and then introduce those policies in the focal firm. In contrast, executives do not simultaneously hold multiple executive positions at different companies, reducing their ability to learn the practices of other firms first-hand. Furthermore, board gender diversity, more so than C-suite gender diversity, has been a topic of focus among the largest institutional investors, who have demanded increased female director representation within corporate boards (Gormley et al., 2023). Finally, the director primacy model posits that directors simultaneously hold substantial authority over corporate decisions and accountability for the consequences of those decisions (Bainbridge, 2008, 2012). Taken together, these factors suggest that directors are uniquely positioned to enact changes within the firm that may influence the economic outcomes of the female workers within their firms.

3 Data Compilation

Our analysis is based on a novel panel data set that links commercially available data describing the composition of boards of directors with confidential administrative employer-

employee matched data from the U.S. Census. These data allow us to study the dynamic relationship between board diversity and firm-level trends in workforce gender diversity, as well as earnings outcomes. By comparison, prior research on boards of directors generally focuses on outcomes that do not require confidential administrative data, such as market returns and accounting performance. While these studies provide useful high-level insights, they cannot characterize employment outcomes, particularly across the organizational hierarchy, and they do not speak to the possible employment-based mechanisms underlying any effects.

3.1 Firm and Board Data

BoardEx provides detailed information about the composition of boards of directors, including longitudinal information about individual board members and the firms that they advise. These data include director-specific information (e.g., gender, age, and educational attainment), in addition to board-specific information (e.g. board tenure, committee assignments, and the start and end date of each appointment).

We examine boards between 2001 and 2019, and we study those firms that can be matched to CRSP-Compustat data. The CRSP-Compustat data is used to measure firm characteristics like size, profitability, investment, and financial structure. Across our sample period, there are roughly 4,000 publicly listed firms with data availability for their boards of directors.

Figure 1a summarizes recent trends in board gender diversity. The fraction of organizations with at least one woman on their board has steadily increased over the last two decades. In the early 2000s, less than 50% of firms had gender-diverse boards.² That number increased to nearly 80% by 2019. At the same time, the overall fraction of board seats occupied by women continues to be relatively small, as illustrated in Figure 1b. In 2001, female directors occupied less than 10% of the overall board seats for the average company. By 2019, their

²The visual decrease in the fraction of boards with a female director from 2002 to 2003 in figure (a) is due to BoardEx adding substantially more firms to their dataset in 2003, many of which had no female directors.

share of the total board seats doubled, but remained below 20%. In summary, female representation on corporate boards remains disproportionately low despite recent changes in the likelihood of adding at least one female director to the boards of most organizations.

We leverage the staggered timing of first-time appointments of women to corporate boards across firms to estimate the relation between female director representation and the outcomes of interest. We are primarily interested in the effect of an *extensive* margin change in board gender composition. We identify firms that transitioned from no gender diversity on the board (i.e., only male directors) to appointing at least one female director. These firms are categorized as “treated firms.” Firms that we observe with gender-diverse boards—those with at least one woman on the board—in their first year of observation are categorized as “always treated firms.” Finally, firms with no gender diversity on their board of directors throughout the entire observation period are categorized as “never treated firms.”

Figure 2 depicts variation in the composition of our data among these three firm types.³ This figure underscores several descriptive facts about board gender diversity during this time period. First, roughly 38% of firms have gender-diverse boards in the first year they are observed in the BoardEx database—as we will later explain, we will exclude these “always treated” firms from all empirical analyses. Second, about 31% of firms retain non-gender-diverse boards of directors throughout our entire observation period. Third, and most importantly, extensive margin changes in board gender diversity occur frequently in our sample period, as roughly 31% of firms are observed to transition from non-gender-diverse to gender-diverse boards of directors between 2001 and 2019. In Section 4, we describe how we compare treated and control firms in a staggered difference-in-differences framework to measure any changes in employee-related outcomes after the first woman is added to the board of directors.

³The compositions depicted in this graph differ from those that one might infer from Figure 1a because of the entrance of new firms into the BoardEx sample over time. This graph reflects variation in the BoardEx data without regard to whether a firm is in our matched BoardEx-LEHD database. In future drafts, we will include information based on our matched BoardEx-LEHD database, but exporting this information out of the Census requires a lengthy disclosure and review process, which was not completed by the time this manuscript was written.

We acknowledge that the decision to appoint a female director is potentially endogenous to any other decisions a firm may be in the process of implementing or anticipate implementing with regards to employee hiring, compensation, and turnover. To address this concern, we identify those firms where the death of a board director preceded the first-time appointment of a female director. This subsample is compelling because a death of a board director introduces some exogeneity in the *timing* at which a female director may be appointed to a board. Of course, no method short of random assignment will completely eliminate the influence of endogeneity, but our hope is that this subsample analysis will provide increased confidence in the inferences we draw from the results.

3.2 Employee Composition and Earnings Data: U.S. Census

We access employer-employee matched data using the U.S. Census Longitudinal Employer-Household Dynamics (LEHD) database. The LEHD database includes quarterly wages by worker, as well as information about the worker’s employer, for workers in 23 different states. Within these states, LEHD coverage is comprehensive: approximately 96% of all private-sector jobs are included in the LEHD files (Abowd et al., 2005). Earnings include wages that are covered by the state’s unemployment insurance program: salaries, bonuses, equity, tips, and the dollar value of other perquisites (e.g., meals, housing, and retirement contributions) (BLS, 2016).⁴ The longitudinal nature of these data permit us to characterize employee outcomes, both within and across employers. We merge the LEHD data with other demographic data sets from the U.S. Census. We use these auxillary data sets to append information describing the age, gender, nationality, number of children and dates of child birth, and race of employees within a firm.⁵

⁴In contrast, wages not covered by state unemployment insurance programs (e.g., self-employed wages, wages “under the table”) are not reported in the LEHD database.

⁵The binary nature of our data requires that we categorize workers as male or female. Although this does not fully capture the experience of non-binary individuals and those of other genders, our results still inform the on-going debate on how board gender composition impacts the outcomes of rank-and-file employees. We use “male” and “female” interchangeably with “man” and “woman,” respectively, throughout the manuscript, with the intent being to capture an individual’s self-reported gender, not necessarily their

We limit our sample to employer-employee-year tuples for workers aged 20 to 59. We exclude workers who report less than \$8,000 in average annual wages over their lifetime earnings as captured by the LEHD. We also exclude workers who work fewer than two quarters each year on average as reported in the LEHD. We use Census resources to ensure that the reported employer is the parent-level organization. Finally, we limit our analysis to those firms that employ at least one male worker and at least one female worker in aggregate.

We use the employer-employee matched data to create several firm-level summary measures of employment and earnings outcomes. We are particularly interested in the outcomes of employees at treated firms as characterized by the within-firm earnings distribution. To achieve this, we bin each worker based on where they fall in the within-firm earnings distribution: below median, above median, below mean, and above mean. For each firm, we measure the share of female employees overall, as well as within each of the four earnings bands. Likewise, for each firm, we calculate the average earnings of male and female employees in aggregate and within each of the four earnings bands.

4 Empirical Methods

To estimate the effect of female director representation on the outcomes of interest, we leverage variation in the timing of first-time appointments of female directors across firms. We posit that such extensive margin changes are likely to be particularly relevant for employee-related outcomes, as female directors can use their experience as women in the workforce to implement business practices and policies that may especially appeal to and benefit female workers. We estimate these effects using the estimators for staggered difference-in-differences proposed by [Callaway and Sant’Anna \(2021\)](#). This approach avoids the common confounding effect of a standard staggered treatment design, wherein researchers could falsely incorporate the comparison between already treated firms with just treated firms ([Barrios, 2021](#)). This errant comparison can bias treatment effect estimates, especially when treatment effects are

sex assigned at birth.

dynamic (Baker et al., 2022).⁶

The Callaway and Sant’Anna (2021) approach separately considers the treatment effects across treatment cohorts, where in our case a treatment cohort designation is based on the year in which a firm first appoints a female director, g . We estimate cohort- and time-specific average treatment effects on the treated firms, $\widehat{ATT}(g,t)$, using two-period/two-group difference-in-differences estimators. Then we compute summary treatment effect estimates by aggregating together the cohort- and time-specific estimates, weighting them by the size of each treatment cohort. In our setting, $G_j = g \in \{2001, \dots, 2018\}$ represents treatment cohorts (i.e., all firms j that are treated in year g), and $C_j = 1$ for control group firms. An unconditional estimator for $ATT(g,t)$, the average effect of a first-time female director appointment for firms in cohort g at time $t \geq g$ is

$$\widehat{ATT}_{un}^{eve}(g,t) = \frac{\sum_j \Delta Y_{j,g-1,t} \mathbb{1}\{G_j = g\}}{\sum_j \mathbb{1}\{G_j = g\}} - \frac{\sum_j \Delta Y_{j,g-1,t} \mathbb{1}\{C_j = 1\}}{\sum_j \mathbb{1}\{C_j = 1\}}, \quad (1)$$

where $\Delta Y_{j,g-1,t} = Y_{j,t} - Y_{j,g-1}$. The identifying assumption of this approach is that of parallel trends in outcomes among firms in a given treatment cohort and those in the control group. We provide evidence in Section 5 that suggests this assumption is likely satisfied in our setting.

For a given treatment cohort, g , we identify two control groups of firms that did not experience any change in the female director representation in year g : (1) those firms that add women to their boards of directors for the first time in some later period $n > g$ (i.e., eventually treated firms); and (2) those firms that we never observe as having gender-diverse boards between 2001 and 2019 (i.e., never treated firms). As discussed by Deshpande and Li (2019), one benefit of using eventually treated firms as a control group is that it allows us to exploit variation in the timing of first-time female director appointments, rather than variation in the occurrence of such appointments.⁷

⁶It is for this reason that we exclude always-treated firms from the empirical tests.

⁷See Guryan (2004) for another example of using eventually treated units as a control group, as opposed to never treated units.

Our control groups combine two distinct types of counterfactual outcomes. On the one hand, the never treated control group captures concurrent trends in employee-related outcomes that are, by definition, unaffected by gender diversity on boards of directors in any time period. On the other hand, the never treated control group may differ from the set of firms that choose to add a woman to their board of directors in unobservable ways. This highlights the contribution of the eventually treated control group. Eventually treated firms are likely to be selected on the same unobservable characteristics that lead our treated firms to add a woman in year g . Later, we empirically test and find evidence in support of this assumption. In addition, we conduct sensitivity analyses to highlight the robustness of our results based on whether our control group comprises of only eventually treated firms, only never treated firms, or both.⁸

Figure 3 depicts the variation in the timing of treatment among the treated firms that we study.⁹ This graph shows that the number of firms appointing female directors for the first time ranges between 60 and 280 in any given year, with relatively more firms adding women towards the end of our treatment period.

5 Results

Here we discuss our main results. We first consider the effect of an extensive margin change in board gender diversity on the gender composition of a firm’s workforce, and we explore heterogeneity in this effect based on the newly appointed female director’s committee assignment. We then consider the effect on the compensation of female workers. For both outcome variables, we consider both the overall effect and the effect at different levels within a firm’s compensation distribution. We finish with an analysis of the timing of first-time

⁸In some of our empirical estimations, we also include firm-year level controls for return on assets, leverage, CEO gender, the fraction of employees with at most a high school education, the fraction of employees with at most some college education, the fraction of employees who are white, and the fraction of employees who are under forty years of age. Our results are not sensitive to the inclusion or exclusion of these control variables.

⁹This graph reflects variation in the BoardEx data without regard to whether a firm is in our matched BoardEx-LEHD database. In future drafts, we will include information based on our matched database.

female director appointments, wherein we find no evidence of a predictable pattern based a firm’s financial circumstances or workforce compositions.

5.1 Effect on Workplace Gender Diversity

Table 1 reports qualitative estimates of the effect of appointing the first female board member to a previously all-male board on the gender composition of the firm’s workforce. In this case, the outcome variable in Equation (1), Y_{jtg} , captures the fraction of the firm’s employees that are female. In Column (1), we report estimates using only the eventually treated firms in our control group. In Column (2), we use only the never treated firms in our control group. Finally, in Column (3), we combine both groups of firms in our control group.

In all cases, we do not find evidence of differential pre-trends among treated firms and control firms in the three years prior to treatment. While our estimates are positive in magnitude, they are not statistically different from zero. In other words, we find that the gender composition of treatment and control group firms follow similar trends before the first appointment of a female director to treated firms’ boards.

We find that the gender diversity of a firm’s workforce increases in the first four years after a female director is added to the board. Specifically, the estimates in each of the years one to four are always positive, and they are statistically significant in years two and four. Moreover, our findings are consistent across all three permutations of our control group, and in particular, we gain statistical precision when we include both eventually treated and never treated firms in our control group. For this reason, we refer to this empirical specification as our baseline specification, and we employ this specification throughout our analysis.

In Columns (4)–(7), we estimate the pre-trends and the treatment effects at different points within the firm-wide income distribution. In Column (4) (Column (5)), we estimate the effect on workforce diversity among all employees whose pay is below (above) the *median* level of pay in the firm that year. In Column (6) (Column (7)), we estimate the effect on workforce diversity among all employees whose pay is below (above) the *average* level of pay

in the firm that year. In all specifications, we use both eventually treated and never treated firms as the control group.

Across all four specifications, we find no evidence of differential pre-trends in female representation between treatment and control firms. In Columns (4) and (6), we find no evidence of changes in female representation among lower-wage workers—that is, workers whose pay is below the median or mean—during the first four years after treatment, respectively. In contrast, the results in Columns (5) and (7) indicate an increase in female representation among higher-wage workers, or those workers with above median and above mean pay, respectively. The effects are especially pronounced in Column (7), as the effects are significant in years one and four at the 10% level and in year two at the 5% level. As the distribution of pay is almost always right-skewed, given the large levels of compensation of executives and managers, the results for workers above the mean in Column (7) suggest that women are likely being more represented in management roles in the years after a female director is first appointed to the board of directors.

In Table 2, we repeat these same tests using a subsample of the treatment group that only includes those firms where the death of a board director created an open board position within the subset of treated firms. We posit that the death of a board director introduces some exogeneity in the *timing* at which a female director is first appointed to a board. The estimates in Table 2 are quite consistent with our main results, which bolsters the inference that the first-time appointment of a woman to the board of directors leads to an increase in female representation throughout the firm.

5.1.1 Heterogeneous Effects Based on Committee Designation

Next, we analyze the committee assignments of first-time female director appointees. In doing so, we can further explore the role that female directors play in shaping policies that benefit and attract female workers. The three core committees on the board of directors are the audit committee, the nomination committee, and the compensation committee. The

audit committee oversees the firm’s financial statements and reporting. The nominating committee’s job includes considering a firm’s potential board of directors and other key management personnel. The compensation committee is responsible for setting the pay of top executives and advising on the broader compensation practices within the firm. Given the employee-focused duties of compensation committee members, we expect them to have the most influence over policies and practices that directly impact rank-and-file workers. In comparison, the duties of audit and nominating committee members—which are more externally-focused—are less likely to directly impact the firm’s rank-and-file employees.

We test these predictions by adjusting the definition of a treated firm in new estimations of Equation (1). We tabulate these estimations in Table 3. In all cases, Y_{jtg} captures the fraction of the firm’s employees that are female. In Column (1), treated firms are those with first-time female director appointments wherein that director is also assigned to the audit committee upon appointment. In Columns (2) and (3), treated firms are those with first-time female director appointments wherein that director is also assigned to the nomination committee and compensation committee, respectively. In all cases, we exclude observations from firms with first-time female director appointments wherein the director is *not* appointed to the committee in question, and we use both eventually treated and never treated firms as a control group.

In all three columns, we do not find evidence of differential pre-trends among treated firms and control firms in the three years prior to treatment. In Column (1), we find that the female representation within a firm’s workforce increases two to four years after a female director is added to the audit committee. In Column (2), we find no relation between female appointments to the nomination committee and female employee representation. In Column (3), we estimate a positive and highly significant relation between first-time female appointments to the compensation committee and female representation in the workplace. The compensation committee effect is immediate and persistent from the year in which the female director is first appointed to the board and compensation committee to four years

afterwards. The heterogeneous effects across the three columns suggest that first-time female director appointments can lead to changes in outcomes for female workers, but only if the newly appointment female directors are put in positions of influence over policies related to rank-and-file employees.

5.2 Effect on Female Earnings

Table 4 reports estimates of the effect of appointing the first female board member to a previously all-male board on the earnings of female employees, while controlling for the earnings of male employees. To start, we replace Y_{jtg} with the average annual earnings among all female employees in the firm, and we estimate Equation (1) using eventually treated firms as the control group. We continue to use all the previously discussed control variables, and we also control for the average annual earnings among all male employees in the firm. We report the results in Column (1). We first assess the pre-trends by considering the significance of the estimates on $e = -3$ and $e = -1$. The estimate on $e = -3$ is not statistically different from zero, suggesting that the earnings of female workers in treatment and control group firms follow similar trends two and three years before the first appointment of a female director to treated firms' boards. The significant estimate on $e = -1$ indicates that treated firms may have experienced an increase in the average earnings of females in the year before the first female director appointment. One important nuance to consider when interpreting this estimate is that $e = 0$ refers to the first year in which a female director appears on the board based what is reported in the firm's proxy statements, but it could be the case that the involvement of the new female director in the firm's affairs could have begun at time $e = -1$ if, for example, the vacancy on the board occurred at time $e = -1$.

Then we assess the dynamic nature of the treatment effect over time by analyzing the sign and significance of the estimates on $e \in [0, 4]$. The coefficients are always positive, and they are significant in four of the five time periods, from $e = 0$ to $e = 3$. In Columns (2) and (3), we repeat this exercise using different control groups. In Column (2), we use the set of

never treated firms as a control group, and in Column (3) we use both eventually treated and never treated firms as a control group. Our findings are fairly consistent across all three specifications. Taken together, these results suggest that the earnings of female employees increase when a female director is first appointed to the board of directors.

In Columns (4)–(7), we estimate the pre-trends and the treatment effects at different points within the firm-wide income distribution. In Column (4) (Column (5)), we replace Y_{jtg} with the average annual earnings among all female employees whose pay is below (above) the median level of pay in the firm that year. In Column (6) (Column (7)), we replace Y_{jtg} with the average annual earnings among all female employees whose pay is below (above) the average level of pay in the firm that year. In all specifications, we use both eventually treated and never treated firms as the control group. In Columns (4) and (5), we find mixed evidence regarding differential pre-trends between treatment and control firms. In Columns (6) and (7), we find no evidence of differential pre-trends between treatment and control firms. In Columns (4) and (6), we find evidence of significant increases in the earnings of female workers whose pay is below the median or mean, respectively. In contrast, the results in Columns (5) and (7) show little evidence of significant changes in the earnings of female workers whose pay is above the median or mean, respectively.

When considered in tandem, the estimates in Tables 1 and 4 suggest that the first appointment of a female to the board of directors leads to an increase in female representation among the top earners of the firm several years after the appointment. But among these top-earning females, we do not find evidence that their annual earnings increase due to the change in board gender composition. In contrast, we do not find any changes in female representation among the bottom earners of the firm. But among these bottom-earning females, we do find evidence that their pay increases, and the increases occur right when the female director appointment occurs, and the increases do not reverse. One possible interpretation of these findings is that female directors are able to make immediate improvements to the working environment that allow low-earning female workers to earn more than they did pre-

viously, such as by implementing family-friendly policies that may allow female employees to log more hours. Whereas the lagged female representation response may be the result of the time it takes to recruit and hire new employees into management and other upper-level positions.

5.3 Timing of Extensive Margin Changes in Board Diversity

Next, we conduct tests that show that first-time female director appointments are not predictable based on the firm's performance or financial position or based on the composition of its workforce. To do this, we take the full sample of firms that make a first-time female director appointment in the year 2007 or later. Using one observation per firm, we run a logistic regression where the dependent variable equals one if the firm makes its first-time female director appointment in 2007, and zero otherwise, and the regressors are the prior year's values of return on assets, leverage, the fraction of employees with at most a high school education, the fraction of employees with at most some college education, the fraction of employees who are white, and the fraction of employees who are under forty years of age. We then repeat this estimation for each year from 2008–2014, removing firms that made their first-time female director appointment in a previous year and always setting the dependent variable to be equal to one if the firm makes its first-time female director appointment in the year of interest, and zero otherwise.

We report the estimates on the six regressors in Table 5. Column (1) displays the predictors of 2007 first-time female director appointments. The other years' predictors are displayed in Columns (2)–(8). Across all six potential predictors, we never find evidence that one consistently predicts first-time female director appointments. For instance, the estimates on *Return on Assets* are positive and insignificant in Columns (1) and (7), they are negative and insignificant in Columns (2)–(6), and the one significant estimate is in Column (8). Similarly, the coefficients on *Leverage*, *High School*, *Some College*, and ≤ 40 *Workforce* toggle back and forth between being positive and negative, and they are never statistically

significant in more than three of the eight years. The coefficients on *White Workforce* are always positive, but again, they are only statistically significant in two of the eight years, 2010 and 2013. Taken together, neither the firm’s performance, financial position, nor the composition of its workforce appear to be reliable predictors of the decision to appoint a female director to the board for the first time. This finding helps to mitigate the possible concern that our earlier findings are driven by some alternative trend in the firm’s life-cycle that simultaneously leads to both the decision to appoint a female director and a change in our outcomes of interest.

6 Robustness

The strength of our main research design is that it allows us to both (a) compute an average effect and (b) assess the sensitivity of our results to the selected control group. One critique, however, is that the design does not allow us to distinguish between policy changes induced by the female board director and policy changes that were concurrent with her appointment. To address this concern, we exploit the introduction of California Senate Bill (SB) 826 in 2018.

SB 826 requires any firm with a “principal executive office” in the state of California to appoint and maintain a minimum number of female board directors or face monetary penalties.¹⁰ Although SB 826 passed both houses of the California legislature and was signed into law in 2018, it faced an immediate injunction in the court system and was, ultimately, overturned by the Court in 2022. Nonetheless, SB 826 led many firms to add female directors to their boards of directors in anticipation of future regulatory action ([Greene et al., 2020](#); [Allen and Wahid, 2023](#)). We conjecture that firms that added female directors to their boards in anticipation of the law were unlikely to concurrently introduce female-friendly policies,

¹⁰As written, the senate bill mandated that all covered firms have at least one female director by 2019; firms with five or more directors had increased quotas in future years. The bill also outlined a minimum \$100,000 penalty for firms that failed to comply. For more details, please see the California Legislature Women’s Caucus SB 826 Factsheet.

outside of those that would be proposed by the newly appointed female director.

We first provide confirmatory evidence that SB 826 did, in fact, prompt the addition of female directors to corporate boards. We adjust our sample period to extend from 2014 to 2020, and we generate two new variables: *Post*, an indicator equal to 1 for years after 2018 and zero otherwise, and *Treat*, an indicator equal to 1 for companies with headquarters in California as identified by Compustat. We report a simple two-way tabulation using those two variables in Table 6 Panel A. The percentage of female directors on the boards of untreated firms increased by 4.9 percentage points (from 8.1% in the pre-period to 13% in the post-period). In comparison, the percentage of female directors on boards of treated firms increased by 5.8 percentage points (from 8.5% to 14.3%) over the same time period. In other words, the share of female directors on boards increased by 0.9 percentage points more for treated firms than for untreated firms.

A natural question is whether the increased appointment of female directors was part of a broader trend amongst companies headquartered in California. We consider this possibility by narrowing our sample period to pre-treatment years spanning 2014 to 2018 and by generating the variable *Placebo Post*, an indicator equal to 1 for years after 2016. We report the new two-way tabulation in Table 6 Panel B. Unlike in our tabulation with the true *Post* variable, we do not observe a disproportionate increase in the appointment of female directors among treated firms (i.e., those headquartered in California) during the placebo post-period, relative to untreated firms. Specifically, the share of female directors on boards increased by 2.2–2.3 percentage points for both treated and untreated firms.

After finding preliminary evidence of SB 826’s impact on female director representation in the summary statistics, we estimate the relation between the interaction of *Post* with *Treat* and the percentage of female directors using an OLS regression. The regression approach allows us to control for several firm-level financial characteristics, along with firm and year fixed effects. Table 7 summarizes our regression results. In Column (1), we find a positive and statistically significant relation between $Post \times Treat$ and the dependent variable, the

percentage of female directors on the firm’s board. For robustness, we test for a relation between *Placebo Post* \times *Treat* and the dependent variable in Column (2) and, consistent with the summary statistics reported in Table 6 Panel B, find no association. We interpret these results as evidence that California SB 826 did indeed increase the appointment of female directors among firms with headquarters in California.

In light of the strong association between the two variables, we elect to use SB 826 as an instrumental variable for the percentage of female directors on a firm’s board. Based on the first stage shown in Table 7, SB 826 satisfies the relevance condition. It is reasonable to believe that, for at least some portion of the rank-and-file female workers, the instrument satisfies the exclusion restriction. Stated differently, we argue that firms do not have a reason to improve the welfare of female rank-and-file workers as a means to satisfy SB 826, which only pertains to female employees at the director level.¹¹

The above analyses were performed outside of the U.S. Census Statistical Research Data Center. We prepared both the reduced form and 2SLS regressions inside the U.S. Census RDC and summarize those in Table 8. In Column (1), we observe a positive and statistically significant relation between *Post* \times *Treat* and the fraction of female employees at the entire company. Likewise, in Column (2), we observe a positive and statistically significant relation between the *Pct. Female Directors* and the fraction of female employees at the company when instrumenting for *Pct. Female Directors* with *Post* \times *Treat*. Importantly, the 2SLS also rejects the under-identification test, which gives us further confidence in our instrument. The positive relation between female director representation and the share of female employees within the firm following SB 826 give us confidence that the results in our main analyses are not solely attributable to other concurrent firm policies.

¹¹The exclusion restriction could hypothetically be violated if firms increase the share of female executives in hopes of appointing one of these women as an internal director in the future. We believe this is unlikely as treated firms were concerned about satisfying SB 826’s requirements in the short-run.

7 Conclusion

It has been well documented that women are under-represented among business leaders. A so-called “glass ceiling” prevents many women from advancing to the highest levels of corporate leadership (Matsa and Miller, 2011; Manzi and Heilman, 2021). Female workers may also face substantial barriers in early employment opportunities (Roberson and Perry, 2021), leading to gaps in their employment, compensation, and promotion outcomes compared to male employees (Goldin, 1990, 2006, 2014; Blau and Kahn, 2017). Whether and how these two stubbornly persistent stylized facts are related remains an open empirical question, particularly among publicly traded firms in the United States. Corporate boards of directors are an especially important setting in which to study the impact of female leadership on the relative position and pay of female employees, as boards of directors influence organizational policies and practices. In this paper, we estimate the impact of increased female director representation on workplace gender diversity and women’s earnings across the within-firm earnings distribution.

We expand upon existing studies of the effect of board gender diversity by turning the focus to employee-related outcomes, as opposed to firm performance and financial outcomes. Analyses of employee-related outcomes require long-horizon administrative data, which is uncommon, especially in the U.S. context. We circumvent this data limitation by using data from the U.S. Census Bureau to link administrative longitudinal employee data to external data on board composition. We find evidence that the first appointment of a female to the board of directors leads to an increase in female representation among the top earners of the firm two to four years after the appointment. In contrast, we do not find any changes in female representation among the bottom earners of the firm. We do, however, find evidence that the pay of bottom-earning females increases relative to men. We find that the effects on workplace gender diversity are the most pronounced when the first-time female director is appointed to the compensation committee, wherein they have influence over the general compensation practices within the firm.

There has been a recent proliferation of policies—both in Europe and in the United States—enacted to mandate minimum levels of gender diversity on boards. Despite recent regulatory changes, the effect of board gender diversity on organizational outcomes has not been well established. Our findings fill part of this gap in the literature, contributing to the broader policy debate, especially as the United States and other developed countries grapple with whether and how to regulate gender board diversity.

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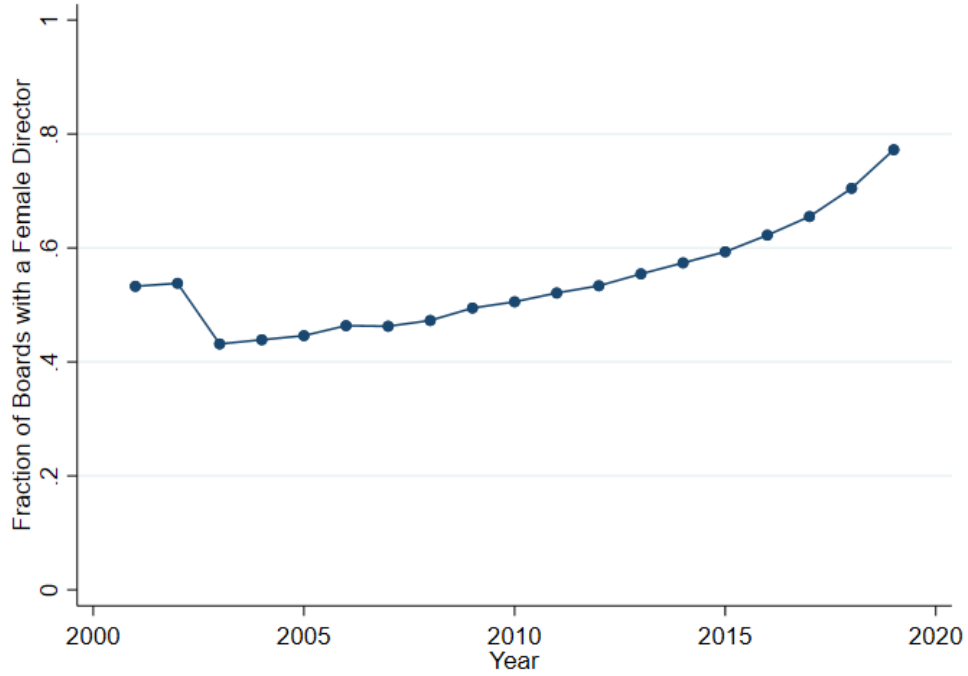
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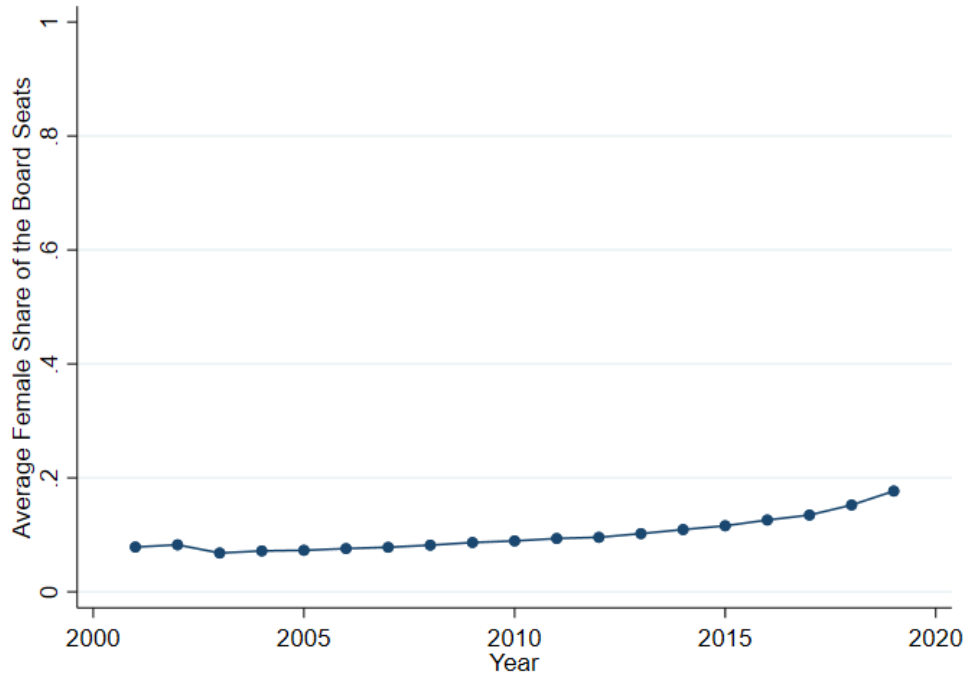
Figures and Tables

Figure 1: Trends in Board Gender Diversity

(a) Share of Boards with At Least One Woman Across Time

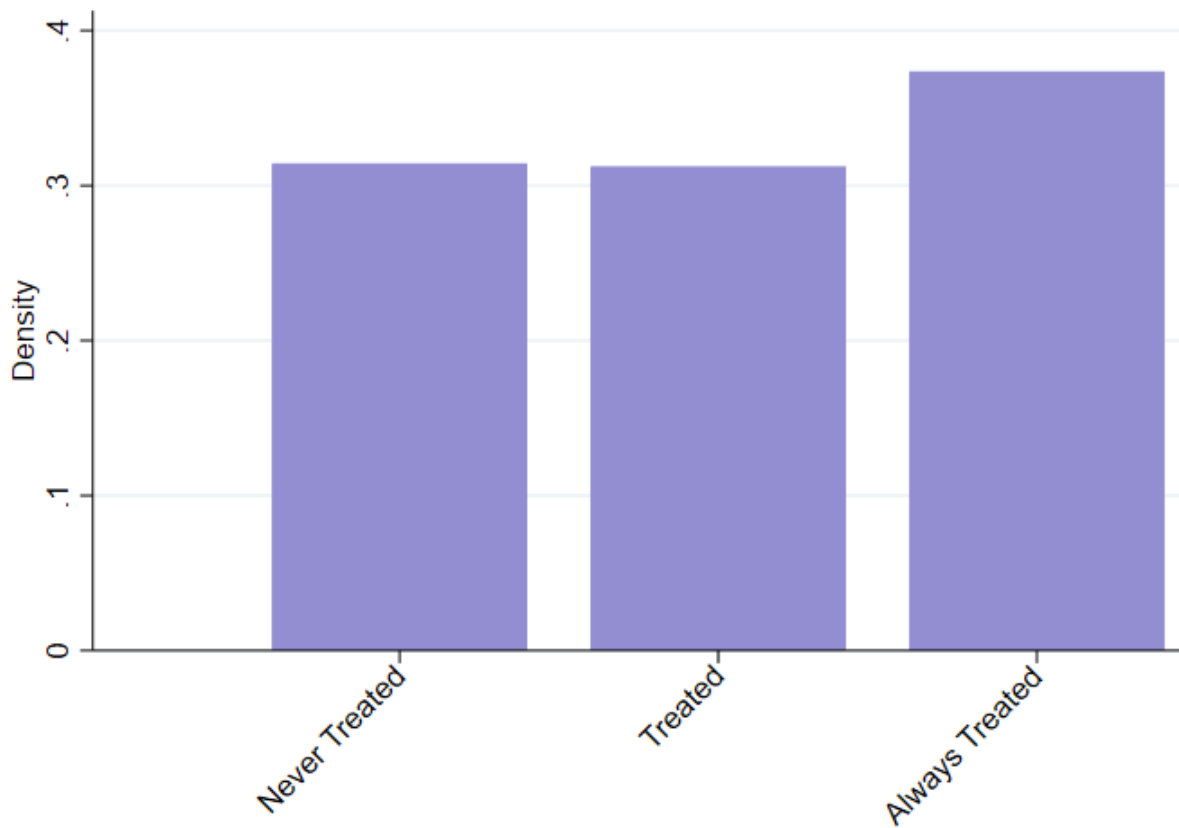


(b) Female Share of the Board Seats Across Time



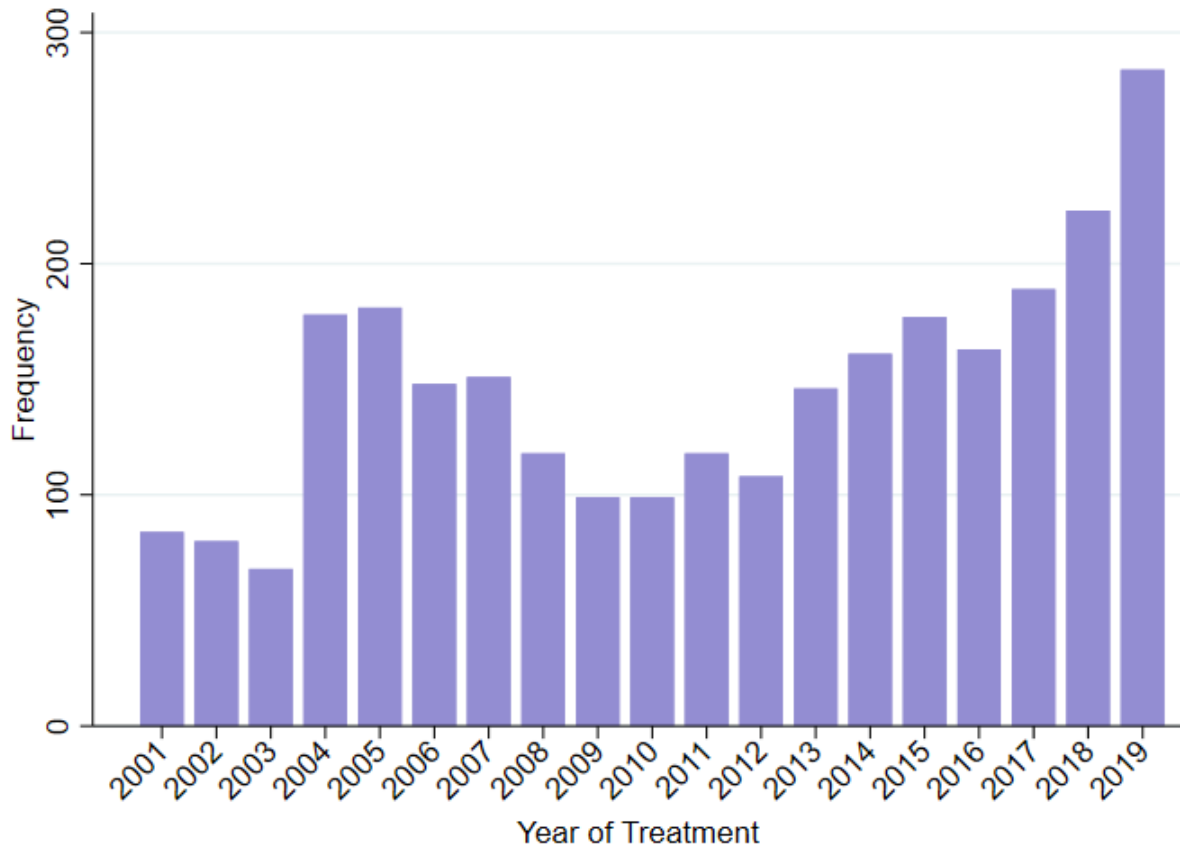
Notes: BoardEX 2001–2019, covering 8,889 unique firms. The visual decrease in the fraction of boards with a female director from 2002 to 2003 in figure (a) is due to BoardEx adding substantially more firms to their dataset in 2003, many of which had no female directors.

Figure 2: Characterizing Firms Based on Variation in Board Gender Diversity



Notes: BoardEx 2001–2019, covering 8,889 unique firms. Treated firms are those that are first observed with no women on their board of directors and that we observe adding at least one woman to their board of directors between 2001 and 2019. Never Treated firms are those firms that have no women on their board of directors between 2001 and 2019. Always Treated firms are those that we observe with at least one woman on the board in their first year of inclusion in the BoardEx database.

Figure 3: Empirical Design: Treatment Timing



Notes: BoardEX 2001–2019, covering 2,775 unique firms. This figure illustrates the timing of treatment for firms that add women to their board of directors between 2001 and 2019.

Table 1: Fraction of Female Employees: Effect of Appointing the First Female Director

		Fraction of Female Employees						
		Entire Company	Entire Company	Entire Company	Below Median Pay	Above Median Pay	Below Mean Pay	Above Mean Pay
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
$e = -3$		+	+	+	+	+	+	+
$e = -1$		+	+	+	+	-	+	+
$e = 0$		+	+	+	+	+	+	+
$e = 1$		+	+	+	+	+	+	+*
$e = 2$		+*	+*	+*	+	+*	+	+**
$e = 3$		+	+	+	+	+	+	+
$e = 4$		+*	+*	+**	+	+	+	+*
Stack \times Firm FE		✓	✓	✓	✓	✓	✓	✓
Stack \times Year FE		✓	✓	✓	✓	✓	✓	✓
Financial Controls		✓	✓	✓	✓	✓	✓	✓
Control Group	Eventually Treated	Never Treated	Both	Both	Both	Both	Both	Both
Observations	22,000	33,000	51,000	51,000	51,000	51,000	51,000	51,000

Notes: This table reports qualitative estimates of the effect of appointing the first female board member to a previously all-male board on the gender composition of the firm's workforce. These are estimations of Equation (1), wherein the outcome variable, Y_{itg} , captures the fraction of the firm's employees that are female. In Column (1), we report estimates using only the eventually treated firms in our control group. In Column (2), we use only the never treated firms in our control group. In Column (3), we combine both groups of firms in our control group. In Column (4) (Column (5)), we estimate the effect on workforce diversity among all employees whose pay is below (above) the *median* level of pay in the firm that year. In Column (6) (Column (7)), we estimate the effect on workforce diversity among all employees whose pay is below (above) the *average* level of pay in the firm that year. In Columns (4)–(7), we use both eventually treated and never treated firms as the control group. All specifications include stack-by-firm fixed effects and stack-by-year fixed effects, as well as firm-year level controls for return on assets, leverage, CEO gender, the fraction of employees with at most a high school education, the fraction of employees with at most some college education, the fraction of employees who are white, and the fraction of employees who are under forty years of age. Standard errors are clustered at the stack-by-firm level to account for repeated firm observations across the stacks. Statistical significance of 10%, 5%, and 1% is denoted by *, **, and ***, respectively.

Table 2: Fraction of Female Employees: Effect of Appointing the First Female Director Following Director Death

		Fraction of Female Employees						
		Entire Company	Entire Company	Entire Company	Below Median Pay	Above Median Pay	Below Mean Pay	Above Mean Pay
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
$e = -3$		–	–	–	–	+	–	+*
$e = -1$		–	–	–	–	+	–	+
$e = 0$		+	+	+	–	+**	–	+**
$e = 1$		+*	+*	+*	–	+***	+	+***
$e = 2$		+	+	+	+	+**	+	+**
$e = 3$		+	+	+	+	+	+	+
$e = 4$		+	+	+	–	+	–	+*
Stack \times Firm FE		✓	✓	✓	✓	✓	✓	✓
Stack \times Year FE		✓	✓	✓	✓	✓	✓	✓
Financial Controls		✓	✓	✓	✓	✓	✓	✓
Control Group	Eventually Treated	Never Treated	Both	Both	Both	Both	Both	Both
Observations	18,500	29,000	47,500	47,500	47,500	47,500	47,500	47,500

Notes: This table reports qualitative estimates of the effect of appointing the first female board member to a previously all-male board on the gender composition of the firm’s workforce. These are estimations of Equation (1), wherein the outcome variable, Y_{itg} , captures the fraction of the firm’s employees that are female. In Column (1), we report estimates using only the eventually treated firms in our control group. In Column (2), we use only the never treated firms in our control group. In Column (3), we combine both groups of firms in our control group. In Column (4) (Column (5)), we estimate the effect on workforce diversity among all employees whose pay is below (above) the *median* level of pay in the firm that year. In Column (6) (Column (7)), we estimate the effect on workforce diversity among all employees whose pay is below (above) the *average* level of pay in the firm that year. In Columns (4)–(7), we use both eventually treated and never treated firms as the control group. In all cases, we only consider treated firms for which the first-time female appointment follows the death of a director. All specifications include stack-by-firm fixed effects and stack-by-year fixed effects, as well as firm-year level controls for return on assets, leverage, CEO gender, the fraction of employees with at most a high school education, the fraction of employees with at most some college education, the fraction of employees who are white, and the fraction of employees who are under forty years of age. Standard errors are clustered at the stack-by-firm level to account for repeated firm observations across the stacks. Statistical significance of 10%, 5%, and 1% is denoted by *, **, and ***, respectively.

Table 3: Fraction of Female Employees: Effect of First Female Committee Appointment

	Fraction of Female Employees		
	Audit Committee	Nomination Committee	Compensation Committee
	(1)	(2)	(3)
$e = -3$	+	+	-
$e = -1$	+	-	+
$e = 0$	+	+	+***
$e = 1$	+	+	+***
$e = 2$	+*	+	+**
$e = 3$	+**	+	+***
$e = 4$	+*	+	+***
Stack \times Firm FE	✓	✓	✓
Stack \times Year FE	✓	✓	✓
Financial Controls	✓	✓	✓
Control Group	Both	Both	Both
Observations	43,500	43,000	43,000

Notes: This table reports qualitative estimates of the effect of appointing the first female board member to a specific committee of a previously all-male board on the gender composition of the firm’s workforce. These are estimations of Equation (1), wherein the outcome variable, Y_{itg} , captures the fraction of the firm’s employees that are female. In Column (1), treated firms are those with first-time female director appointments wherein that director is also assigned to the audit committee upon appointment. In Columns (2) and (3), treated firms are those with first-time female director appointments wherein that director is also assigned to the nomination committee and compensation committee, respectively. In all cases, we exclude observations from firms with first-time female director appointments wherein the director is *not* appointed to the committee in question, and we use both eventually treated and never treated firms as a control group. All specifications include stack-by-firm fixed effects and stack-by-year fixed effects, as well as firm-year level controls for return on assets, leverage, CEO gender, the fraction of employees with at most a high school education, the fraction of employees with at most some college education, the fraction of employees who are white, and the fraction of employees who are under forty years of age. Standard errors are clustered at the stack-by-firm level to account for repeated firm observations across the stacks. Statistical significance of 10%, 5%, and 1% is denoted by *, **, and ***, respectively.

Table 4: Female Earnings: Effect of Appointing the First Female Director

		Female Earnings						
		Entire Company	Entire Company	Entire Company	Below Median Pay	Above Median Pay	Below Mean Pay	Above Mean Pay
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
$e = -3$		+	+	+	+**	+	+	-
$e = -1$		+**	+*	+**	+	+**	+	+
$e = 0$		+***	+***	+***	+***	+	+***	+
$e = 1$		+**	+***	+***	+**	+*	+**	+
$e = 2$		+**	+***	+***	+***	+	+***	+
$e = 3$		+*	+***	+***	+***	+	+***	+
$e = 4$		+	+***	+***	+**	+	+**	+
Stack \times Firm FE		✓	✓	✓	✓	✓	✓	✓
Stack \times Year FE		✓	✓	✓	✓	✓	✓	✓
Financial Controls		✓	✓	✓	✓	✓	✓	✓
Control Group	Eventually Treated		Never Treated	Both	Both	Both	Both	Both
Observations		22,000	33,000	51,000	51,000	51,000	51,000	51,000

Notes: This table reports qualitative estimates of the effect of appointing the first female board member to a previously all-male board on the compensation of female employees, conditional on the compensation of male employees. These are estimations of Equation (1), wherein the outcome variable, Y_{itg} , captures the average annual earnings among all female employees in the firm. In Column (1), we report estimates using only the eventually treated firms in our control group. In Column (2), we use only the never treated firms in our control group. In Column (3), we combine both groups of firms in our control group. In Column (4) (Column (5)), we estimate the effect on workforce diversity among all employees whose pay is below (above) the *median* level of pay in the firm that year. In Column (6) (Column (7)), we estimate the effect on workforce diversity among all employees whose pay is below (above) the *average* level of pay in the firm that year. In Columns (4)–(7), we use both eventually treated and never treated firms as the control group. All specifications include stack-by-firm fixed effects and stack-by-year fixed effects, as well as firm-year level controls for return on assets, leverage, CEO gender, the fraction of employees with at most a high school education, the fraction of employees with at most some college education, the fraction of employees who are white, and the fraction of employees who are under forty years of age. Standard errors are clustered at the stack-by-firm level to account for repeated firm observations across the stacks. Statistical significance of 10%, 5%, and 1% is denoted by *, **, and ***, respectively.

Table 5: Yearly Predictors of Appointing the First Female Director

	Appointing the First Female Director							
	2007	2008	2009	2010	2011	2012	2013	2014
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Return on Assets $_{t-1}$	+	-	-	-	-	-	+	-**
Leverage $_{t-1}$	+	-	+	+	-	+	+	+
High School $_{t-1}$	+	-	-	-	+	-	-	-
Some College $_{t-1}$	-	-	-	-	+	-	+	+
White Workforce $_{t-1}$	+	+	+	+	+	+	+	+
≤ 40 Workforce $_{t-1}$	+	+	-	+	+	+	+	+
Observations	700	650	600	550	550	500	500	450

Notes: In this table, we take the full sample of firms that make a first-time female director appointment in the year 2007 or later. In Column (1), we use one observation per firm, and we run a logistic regression where the dependent variable equals one if the firm makes its first-time female director appointment in 2007, and zero otherwise, and the regressors are the prior year's values of return on assets, leverage, the fraction of employees with at most a high school education, the fraction of employees with at most some college education, the fraction of employees who are white, and the fraction of employees who are under forty years of age. We then repeat this estimation for each year from 2008–2014, removing firms that made their first-time female director appointment in a previous year and always setting the dependent variable to be equal to one if the firm makes its first-time female director appointment in the year of interest, and zero otherwise. Statistical significance of 10%, 5%, and 1% is denoted by *, **, and ***, respectively.

Table 6: Impact of SB 826 on Female Directors as Percent of Board

Panel A: Treat and Post Two-Way Tabulation

Post	Treat	
	0	1
0	0.081	0.085
1	0.130	0.143

Panel B: Treat and Placebo Post Two-Way Tabulation

Placebo Post	Treat	
	0	1
0	0.068	0.073
1	0.091	0.095

Notes: In this table, we compute a two-way tabulation to evaluate the impact of SB 826 on female directors as a percent of the board. In Panel A, the sample period is 2014 to 2020, and each observation is a firm-year. Unlike prior analyses, this analysis does not use a stacked difference-in-differences design. To improve comparability across tables, however, we do drop “always treated” firms, i.e., those firms that had a female director present the first year they appear in BoardEx. *Post* is an indicator equal to 1 in 2019 and 2020 (and zero otherwise). *Treat* is an indicator equal to 1 for firms with headquarters in California (as identified in their 10-Ks). The value in each cell is the percentage of directors who are female. Panel B differs from Panel A in two ways: the sample period is from 2014 to 2018 and *Placebo Post* is an indicator equal to 1 in 2017 and 2018.

Table 7: CA Senate Bill 826 and Female Directors as a Percent of Board

	Pct. Female Directors (1)	Pct. Female Directors (2)
Post \times Treat	0.0161*** (0.0022)	
Post \times Treat (Placebo)		0.0030 (0.0022)
Board Size		0.0078*** (0.0012)
Firm Size	0.0089*** (0.0022)	0.0025 (0.0028)
ROA	-0.0191*** (0.0045)	-0.0064 (0.0047)
Leverage	-0.0085* (0.0050)	-0.0117** (0.0054)
MtBE	0.0000 (0.0002)	-0.0001 (0.0001)
Market Cap	0.0000 (0.0016)	-0.0003 (0.0018)
Firm FE	✓	✓
Year FE	✓	✓
Observations	13,657	11,655
R-squared	0.7640	0.7971

Notes: In this table, we examine the viability of California Senate Bill 826 as an instrument for the female directors as a percent of the board. The first regression is equivalently the first stage for a 2SLS. The second regression differs from the first regression in that it uses *Post \times Treat (Placebo)*, a placebo treatment indicator. Standard errors are clustered by state. Statistical significance of 10%, 5%, and 1% is denoted by *, **, and ***, respectively.

Table 8: CA Senate Bill 826 and Fraction of Female Employees

	Entire Company (1)	Entire Company (2)
Post \times Treat	+	

Pct. Female Directors	+	+
		*
Controls	✓	✓
Firm FE	✓	✓
Year FE	✓	✓
Observations	7,400	7,400
Instrument	N/A	Post \times Treat
Model	Reduced Form	2SLS
Reject Under-Identified Inst?	N/A	Yes

Notes: In this table, we use California Senate Bill 826 as an instrument for the female directors as a percent of the board and then examine the impact of female director representation on the female share of rank-and-file employees. The first regression is the reduced form. The second regression is the 2SLS. Standard errors are clustered by state. Statistical significance of 10%, 5%, and 1% is denoted by *, **, and ***, respectively.

A Appendix - Variable Definitions

Variable	Definition	Source
Board Characteristics		
Board Size	Equal to the total number of directors on the board.	BoardEx
CEO-Chair	Equal to one if the CEO is also the chair of the board, and zero otherwise.	BoardEx
Frac. Female	Equal to the number of female directors on the board divided by the total number of directors on the board.	BoardEx
Employment Outcomes		
Log(Employees)	Equal to the log of one plus the total number of employees (000s).	Compustat
Wage/Employees	Equal to the total staff expense divided by the total number of employees (000s).	Compustat
Log(SG&A)	Equal to the log of one plus the total selling, general, and administrative expense.	Compustat
Fraction of Female Employees	Equal to the number of female employees in the firm divided by the total number of employees.	LEHD
Other Outcomes		
Firm Size	Equal to the log of total assets.	Compustat
ROA	Equal to operating income after depreciation divided by the total assets.	Compustat
Leverage	Equal to the sum of Debt in Current Liabilities and Total Long-Term Debt divided by the total assets.	Compustat
High School	Fraction of employees with at most a high school education.	LEHD
Some College	Fraction of employees with at most some college education.	LEHD
White Workforce	Fraction of employees who are white.	LEHD
≤ 40 Workforce	Fraction of employees who are under forty years of age.	LEHD
Market to Book	Equal to the product of a company's annual fiscal price close and common shares outstanding divided by total common equity.	Compustat

Market Cap	Natural log of the product a company's annual fiscal price close and common shares outstanding.	Compustat
SGA/Assets	Equal to the total amount of selling, general and administrative expense divided by the total book value of assets.	Compustat
Cash/Assets	Equal to the total amount of a cash and cash equivalents divided by the total book value of assets.	Compustat
Debt/Assets	Equal to the sum of long-term debt and debt in current liabilities, all divided by the total book value of assets.	Compustat
Yearly Return	Yearly adjusted stock return including dividends.	Compustat
Capx/Assets	Equal to capital expenditures divided by the total book value of assets.	Compustat
Cashflow/Assets	Equal to the sum of depreciation and amortization and income before extraordinary items, all divided by the total book value of assets.	Compustat
Volatility	Equal to the standard deviation of stock returns across the previous calendar year.	CRSP
ESG Outcomes		
Women & Minority Contract	2012 through 2013: Indicator identifying companies with a demonstrably strong record on purchasing from or contracting with women- and/or minority-owned businesses. 1991 through 2011: The company does at least 5% of its subcontracting, or otherwise has a demonstrably strong record on purchasing or contracting, with women- and/or minority-owned businesses.	MSCI KLD
Work-Life Benefits	Indicator equal to 1 if the company has outstanding employee benefits or other programs addressing work/life concerns, e.g., childcare, elder care, or flextime.	MSCI KLD
Controversies	Indicator measuring the severity of controversies related to a firm's workforce diversity, including its own employees as well as temporary employees, contractors, and franchisee employees. Topics covered include, for example, allegations of discrimination on the basis of sex, race, ethnicity, or other characteristic.	MSCI KLD
Board of Directors - Minorities	Indicator equal to 1 identifying companies with no minorities on their board of directors.	MSCI KLD

Board Diversity	Indicator equal to 1 identifying companies with no women on their board of directors.	MSCI KLD
Gay and Lesbian Policies	Indicator to identify whether the company has implemented notably progressive policies toward its gay and lesbian employees. In particular, it provides benefits to the domestic partners of its employees.	MSCI KLD
Union Relations	Indicator to identify companies with high union density.	MSCI KLD
Cash Profit Sharing	Indicator to identify companies that have a cash profit-sharing program through which they have recently made distributions to a significant proportion of their workforce.	MSCI KLD
Employee Involvement	Indicator to identify companies that encourage worker involvement via generous employee stock ownership plans (ESOPs) or employee stock purchase plans (ESPPs).	MSCI KLD
Employee Strengths - Other Strengths	Indicator that captures best-in-class management performance in the area of human capital.	MSCI KLD
Emp. Relations - Number of Strengths	Indicator variable that captures whether there is a relatively high or low level of strength regarding the firm's employee relations.	MSCI KLD
Health and Safety Concern	Indicator to identify companies that have strong employee health and safety programs.	MSCI KLD
Emp. Relations Other Concerns	Indicator to identify companies that are involved in employee relations controversies that are not covered by other MSCI ESG Research indicators.	MSCI KLD
Emp. Relations - Number of Concerns	Indicator variable that captures whether there is a relatively high or low level of or concern regarding the firm's employee relations.	MSCI KLD
Benefits to Economically Disadvantaged	Variable name is <i>PRO - str - C</i> in WRDS, but the data manual lists <i>PRO - str - C</i> as access to healthcare.	MSCI KLD
Support for Education	Indicator to identify a company that has either been notably innovative in its support for primary or secondary school education, particularly for those programs that benefit the economically disadvantaged, or the company has prominently supported job-training programs for youth.	MSCI KLD
Volunteer Programs	Indicator to identify that the company has an exceptionally strong volunteer program.	MSCI KLD

Social Opportunities - Indicator to assess the extent to which a company is provid- MSCI KLD
Access to Finance ing lending, financing, or products to underrepresented or
under-banked communities. Top performing companies will
offer products and services to communities with limited or
no access to financial products.
