The Value of Skill Signals for Women's Careers

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Abstract

We show that observable skill signals are more important for women's career advancement than for men's. Signals of higher education and professional experience increase male directors' probability to enter a leadership position by 7.1%, and their compensation by 6.7% ($287,850). Female directors with these signals are 13.9% more likely to enter a leadership position, and their compensation is 20.0% ($809,400) higher. These results are in line with models of screening discrimination, in which women need to provide more observable skill signals to make up for the fact that employers find it more difficult to judge on their unobservable qualification for a job. Supporting this channel, we find that our results are stronger for firms with all-male nomination committees, for firms located in gender-conservative states, and for outside hires where information asymmetries are larger.

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1 Introduction

Women are still under-represented in leadership positions. According to the U.S. Department of Labor, women make up 47.1% of the labor force in 2021. However, they only held 25.2% of board seats at firms of the Russell 3000 universe, and made up only 5.6% of all CEOs in the Russell 3000 in the second quarter of 2021.[1] Women, on average, also earn less than men. In the US, the gender pay gap amounted to 18% in 2021.[2] It is particularly pronounced in leadership positions, which has been explained by convex pay structures in higher-paying jobs that disproportionately reward individuals who labor long hours and do not mind inflexible schedules (Goldin, 2014; Bertrand, 2018).

What is the reason for these persisting gender differences? The literature has provided several explanations: They range from differences in preferences for competition and negotiation (Niederle and Vesterlund, 2007; Bowles et al., 2007; Small et al., 2007), differences in educational and occupational choices (Blau and Kahn, 2017; Goldin, 2014; Bertrand, 2018) to fertility related choices and motherhood (Bertrand, 2020; Kleven et al., 2019). On top of these differences, labor market discrimination has also been shown to contribute to the gender gap in leadership positions (Goldin and Rouse, 2000), suggesting that equally qualified women face a systematic disadvantage in hiring and compensation decisions.

As pointed out in a model of screening discrimination by Cornell and Welch (1996), discrimination against female candidates may occur even if it is common knowledge that their underlying group characteristics do not differ from men's. If male employers can estimate job applicants' unobservable qualifications more precisely when candidates belong to their own gender, they may find it more difficult to judge whether a female applicant is suitable for a certain position and whether she adds enough value to the firm to warrant a certain level of compensation. This uncertainty should be particularly relevant for jobs that require a broad set of unobservable qualifications, as is the case for leadership positions. Providing more observable skill signals may thus be particularly important for women aiming to reach a leadership position.

[1] See `https://www.equilar.com/reports/84-q2-2021-equilar-gender-diversity-index`.

[2] See `https://www.payscale.com/research-and-insights/gender-pay-gap/`

In this paper, we show that observable skill signals are indeed more important for women's career advancement than for men's. Specifically, signals of higher education and professional experience increase male directors' probability to enter a leadership position by 7.1% on average, but they increase female directors' probability to enter a leadership (CEO) position by 13.9% (34.5%). We find a similar effect for executive compensation. While male directors experience a 6.7% increase in compensation for additional skills signals on average, the effect is again significantly stronger for female directors, who experience a 20.0% increase in total compensation.

Our analysis is based on biographic information for a large sample of 107,165 directors included in the BoardEx database between 2000 and 2019. Out of theses directors, 16,424 (15.3%) are female. We investigate two categories of skill signals that have been shown to increase the probability to enter a leadership position and to receive higher compensation: signals of higher education (Useem and Karabel, 1986; Graham et al., 2012), and signals of professional experience (Murphy and Zabojnik, 2004; Custódio et al., 2013).

Our proxies for signals of higher education are an education score, which increases in degree levels as in Graham et al. (2012), and a variable reflecting whether a director graduated from a Top 50 US school (Useem and Karabel, 1986; Falato et al., 2015). As a proxy for professional experience, we follow Custódio et al. (2013) and compute a Generalist Index Score for each director in our sample. This index reflects general management skills from past work experience. We also look at same industry experience as an alternative proxy for directors' professional experience.

We then run fixed effect regressions where the dependent variable is a dummy variable reflecting whether a director is in a leadership position in a given year. Our main independent variables are the skill signals and their interaction with a female dummy variable. The regressions include standard firm-level and manager-level control variables as well as year and firm fixed effects, or year×firm fixed effects as well as all control variables interacted with the female dummy variable.

Our results show that all skill signals increase female directors' likelihood to enter a leadership position more strongly than that of male directors. We find that signals of higher educational degrees increase the probability to enter a leadership position by 4.2% for male directors and by 8.2% for female directors relative to the respective baseline probabilities. Having graduated from a Top50 US school increases male directors' likelihood to enter a leadership position by 0.9%, but female directors' likelihood to enter a leadership position by 6.1%, relative to the baseline probabilities. With respect to signals of professional experience, we find that general management skills increase male directors' likelihood to reach a leadership position by 13.4%, and female directors' likelihood to reach a leadership position by 21.4%. Same industry is even more important. It increases the likelihood to enter a leadership position by 10.0% for male directors, and by 19.8% for female directors relative to the respective baseline probabilities.

It is important to note that in all regressions, the baseline probability of a female director to enter a leadership position remains significantly negative. Thus, the provision of observable skill signals mitigates, but does not eliminate, the gender gap in leadership positions.

The empirical challenge in our analysis is to identify the correct pool of potential candidates for a leadership position. Our main results are based on the full BoardEx sample. BoardEx includes all directors working for publicly listed companies with a market cap of at least 10 million USD (Engelberg et al. (2013)). Thus, we do not expect gender driven selection when using the full BoardEx sample. In addition, we find that at least based on observables, women in our sample possess *more* skill signals then men, while they still have a *lower* probability of entering a leadership position and earn lower pay. This should work against us finding a result from a sample selection point of view. However, including the full BoardEx sample may raise concerns that directors in our sample are not sufficiently comparable (for example, they may differ in their preferences to compete and negotiate for leadership positions), and thus may not belong to the pool of potential candidates for a given leadership position. To mitigate these concerns, we repeat our analysis in a highly selective sample that is restricted to the ExecuComp database and only consists of the top five managers at a given firm. These directors already are in a leadership position and should be very comparable in their preferences and willingness to lead. We then examine their likelihood to become the CEO.

We find that signals of higher education increase male executives' likelihood to become CEO by 5.1% and female executives' likelihood to become CEO by 15.3% relative to the respective baseline probabilities. Our second education proxy, i.e. having graduated from a Top50 US, is even more important for excutives' likelihood to become CEO. It increases the probability to become CEO by 11.0% for male executives and by 47.6% for female executives. Signals of professional experience are also more important for female executives than for male executives. For example, same industry experience increases male executives' probability to become CEO by 2.4%, but female executives' probability to become CEO by 39.3%.

Consistent with our conjecture that skill signals are more important for female directors' careers than for careers of male directors, we find that female directors in our sample possess more of these signals than male directors. This may at first seem counterintuitive given that the same number of skill signals leads to a higher probability to enter a leadership position for female directors than for male directors. However, we also find that female directors in our sample are still less likely to enter a leadership position, become CEO, and earn significantly less than their male counterparts. Thus, given their lower baseline probabilities, women need to collect more of these signals to achieve parity and close gender gaps.

Following the theory of Cornell and Welch (1996), a higher uncertainty of male employers in judging female applicants' unobservable qualifications for leadership positions may explain why the provision of observable skill signals is more beneficial for female directors than for male directors. To test this channel more explicitly, we examine whether our main results are stronger for firms where only men are in charge of senior-level hiring. We repeat our baseline regressions and include a triple interaction to distinguish between nomination committees with all male members and those that have at least one female member. We find that our main results are indeed stronger for firms with all-male nomination committees, i.e., skill signals are particularly important for female directors in firms with all-male nomination committees.[3]

In a similar vein, we examine whether skill signals are more valuable for female directors who are hired for a leadership position from outside the company. As information asymmetries should be larger for outside hires, we expect our main result to be stronger for this subset of female directors and find significant results for some, but not all of our skill proxies.

Our results also tend to be stronger for firms located in gender conservative states, where the "Think manager - Think male" paradigm is presumably stonger. In these states, uncertainty

[3]Note that these results also rule out an alternative story, according to which the same skill signal may be more informative if it is obtained by a female director than by a male director. For example, employers may rationally put more weight on a degree of a Top 50 school obtained by a women if it was more difficult for women to enter these schools. This, however, would be hard to reconcile with the fact that our results are stronger for all-male nomination committees.

regarding unobservable qualifications of female candidates for leadership positions should be higher because traditional gender norms stand in stark contrast to promoting women to top management roles (Koenig et al., 2011).

In the final step, we turn towards executive compensation and examine whether skill signals are also important for higher levels of pay and, particularly, if female directors' compensation benefits more from these signals than male directors' compensation. While one could still argue that, even among the top five executives of a firm, highly qualified women may still be more reluctant to enter the driving seat as CEO, it is implausible to assume that they are more reluctant to receive higher compensation than their male counterparts. However, according to the model of screening discrimination by Cornell and Welch (1996), male employers' difficulty to accurately judge on the quality of female directors' unobservable skill set may also translate into higher uncertainty regarding the value that a female director adds to the firm. As a result, female directors may receive lower compensation than male directors. Female directors can try to counterbalance this disadvantage by providing more observable skill signals.

We find that educational skill signals increase female directors' compensation more strongly than male directors' compensation. Having graduated from a Top 50 ranked college has the strongest effect on female directors' compensation. If a female director graduated from a top 50 ranked college, she receives 25.2% higher compensation, which amounts to an additional $1,018,600 in absolute terms. Among the experience-based skill signals, having worked in the same industry before the current employment is the most important skill signal for raising female directors' total compensation. It increases male directors' total compensation by 8.1%, or $346,700, and female directors' compensation by 31.7%, or $1,218,300. Again, the baseline gender difference in compensation is negative in all regressions. Thus, observable skill signals mitigate, but do not reverse, the gender pay gap.

The main contribution of our paper is to show that female directors' careers benefit more from the provision of objective skill signals than careers of male directors. In both dimensions – higher education and professional experience – the likelihood to enter a leadership position, the likelihood to become CEO, and the level of compensation increase more strongly if a female director provides a given skill signal than if a male director provides the same signal. These results, together with our cross-sectional evidence, for example on the gender composition of nomination committees, provide empirical support for the theoretical model on screening discrimination by Cornell and Welch (1996). Results in our paper also show that the overall probability to enter a leadership position is still lower for female directors than for male directors, even if female directors possess additional skill signals. Similarly, even female directors with a larger skill set still earn less than their male counterparts. Thus, being a women is still detrimental to reaching a leadership position, and to receive higher compensation.

Four papers on different settings augment the results of our analysis. Benson et al. (2021) investigate promotion decisions in a large retail chain and find that men's promotions are more strongly based on future potential, while women's promotion depends more on their past performance. In an academic context, Sherman and Tookes (2022) and Heckman and Moktan (2020) examine the likelihood of finance and economics assistant professors to get tenure. For 2016 and 2017, Sherman and Tookes (2022) show that the marginal impact of sole-authored top publications on the likelihood to get tenure is significantly higher for female finance professors than for male finance professors. Similarly, Heckman and Moktan (2020) show that male faculty in economics benefit more from top 5 publications — the same quantity of top five publications is associated with faster tenure for male faculty compared to their female counterparts. They also show that there are no gender differences in the quality of these articles. Finally, Lang and Manove (2011) show that educational attainment conditional on participating in the Armed Forces Qualification Test is higher for African Americans than for Caucasian candidates which they explain with African Americans' higher needs of signaling due to statistical discrimination in the labor market. Even though these papers focus on other settings, their results point in the same direction as ours: Members of minority groups benefit more from the provision of observable skill signals.

Our results also contribute to the literature on gender gaps in leadership positions. For example, Bertrand (2018) shows that women are highly underrepresented in leadership positions in US companies. Although the gap in leadership positions is getting smaller, von Meyerinck et al. (2021) present evidence that, based on the current trend, it would take another 40 years to close the gender gap in US boards. Additionally, Fortin (2005), Bursztyn et al. (2017) and Charles et al. (2018) argue that gender norms impair women's career advancement. Our paper provides an additional explanation for the remaining gender gaps that we observe. Women have to provide more skill signals to reach a leadership position than men.

In addition, our paper contributes to the vast literature on the gender pay gap. Blau and Kahn (2017) show that although the gender pay gap decreased since 1980, there is still a substantial difference in wages between men and women. Furthermore, the gender pay gap is even more pronounced at the very top of the wage distribution (Goldin, 2014). Several explanations for the gender pay gap are discussed in the literature. A large body of research argues that gender differences in labor market outcomes are due to psychological attributes of men and women (Bertrand, 2018). For example, compared to men, women are more risk-averse (Bertrand, 2011; Dohmen et al., 2011), less willing to compete (Niederle and Vesterlund, 2007; Flory et al., 2015), and less likely to negotiate their compensation (Babcock and Laschever, 2009; Greig, 2008). We show that, in addition, compensation is determined by the provision of observable skill signals, and women need to collect more of these signals than men to reach the same level of pay.

2 Data and summary statistics

2.1 Sample Construction

Our main sample comprises variables from BoardEx Northamerica provided by Management Diagnostic Limited and from Compustat's Execucomp database. In the first step, we compute proxies for directors' skill signals from their biographic information in the BoardEx database. The data cover US publicly traded active and inactive companies with a market capitalization that is greater than or equal to ten million dollars. BoardEx data allow us to identify the educational background and professional experience of each director. Additionally, we obtain detailed information about directors' current job, e.g. the company she works for and her position in the company. Our analysis is based on a sample running from 2000 to 2019, as BoardEx data reliability decreases considerably before 2000 (Engelberg et al., 2013).

In the second step, we merge company information from CRSP/Compustat to companies from the BoardEx sample. We include the following firm characteristics in our analysis: total assets, book to market ratio, annual stock return and idiosyncratic volatility. They are defined in detail in

Variable Appendix A1. To merge the data, we proceed in two steps. First, BoardEx provides ISINs for most active companies. We use a firm's ISIN to construct the CUSIP number and merge firms with CRSP/Compustat data by CUSIPs. If the first step does not result in a match or if BoardEx does not provide an ISIN, we apply the Levenshtein algorithm on the company names in the two databases and manually check the matches. This results in 9,399 unique companies in our combined Boardex/Compustat sample. We winsorize all company control variables at the 1% and 99% level.

In the third step, we follow Bertrand and Hallock (2001) and sort directors into different occupations based on their role name in BoardEx. We classify directors as CEO, Chair, Vice Chair, President, CFO, COO, Other Chief Officers, Executive VP, Senior VP, Group VP and VP. We drop all observations of directors in management positions below the ones classified by Bertrand and Hallock (2001), as the information provided by BoardEx is less accurate and comprehensive for people working in those positions. We then define a dummy variable, Leadership position, which is equal to one if a director is CEO, Chair, Vice Chair, President, CFO, COO, or Other Chief Officer of the company, and zero if a director's position belongs to one of the other categories. Alternatively, we define a dummy variable, CEO, which is equal to one if a director is CEO in a given year, and zero otherwise.

The sample consists of 16,424 unique female directors and 90,741 unique male directors working for 7,323 companies. We observe at least one female director in 5,454 companies. Figure 1 shows that 12.8% of all directors in a leadership position are female. In 2000, there are only 789 (6.5%) female directors in leadership positions in the sample, and 11,279 male directors. This fraction increases to 16.5% (2,628) female directors in leadership positions in 2019.

Finally, we merge compensation data from Execucomp to CRSP/Compustat company information based on the common company identifier (gvkey). As there is no common unique identifier for directors in Execucomp and BoardEx, we manually verify that compensation is correctly matched to each director based on directors' names. Overall, we match 84% of the director-year observations in Execucomp with the combined BoardEx and CRSP/Compustat data set.[4] We use this smaller

[4]We use compensation data from Execucomp instead of compensation data from BoardEx for two reasons. First, Execucomp provides compensation data for a larger fraction of directors. For our final sample, only 30% of the director-company-year observations have compensation data in BoardEx. Second, as most US studies use Execucomp data, using Execucomp data allows us to compare our results to the existing literature on CEO pay in the US (Fernandes et al., 2013).

sample of 7,980 unique directors (388 female and 7,592 male) to address the trade-off between comparability of directors and inclusion of all potential candidates for leadership positions.

2.2 Variable Construction

We use directors' biographical information from BoardEx to compute proxies for skill signals based education and professional experience. These variables have been shown to predict career advancement and compensation (Spilerman and Lunde, 1991; Custódio et al., 2013).

Education.

We calculate two different proxies for education based skills. First, we follow Graham et al. (2012) and define an Education Score for each director in our sample. A director's Education Score is equal to one if her highest degree is a Bachelor's degree, equal to two if her highest degree is a Master's, advanced law degree and/or MBA, equal to three if her highest degree is a PhD, and zero otherwise. Second, we measure the prestige of the university/college a director graduated from and define a dummy variable, Top 50 ranked college, which is equal to one if a director obtained a Bachelor's degree, Master's degree, law degree or a PhD degree from a Top 50 ranked college, and zero otherwise. A Top 50 ranked college is defined according to Forbes America's Top Colleges List.[5]

Professional experience.

We proxy for signals of professional experience based on directors' employment history provided by BoardEx. All professional skill measures are based on job experience a director gained before her current employment. First, we follow Custódio et al. (2013), and estimate a Generalist Index calculated as:

$$\begin{aligned} Generalist\ Index = {} & 0.268 * \ Number\ of\ Positions + 0.312 * \ Number\ of\ Firms \\ & + 0.309 * \ Number\ of\ Industries + 0.281 * \ CEO\ Experience \\ & + 0.153 * \ Conglomerate\ Experience \end{aligned} \tag{1}$$

where *Number of Positions* (*Firms* / *Industries*) is defined as the number of different positions (firms/industries) the director worked in before the current employment, *CEO Experience* is a

[5]See Appendix Table OA1 for a list of all schools includes in the Top 50 rank.

dummy variable that is equal to one if the director was CEO at a listed firm before, and zero otherwise. *Conglomerate Experience* is an indicator that equals one if the director worked at a listed firm with more than one segment before her current employment, and zero otherwise.

We further examine job experience within the same industry and define an indicator equal to one, if a director has already worked in the same industry before, and zero otherwise.

2.3 Summary statistics

Panel A of Table 1 shows summary statistics of director characteristics. There are 16% female directors in the sample, and directors are on average 50 years old. 41% of directors hold a leadership position, and 9% of directors are CEO. Directors in our sample earn on average $4.27 million per year. While the bottom 1% of directors in our sample have a total compensation of less than $200,000 per year, the top 1% of directors earn more than $20 million per year. The means that the distribution of total compensation across directors in our sample is right-skewed. Hence, we use the inverse hyperbolic sine of total compensation in our regression analysis (Aihounton and Henningsen, 2021). It is also reported in Panel A to allow for the calculation of effect sizes.

Panel B of Table 1 presents summary statistics of firm characteristics. Total assets range from $13 million to $159.10 billion. Thus, the total assets variable is also right-skewed, and we again use the inverse hyperbolic sine of total assets in our regression analysis. The mean company in our sample has a stock return of 13.75% over the last year and a market to book ratio of 3.22.

In Table 2, Panel A, we show summary statistics for female and male directors separately. Female directors are on average 2.75 years younger than male directors. 29% (43%) of female (male) directors are in a leadership position of a company at some point during the sample period. Female directors are also less likely to be CEO. The number of board seats for each director is similar for female and male directors. Female directors hold on average 2.01 board seats and male directors hold on average 1.95 board seats. The difference is not statistically significant.

Directors in our sample have an average education score of 1.06. It increases to 1.07 for directors in leadership positions (Panel B) and to 1.15 for CEOs (Panel C). While 18.6% of all directors graduated from a Top 50 ranked college, 21.7% of CEOs went to a Top 50 ranked college. Furthermore, the difference in education skills between female and male directors is negative for non-leadership positions, i.e. female directors in non-leadership positions have a lower Education Score (1.05 vs. 1.07) than male directors in non-leadership position. The difference turns positive for directors in leadership positions (Panel B) and gets even larger for CEOs (Panel C). A similar pattern emerges for graduating from a Top50 ranked college. While there is no difference in the fraction of female and male directors who graduated from a Top50 ranked college in the overall BoardEx sample, 28.2% of female CEOs but only 21.5% of male CEOs graduated from a Top 50 ranked college.

Table 3 provides further details regarding the fraction of female and male directors in a leadership position graduating from a Top50 ranked college. The absolute number of female directors graduating from the same university is highest for Harvard, Stanford and the University of Pennsylvania. However, the ratio of female to male directors in a leadership position graduating from the same university is higher for smaller universities like Boston College and Georgetown University.

The Generalist Index score is 0.67 in the overall sample, and increases to 0.83 for directors in leadership positions, and to 1.09 for CEOs. Furthermore, there is no difference in the Generalist Index score between female and male directors in our sample, but female CEOs have significantly higher scores than male CEOs. Female directors are also less likely to have same industry experience than male directors in the overall sample, but female CEOs have more same industry experience than their male counterparts.

Overall, results in Table 2 show that women in leadership positions obtained more signals of higher education than their male counterparts. Similar results have been found for African Americans. Lang and Manove (2011) show that educational attainment conditional on participating in the Armed Forces Qualification Test is higher for African Americans than for Caucasian candidates which they explain with African Americans' higher needs of signaling due to statistical discrimination in the labor market.

3 Skill signals and the likelihood to enter a leadership position

In this section, we examine whether and to what extent skill signals are more important for female directors' probability to enter a leadership position than for male directors'. The empirical challenge is to correctly define the pool of potential candidates that are considered for a given leadership position. In our baseline analysis, we focus on all directors in the Boardex database. Boardex collects the full list of directors working for all publicly listed companies in the US with a market capitalization of at least 10 million USD (Engelberg et al. (2013)). It then adds all available information about those directors, i.e. employment history and educational background. When formally examining whether female or male directors might be selected into the BoardEx sample based on different criteria, we find that female leaders in our sample are – if anything – *more* qualified than male directors (see Table 2). However, one could argue that including all Boardex directors as potential candidates for a leadership position creates a pool that is too large and includes too many individuals that would not be eligible for a given leadership position. In addition, this large pool includes a very heterogenous group of individuals who may, for example, differ in preferences for competition and negotiation that are relevant for obtaining a leadership position. Therefore, we repeat our analysis for a smaller sample based on the ExecuComp database. This database only includes the top five executives at a given firm, and we investigate the likelihood of these executives to become CEO. This narrow set of individuals is very likely to belong to the set of potential candidates for the CEO position and should be more homogeneous with respect to preferences and leadership aspirations. However, by definition, the analysis based on ExecuComp data leaves out potential candidates from outside the firm, and thus the ExecuComp pool may be too small. We think that if we can show similar results for both, the largest and smallest pool of potential candidates, this should at least mitigate selection concerns due to the definition of the pool of candidates for a leadership position.

We start our analysis with the following regression for the full BoardEx sample at the director-year level:

(2)

$$
\begin{aligned}
LeadershipPosition_{\text{d,t}} = & \beta_1 Skill\ Signal_{\text{d,t-1}} + \beta_2 Skill\ Signal_{\text{d,t-1}}\ x\ Female\ dummy_{\text{d}} \\
& + \beta_3 Female\ dummy_{\text{d}} + \beta_4\ Director\ Age_{\text{d,t}} + \beta_5\ Director\ Age\ Squared_{\text{d,t}} \\
& + \beta_6\ Total\ Assets_{\text{c,t-1}} + \beta_7\ Return_{\text{c,t-1}} + \beta_8\ Volatility_{\text{c,t-1}} \\
& + \beta_9\ Market\ to\ Book_{\text{c,t-1}} + \alpha_c + \alpha_t + \varepsilon_{\text{d,t}}
\end{aligned}
$$

The dependent variable, *Leadership* $Position_{d,t}$, is a dummy variable equal to one if director d is in a leadership position of company c in year t, and zero otherwise.

The main independent variables are our proxies for skill signals, $Skill\ Signal_{\mathrm{d,t\text{-}1}}$: directors' education and professional experience. Skill signals are measured over directors' lifespan, excluding experience from their current employment.

We interact each skill signal variable with a female dummy, $Femaledummy_{\mathrm{d}}$, which is equal to one for female directors, and zero otherwise. The impact of each skill signal on male directors' probability to enter a leadership position is captured by coefficient β_1. The marginal impact of each skill signal for female relative to male directors is captured by the coefficient on the interaction term, β_2. Finally, the baseline gender difference with respect to the likelihood to become CEO is captured by the coefficient on the female dummy, β_3.

Next, we focus on the ExecuComp sample and examine the probability that one of the non-CEO top executives becomes CEO in a given year, conditional on the provision of observable skill signals. We focus on the CEO position, because it represents the top of the corporate hierarchy (Baker et al., 2009) and can be considered as the ultimate prize in a tournament for promotion (Kale et al., 2009). We then re-estimate the same regression as in Equation 2, but replace the dependent variable by a dummy variable $CEO_{d,t}$, which is equal to one if an executive is CEO in a given year, and zero otherwise.

Following the previous literature, we include the following control variables. $Director\ Age_{\mathrm{d,t}}$ ($Director\ Age\ Squared_{\mathrm{d,t}}$) controls for the non-linear relationship between director age and the likelihood to become a CEO. Weisbach (1988), Murphy and Zimmerman (1993) and Bushman et al. (2010) show that there is a positive link between director age and the likelihood to become CEO up to an age of around 60 years. Being older than 60 years has a negative impact on the likelihood to become CEO, as the average retirement age is between age of 60 and age of 65. We also control for standard firm characteristics that might have an influence on the likelihood that a certain type of CEO is selected by different types of firms. Specifically, we include a firm's total assets, $Total\,Assets_{\mathrm{c,t\text{-}1}}$, as a proxy for size, and the market to book ratio, $Market\,to\,Book_{\mathrm{c,t\text{-}1}}$, as a proxy for firms' growth opportunities. Previous research shows that large firms and firms with high growth potential, select different types of CEOs compared to small and low growth potential firms (Schoar and Zuo, 2017). Firm performance has an impact on CEO turnover and selection (Jenter and Lewellen, 2021). Therefore, the stock return over the past year, $Return_{\mathrm{c,t\text{-}1}}$, is added as control variable. We also include a stock's idiosyncratic volatility, $Volatility_{\text{c,t-1}}$, as Bushman et al. (2010) show that there is a relationship between CEO turnover (new CEO appointments) and idiosyncratic risk.

Finally, we include firm and year fixed effects (α_c and α_t) or firm×year effects ($\alpha_{c,t}$). In our main specification, we estimate linear probability models and cluster standard errors by firm-year to account for dependencies due to multiple directors working at the same firm in a given year.[6]

3.1 Education signals and (female) directors' likelihood to enter a leadership position

Higher education in general and degrees from top-ranked colleges in particular have been shown to be crucial for reaching a managerial position (Useem and Karabel, 1986). If screening discrimination takes place in recruiting for leadership positions, these objective and observable skill signals may be even more important for female directors. We run fixed effects regressions as described in equation 2 and subsequently include our proxies for education signals, interacted with a female dummy variable, as main independent variables.

Results are reported in Table 4. We include firm and year fixed effects in columns (1) - (4) and firm-year fixed effects in columns (5)-(6). Additionally we add interactions of our control variables and the female dummy in columns (3)-(6), to account for the possibility that our results are driven by different company characteristics of firms in which male and female directors work.

Panel A shows the impact of education signals on (female) directors' likelihood to enter a leadership position. Results are based on the full BoardEx sample. First, we include Education Score as a proxy for education-based skill signals in columns (1), (3) and (5). This variable is measured as the highest degree (Bachelor, Master, PhD) a director obtained, and ranges between zero and three. We find that increasing the Education Score by one point (i.e. having a Master's instead of a Bachelor's degree) corresponds to a 1.8pp, or 4.2% relative to the baseline probability, increase in the likelihood of a male director to enter a leadership position. The interaction between Education Score and the female dummy is positive and statistically significant at the 1% level. A one point increase of the Education Score increases the likelihood of a female director to enter a

[6] Alternatively, we estimate logit regressions with industry and year fixed effects and double cluster standard errors by firm and year, which does not affect our results (see Appendix Tables OA2 and OA3).

leadership position by 2.9pp (column (1)) and 2.4pp (columns (3) and (5)), or 9.9% and 8.2% in relative terms. Independent of the specification, all results are statistically significant at the 1% level.

Second, we analyze whether graduating from a Top 50 ranked college increases female and male directors' likelihood to enter a leadership position. This variable is equal to one if a director graduated from a Top 50 ranked college in the US, and zero otherwise.[7] Columns (2), (4) and (6) show that having graduated from a Top 50 ranked college increases the probability to enter a leadership position by 0.4pp (column (6)) to 0.6pp (column (4)), or 0.9% to 1.4% (relative to the baseline probability) for male directors. Having graduated from a Top 50 ranked college is an even more valuable skill signal for female directors. It increases female directors' likelihood to enter a leadership position by 1.8pp (column (6)) to 2.8pp (column (2)) or, 6.1% to 9.6% in relative terms. Again, all results are statistically significant at the 1% level.

Panel B presents results from the ExecuComp sample and analyzes the impact of education signals on (female) executives' likelihood to become CEO. Columns (1), (3) and (5) present results for the Education Score. They show that a one point increase of the Education Score corresponds to a 3.0pp (column (1)) to 3.5pp increase of the likelihood that a male executive becomes CEO. As indicated by the statistically significant interaction term between Education Score and the female executive variable, a one point increase of the Education Score (for example, having a Master's degree instead of a Bachelor's degree) increases the likelihood that a female executive becomes CEO by 6.9pp (column (1)) to 8.5pp (column (5)). In relative terms, this corresponds to a 5.1% to 5.9% increase for male executives, and a 15.3% to 18.9% increase for female executives. In columns (2),(4) and (6) we examine whether graduating from a Top 50 ranked college increases female and male executives' probability to become CEO. We find that graduating from a Top 50 ranked college increases male executives' likelihood to become CEO by 6.5pp (column (2)) to 9.0pp (column (6)). We again find that educational skill signals are even more valuable for female executives. Graduating from a Top 50 ranked college increases female executives' likelihood to become CEO by 21.4pp to (column (2)) to 31.2pp (column (6)). Relative to the baseline probability to become CEO, this

[7]See Appendix Table OA1 for a list of all schools included in the Top50 rank.

corresponds to a 11.0% to 15.3% increase for male executives, and a 47.6% to 69.3% increase for female executives.

Overall, results in Table 4 show that signals of higher education are valuable for directors as they are associated with a higher likelihood to enter a leadership position and to become CEO of the company. The effect is particularly strong for female directors who benefit more from each skill signal, reflected by a larger increase in the likelihood to enter a leadership position and to become CEO.[8]

Results for control variables are broadly in line with the previous literature ((Weisbach, 1988; Murphy and Zimmerman, 1993; Bushman et al., 2010)). Most importantly, we find that female directors are significantly less likely than male directors to enter a leadership position and to become CEO, supporting the vast literature on gender differences in leadership positions (Blau and DeVaro, 2007; Bertrand, 2018; Kaplan and Sorensen, 2021). The likelihood to enter a leadership position or to become CEO is also still smaller for female directors with a large number of observable skill signals. Thus, skill signals mitigate, but do not close, the gender gap in leadership positions.

3.2 Professional experience and (female) directors' likelihood to enter a leadership position

According to Murphy and Zabojnik (2004), general managerial skills have become more important for leadership positions than firm specific skills. We now analyze whether and to what extent general managerial skills gained before working at the current firm are more important for female relative to male directors with respect to the likelihood to enter a leadership position and to become CEO. Results are reported in Table 5.

Panel A examines the impact of professional experience and (female) directors' likelihood to enter a leadership position. First, we use the Generalist Index score, computed as in Custódio et al. (2013), as a proxy for professional experience in columns (1), (3) and (5). Increasing the Generalist Index score by one standard deviation (i.e., higher general managerial skills) increases

[8] For robustness, we strictly analyze promotions into leadership positions and drop subsequent years in which a director is still in the same position from the sample. That is, we define a leadership promotion dummy variable that is only equal to one if a director enters a leadership position in year t, and that is equal to zero for the previous year in which the director was not already in this leadership position. Results are weaker for education based skills and robust for skills based on professional experience (see Appendix Table OA4).

male directors' probability to enter a leadership position by 5.8pp (column (3)) to 6.0pp (column (5)). This corresponds to 13.4% to 13.9% relative to the baseline probability. While not significant in column (1), the interaction term between the Generalist Index and the female dummy is positive and statistically significant at the 1% level in columns (3) and (5). A one standard deviation increase of the Generalist Index increases female directors' likelihood to enter a leadership position by 6.3pp or 21.52% in relative terms.[9] Second, we use same industry experience as a proxy for professional experience and define a dummy variable equal to one if a director has worked in the same industry before, and zero otherwise. Columns (2), (4) and (6) show that having same industry experience increases male directors' probability to enter a leadership position by 4.3pp (column (4)) to 4.5pp (columns (2) and (6)). Having same industry experience is even more important for female directors. It increases their likelihood to enter a leadership position by 5.8pp (column (2)) to 6.9pp (column (4)). Relative to the baseline probability, this corresponds to a 10.0% to 10.4% increase for male directors and a 19.8% to 23.6% increase for female directors.

Panel B analyzes the impact of professional experience and (female) executives' likelihood to become CEO. In columns (1), (3) and (5), we show that a higher Generalist Index score increases the probability of female and male executives to become CEO. A one standard deviation increase of the Generalist Index score corresponds to a 5.7pp (columns (1), (3)) to 8.64pp (column (5)) increase in male executives' likelihood to become CEO. Relative to the baseline probability, this corresponds to a 9.7% to 14.6% increase. The coefficient of the interaction term between the Generalist Index score and the female executive variable is also positive and economically and statistically significant at the 1% level. Specifically, a one standard deviation increase of the Generalist Index score (i.e., higher general managerial skills) increases female executives' probability to become CEO by 16.0pp (column (3)) to 19.2pp (column (5)), or 35.6% to 42.7%.[10]

In columns (2),(4) and (6), we analyze whether having same industry experience increases the likelihood to become CEO. We find that having industry experience increases male executives'

[9] In further analysis, we split the index into its components to test whether its overall impact on the likelihood to enter a leadership position is driven by one individual component. Panel A of Appendix Table OA5 shows that each of the index components except for conglomerate experience are more valuable for female directors than for male directors to enter a leadership position.

[10] We also split the Generalist Index into its individual components to test whether they have a differential impact on the likelihood to become CEO. Panel B of Appendix Table OA5 shows that the interaction between all components and the Female dummy variable are positive and statistically significant.

likelihood to become CEO by 1.4pp (column (2)) to 1.5pp (column (4)), or 2.4% to 2.5% in relative terms. Again, professional experience is an even more valuable skill signal for female executives. Having industry experience increases their likelihood to become CEO by 17.7pp (column (4)) to 20.8pp (column (6)) or 39.3% to 46.2%.

Results for control variables are broadly in line with the previous literature and the results in Table 4.

We also examine the second level of corporate hierarchy and check whether our results are similar for the likelihood to become Executive Vice President. Specifically, we repeat the regression outlined in equation 2 but replace the dependent variable with a dummy equal to one if a director is Executive Vice President in a given year, and zero otherwise. To determine the pool of potential candidates for Executive Vice President positions correctly, we restrict the sample to Executive VP, Senior VP, Group VP and VP, i.e. second level of corporate hierarchy, and drop all directors in a leadership position, i.e. the first level of corporate hierarchy. Results are reported in Appendix Table OA6. They show that all skill signals are associated with a higher likelihood to become Executive Vice President. The impact is again more pronounced for female directors who benefit more from each skill signal, reflected by a larger increase in the likelihood to become Executive Vice President. Thus, our results also hold for the second level of corporate hierarchy.

4 Does screening discrimination explain our results?

According to the models of screening discrimination by Cornell and Welch (1996), members of minority groups face a systematic disadvantage in hiring decisions, even if they are equally qualified. If hiring decisions are made by members of the majority group, these members may find it easier to judge on (unobservable) skills of applicants belonging to the majority group as well. To reduce uncertainty about unobservable skills, members of the minority group have an incentive to collect more observable skill signals to offset the adverse effects from hiring discrimination.

Even though women are not a minority in the overall labor market, and are even over-represented among human resources managers, who are usually involved in hiring decisions, they clearly are a minority when it comes to leadership positions.[11] Given that the hiring process for top management positions is overseen by the board's nomination committee, which is usually composed of men[12], women who aspire for a leadership position have an incentive to provide more observable skill signals to convince male members of the hiring committee that they are qualified.

To examine whether gender gaps in leadership are indeed reduced between female and male directors with a larger number of skill signals, we sort female and male directors into terciles conditional on whether and how much of a given skill signal they gathered. For each tercile, we then compute the gender gap in the likelihood to reach a leadership position and a CEO position respectively. We conjecture that gender gaps should be significantly smaller if female and male directors can provide more objective skill signals.

Results in Table 6 show that gender gaps are indeed more pronounced among female and male directors with fewer skill signals, while they decrease and are significantly smaller among female and male directors with more skill signals. Thus, a larger number of observable skill signals seems to be particularly important for women aspiring to reach a leadership position. These positions are characterized by less precise job descriptions and require a complex skill set along may dimensions, ranging from human resource management, to financial and strategic planing. This results in higher uncertainty regarding a potential match between the job's requirements and the applicant's skill set compared to standardized jobs characterized by mainly routine tasks.

Another prediction that follows from the model by Cornell and Welch (1996) is that observable skill signals should be more important for female directors if the hiring decision is made by men only. Thus, our results should be stronger for firms with an entirely male nomination committee. We formally test this conjecture in Table 7, where we include triple interactions between director gender, skill signal, and a female nomination dummy variable (*Nom*) which is equal to one if the nomination committee includes at least one female member, and zero otherwise.[13]

[11] According to data from statista, in 2021, 80 percent of human resources managers in the United States were women (see `https://www.statista.com/statistics/1088059/share-human-resources-managers-united-states-gender/`). At the same time, only 25.2% of board seats in the Russell 3000 belonged to women (see `https://www.equilar.com/reports/84-q2-2021-equilar-gender-diversity-index`).

[12] See `https://www2.deloitte.com/content/dam/Deloitte/global/Documents/gx-women-in-the-boardroom-seventh-edition.pdf`.

[13] Before 2005, more than 36% of the companies do not have a nomination committee. For 2006-2019 we do not observe a nomination committee for 4% to 6% of the companies. To avoid potential differences in firms selecting

Results in Table 7 show that the triple interactions between director gender, skill signal, and a female nomination committee dummy variable are negative and statistically significant at the 10% level for two skill signals and at the 1% level for one skill signal. For example, the coefficient of the triple interaction between director gender, Top 50 ranked college, and a female nomination committee dummy is -0.184. Thus, having graduated from a Top 50 ranked college is 18.4pp less important for female directors' likelihood to become CEO when the firm already has at least one female director in the nomination committee compared to firms with all-male nomination committees.

To further test the screening discrimination channel, we examine whether our results are stronger for outside hires. We conjecture that it should be easier for a firm to evaluate female candidates from inside the company, because information asymmetries should be smaller for directors with an employment history at the company. Thus, the provision of observable skill signals should be more important for female directors who enter a leadership position from outside the company. Therefore, we include a triple interaction between director gender, skill signal, and an outside dummy variable equal to one if a director has not worked for the company before entering the leadership position, and zero otherwise. Results are reported in Table 8. They provide suggestive evidence that skill signals are even more important for female outside directors compared to female inside directors. For Education Score and Generalist Index, the triple interaction is positive and statistically significant at the 1% level, i.e. increasing the Education Score by 1 point (i.e. having a Masters' instead of a Bachelors' degree) is 1.6pp more important for female outside directors' probability to enter a leadership position compared to female inside directors' probability. We do not observe significant triple interactions for Top50 ranked college degrees and same industry experience.

Finally, we examine whether our results are stronger for firms located in states with conservative gender norms, where the "Think manager - Think male" paradigm (Koenig et al., 2011), according to which men are better suited for leadership positions, should be more common. This may amplify hiring disadvantages for female directors stemming from screening discrimination. As republican states have more conservative gender norms than democratic states (May and McGarvey, 2017), we expect that it is more challenging for female directors to enter a leadership position in republican states compared to democratic states. If this is the case, our skill signals should be even more im-

into having a nomination committee, we restrict the sample to 2006-2019 for our analysis. Our results (not reported) remain robust but become weaker if we include years before 2006.

portant for female directors' likelihood to enter a leadership position in republican states compared to democratic states.

In Table 9, we include a triple interaction between director gender, skill signal, and a conservative dummy variable which is equal to one if a firm's headquarter state has voted for republicans in at least 4 out of the 5 presidential elections between 2000 and 2019, and zero if the state of the headquarter of the company has voted for democrats in at least 4 out of the 5 presidential elections between 2000 and 2019. We find that all four triple interactions between director gender, skill signal, and the conservative state dummy are positive. However, only Top50 ranked college and same industry experience are statistically significant at the 1% level. For example, having graduated from a Top50 ranked college is 2.8pp more important for female directors entering a leadership position in a company headquartered in a more conservative state.

To conclude, Tables 6 to 9 provide support for screening discrimination being a main driver of our results. In addition, they rule out several alternative explanations based on selection effects or gender differences in preferences among female and male directors, as these would be hard to reconcile with cross-sectional differences conditional on, for example, the gender composition of the nomination committee.

5 Skill signals and executive compensation

Screening discrimination may also result in lower compensation of female vs. male executives. If male employers can judge male job applicants' unknown qualities better than those of female applicants, they may also find it more difficult to determine the market value of a female executive, when setting the compensation contract.

Previous research shows that signals of higher education (Useem and Karabel, 1986; Graham et al., 2012) and signals of professional experience (Murphy and Zabojnik, 2004; Custódio et al., 2013) have a positive impact on executive compensation. Therefore, we conjecture that observable skill signals are also more important for female executives' when it comes to determining their compensation.

To test this conjecture, we run the same set of fixed effect regressions as in Equation 2, but use the inverse hyperbolic sine of total compensation, $Compensation_{\mathrm{d,t}}$, as dependent variable. We include the same set of control variables, because the previous literature shows that they are also relevant for executive compensation (Gibbons and Murphy (1992), Kuhnen and Niessen (2012), Gabaix and Landier (2008); Tervio (2008), (Graham et al., 2012), Core et al. (1999)). As in our previous regressions, we also include firm and year fixed effects or firm×year firm effects and interact all control variables with the female dummy variable.

5.1 Education signals and (female) executives' compensation

Advanced degrees are not only crucial for directors to reach leadership positions (Useem and Karabel, 1986), but are also associated with higher compensation (Graham et al., 2012). Graham et al. (2012) provide evidence that executives with higher education, which is often used as a proxy for managerial talent, receive higher pay. Therefore, we now test whether the impact of observable signals such as higher education are a more important determinant for female executives' compensation contracts compared to male executives' compensation contracts.[14]

Table 10 shows the results for our two education signals. Results in columns (1), (3) and (5) show that a one point increase of the Education Score corresponds to a 3.7% increase in total compensation for male executives. In absolute terms, this corresponds to $158,400 higher compensation for the average male executive in our sample. The interaction between Education Score and the female dummy variable is positive and statistically significant at the 10% level in columns (1) and (5) and at the 5% level in column (3). In economic terms, a one point increase of the Education Score (i.e., having a Master's degree instead of a Bachelor's degree) increases total compensation of female executives between 7.8%, or $315,300 in column (1) and 10.9% or $440,600 in column (5).

In columns (2), (4) and (6) we analyze whether executives who have graduated from a Top 50 ranked US college receive higher compensation. We show that graduating from a Top 50 ranked college increases male executives' total compensation by 4.9% in columns (2) and (4) and by 5.4% in column (6). We again find that educational skill signals are even more valuable for female executives. Graduating from a Top 50 ranked college increases female executives' total compensation between 25.2% (column (1)) and 36.1%. This corresponds to an increase of $209,700 to $231,100 for male executives, and $1,018,600 to $1,442,000 for female executives in absolute terms.

[14]The following results are based on the ExecuComp sample, because BoardEx lacks compensation data for more than 70% of the observations in our sample.

Overall, results in Table 10 show that signals of higher education are valuable for executives as they are associated with higher total compensation. The effect is particularly strong for female executives who benefit more from each education-based skill signal in terms of higher total compensation than their male counterparts.[15]

Again, the female dummy is negative in all specifications, indicating that female executives earn about 25% less than male executives (columns (1)-(2)). This finding supports the vast literature on the gender pay gap (Blau and Kahn, 2017). In our sample, the gender pay gap amounts to 26% which compares well to findings in Bell (2005) who report a gender pay gap in the gross compensation of 25%. Our result also supports findings of Bertrand and Hallock (2001), according to which the gender pay gap is more pronounced among women and men in leadership positions. We find that signals oh higher education mitigate, but do not close, the gender pay gap in leadership positions.

Director age is positively related to total compensation up 59 years. Being older than 59 has a negative impact on directors' compensation, which is in inline with previous research (Gibbons and Murphy, 1992; Kuhnen and Niessen, 2012). Total assets have a positive and statistically significant impact on the compensation, supporting the previous literature on the link between firm size and executive pay (Baker et al., 1988; Murphy, 1999; Gabaix and Landier, 2008). We also find that better performing managers receive higher total compensation. The coefficient of idiosyncratic volatility is negative and statistically significant at the 1% level. A one standard deviation increase in idiosyncratic volatility decreases directors' compensation by 0.03%. Thus, the economic significance is very small which is inline with previous research, e.g. Core et al. (1999); Graham et al. (2012). Also as expected from the previous literature (Core et al., 1999), our results show that directors in firms with higher market-to-book ratios (i.e., more growth opportunities) receive higher compensation.

5.2 Professional experience signals and (female) executives' compensation

Custódio et al. (2013) show that executives with higher general managerial skills receive higher compensation. We now test whether female executives benefit more from general managerial skill signals than male executives. Table 11 shows the results.

[15]Our results are not mainly driven by the CEOs in our sample and are robust to excluding CEOs (see Panel A of Table OA7). Results also hold if we restrict the sample to promotions to CEO positions and drop subsequent years in which an executive is still CEO (see Panel B of Table OA7).

In columns (1), (3) and (5), we use the Generalist Index as a proxy for professional experience. This variable proxies for general managerial ability gained during past work experience (see Equation 1). We find that a one standard deviation increase of the Generalist Index corresponds to a 10.2% increase in total compensation for male executives (column (1)). In absolute terms, this corresponds to $436,600 higher compensation. Firms on average pay higher compensation for executives with more general management skills according to the Generalist Index (and each of its components as shown in Appendix Table OA8). This result compares well with findings in Custódio et al. (2013). In their analysis, a one standard deviation increase of the Generalist Index leads to a pay increase of up to 12% ($500,000).

More importantly, the interaction term between the Generalist Index and the female dummy variable is positive and statistically significant at the 1% level in columns (1) and (3) and at the 10% level in column (5). In economic terms, a one standard deviation increase of the Generalist Index increases total compensation of female executives by 15.4% or $622,400 (based on column (1)).

We also find that same industry experience is positively associated with total compensation (column (2), (4) and (6)). Having worked in the same industry before the current employment increases male executives' total compensation by 8.1% or $346,700, and female executives' total compensation by 31.7%, or $1,281,300 (column (2)).

We conclude that signals of professional experience are not only more important for female directors' likelihood to enter a leadership position and to become CEO, but also increase their total compensation more strongly than that of male directors.

6 Conclusion

We show that female directors' careers benefit more from signals of higher education and professional experience than careers of male directors. We observe substantial increases in the likelihood to enter a leadership position, to become CEO and in the level of compensation for female directors with more objective and observable skill signals. Female directors seem to be aware of the additional benefits received from these signals. We find that they posses more of these signals than their male counterparts.

We also provide support for screening discrimination being the main driver of our results. Observable skill signals are more important for female directors if the hiring decision is made by men only and if female directors enter the leadership positions from outside the company or work for firms headquartered in states with conservative gender norms. We would not expect the see such a difference between companies with or without women on their nomination committees if our main result was driven by selection of different types of men and women into the sample, or hetereogeneity in their preferences for leadership positions.

Do our results suggest that equally qualified women have the burden to collect more skill signals to be considered for leadership positions, receive higher pay, and eventually close gender gaps in leadership positions and earnings? As long as there are different baseline probabilities for men and women to reach a leadership position (which is the case in our sample), and if women are not equally represented among recruiters and nominating committees, the answer is yes.

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Figure 1: Fraction of Female Directors

This figure shows the fraction of female directors in our sample. The time period is from 2000 to 2019. The fraction of female directors is defined as the number of unique female directors in each year divided by the total number of unique directors in each year. The fraction of female leaders is defined as the number of unique female directors in a leadership position (CEO, Chairwoman, Vice Chair, President, CFO, COO and Other Chief Officers) divided by the total number of unique directors in a leadership position (CEO, Chairwoman, Vice Chair, President, CFO, COO and Other Chief Officers). The fraction of female CEOs is defined as the number of unique female CEOs each year divided by the total number of unique CEOs in each year. All numbers are based on the BoardEx sample.

Table 1: Summary Statistics

This table presents summary statistics on all variables used in the paper. Data are obtained from Boardex, Compustat, and Execucomp. The sample runs from 2000 to 2019. Panel A presents director characteristics. Leadership Position is a dummy variable equal to one if director is in a leadership position (CEO, Chairwoman, Vice Chair, President, CFO, COO and Other Chief Officers), and zero otherwise. Total compensation is in thousands. Asinh(Total Compensation) is the inverse hyperbolic sine of total compensation. Female is a dummy variable equal to one for female directors, and zero otherwise. Age is the age of the director in years. CEO is an indicator variable that takes the value of one if the director is CEO, and zero otherwise. Education Score is defined according to Graham et al. (2012). Top 50 ranked college is an indicator that is equal to one if the director graduated from a Top 50 ranked college, and zero otherwise. Generalist Index is defined as the Generalist Ability Index from Custódio et al. (2013). Same Industry Experience is an indicator that is equal to one if the director worked in the same industry before, and zero otherwise. Panel B presents firm characteristics. Total assets are from Compustat. Last year return is the annual stock return from CRSP. Idiosyncratic Volatility is defined as the squared residual estimated in a five-year rolling window CAPM regression of monthly returns. Market to book is the ratio of the market value of equity at the fiscal year end divided by the book equity for the fiscal year. All variables are winsorized at the 1st and 99th percentile, and described in detail in Variable Appendix A1.

Panel A: Director characteristics

	mean	median	std	1th	99th	obs
Female	0.16	0.00	0.36	0.00	1.00	784,592
Age	49.68	50.00	9.41	29.00	75.00	784,592
Leadership position	0.41	0	0.49	0	1	784,592
CEO	0.09	0.00	0.29	0.00	1.00	784,592
Total Compensation	4,268.19	2,604.80	4,597.75	188.49	20,072.90	52,812
Asinh(Total Compensation)	8.53	8.56	1.08	5.93	10.60	52,812
Education Score	1.06	1.00	0.92	0.00	3.00	784,592
Top50 ranked college	0.19	0.00	0.39	0.00	1.00	784,592
Generalist index	0.67	0.00	1.02	0.00	4.16	784,592
Same Industry Experience	0.23	0.00	0.42	0.00	1.00	784,592

Panel B: Firm characteristics

	mean	median	std	1th	99th	obs
Assets	16,265.80	2,020.10	34,397.74	12.66	159103.00	756,681
Asinh(Assets)	8.34	8.30	2.31	3.23	12.67	756,681
Last year return in %	13.75	7.39	67.30	-82.69	229.08	784,592
Idiosyncratic Volatility in %	1.92	0.23	82.86	0.00	19.81	773,652
Market to book	3.22	2.15	5.18	-10.17	23.97	756,630

Table 2: Gender differences in personal characteristics and skill signals

This table presents the mean values of different director characteristics related to the educational background and professional experience for the overall sample, and for female and male directors, separately. We calculate the difference between female and male directors and t-stat shows the corresponding t-statistic based on standard errors clustered by director level. Panel A and B present gender differences for the full BoardEx sample Panel A presents personal characteristics and skill signals for the overall sample, Panel B presents skill signals for directors in a leadership position (CEO, Chairwoman, Vice Chair, President, CFO, COO and Other Chief Officers), and Panel C presents skill signals for the Execucomp sample. All variables are defined in detail in Appendix Table A1.

	All	Female	Male	Difference	t-stat	Normalized differences
Panel A: All						
Age	49.68	47.35	50.10	-2.75	-34.57	- 0.292
Leadership position	0.41	0.29	0.43	-0.14	-36.39	- 0.282
CEO position	0.09	0.02	0.11	-0.09	-54.87	-0.299
Number of Board Seats	0.43	0.23	0.47	-0.24	29.32	-0.195
Education Score	1.062	1.048	1.065	-0.017	-1.89	-0.018
Top50 ranked college	0.186	0.184	0.186	-0.001	-0.36	-0.004
Generalist Index	0.669	0.662	0.670	-0.008	-0.86	-0.008
Same Industry Experience	0.234	0.227	0.236	-0.009	-2.47	-0.021
Panel B: Leader						
Age	51.73	49.68	51.98	-2.30	-20.29	-0.266
CEO position	0.23	0.07	0.25	-0.18	-41.53	-0.430
Number of Board Seats	0.79	0.47	0.83	-0.36	-29.32	-0.227
Education Score	1.074	1.090	1.072	0.018	1.29	0.02
Top50 ranked college	0.179	0.184	0.179	0.005	0.77	0.12
Generalist Index	0.826	0.911	0.815	0.096	5.31	0.083
Same Industry Experience	0.264	0.280	0.263	0.017	2.68	0.039
Panel C: CEO						
Age	55.41	53.11	55.49	-2.38	-5.07	-0.237
CEO position	0.59	0.45	0.59	-0.14	-5.73	-0.282
Number of Board Seats	1.95	2.01	1.95	0.06	0.59	0.068
Total Compensation	4,268.20	4,041.87	4,279.91	-238.04	-0.94	-0.011
Education Score	1.222	1.216	1.222	-0.006	-0.12	-0.02
Top 50 ranked college	0.228	0.296	0.224	0.072	2.40	0.181
Generalist Index	1.209	1.581	1.180	0.401	3.55	0.370
Same Industry Experience	0.280	0.335	0.276	0.059	2.05	0.160

Table 3: Where did female directors in a leadership position graduate?

This table shows the number of female and male directors in a leadership position that graduated from a given university. We only include universities where at least 25 female directors in a leadership position graduated. Percentage is the number of female directors in a leadership position divided by the total number of directors in a leadership position who graduated from the same university.

Rank	Percentage	# All	# Male	# Female	University
1	14.0%	207	178	29	University of Washington
2	13.6%	361	312	49	Indiana University
3	12.5%	287	251	36	Georgetown University
4	11.9%	630	555	75	Northwestern University
5	11.7%	214	189	25	Boston College
6	11.5%	295	261	34	University of North Carolina Chapel Hill
7	11.5%	262	232	30	Oregon State University
8	11.3%	459	407	52	Cornell University
9	11.3%	648	575	73	University of California Berkeley
10	11.3%	560	497	63	Columbia University
11	11.1%	316	281	35	Duke University
12	10.9%	506	451	55	University of Texas
13	10.7%	261	233	28	Michigan State University
14	10.6%	1610	1439	171	Harvard University
15	10.5%	305	273	32	Penn State University
16	9.9%	538	485	53	University of Chicago
17	9.4%	947	858	89	Stanford University
18	9.2%	585	531	54	University of Michigan
19	9.2%	488	443	45	New York University
20	8.5%	331	303	28	SUNY at Buffalo
21	8.5%	943	855	79	University of Pennsylvania
22	8.2%	376	345	31	University of Wisconsin
23	7.8%	424	391	33	University of Illinois Urbana-Champaign
24	7.8%	347	320	27	California State University Sacramento
25	7.6%	353	326	27	University of Southern California
26	6.6%	378	353	25	University of Virginia
27	6.2%	487	457	30	Massachusetts Institute of Technology

Table 4: Are signals of higher education more beneficial for female directors?

This table presents results on the impact of female directors' educational background on their likelihood to enter a leadership position in Panel A and to become CEO in Panel B. Results in Panel A are based on the full BoardEx sample, results in Panel B are based on the Execucomp sample. Education Score is defined according to Graham et al. (2012). Top 50 ranked college is an indicator that is equal to one if a director graduated from a Top 50 ranked college, and zero otherwise. Female dummy is an indicator variable that takes the value of one if a director is female, and zero otherwise. Age (squared) is the age (squared) of a director. Total assets is the inverse hyperbolic sine transformation of firm's book value of total assets. Market to Book is the ratio of the market value of equity divided by the book value of equity. Last year return is the raw annual stock return ending on the fiscal year-end date. Idiosyncratic volatility is the squared residual estimated from a CAPM regression of monthly returns. In columns (3) - (6), the control variables are interacted with the female indicator variable. The regression includes firm and year fixed effects in columns (1) - (4) and firm-year fixed effects in columns (5) and (6). *t*-statistics based on standard errors clustered by firm-year level are shown in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Panel A: Likelihood to enter a leadership position	(1)	(2)	(3)	(4)	(5)	(6)
Education Score_{t-1}	0.018***		0.018***		0.018***	
	(24.30)		(24.98)		(24.45)	
Education Score_{t-1} x Female dummy	0.011***		0.006***		0.006***	
	(7.26)		(4.01)		(3.95)	
Top50 ranked college_{t-1}		0.005***		0.006***		0.004***
		(3.02)		(3.63)		(2.71)
Top50 ranked college_{t-1} x Female dummy		0.023***		0.014***		0.014***
		(6.22)		(3.74)		(3.86)
Female dummy	-0.123***	-0.116***	-0.186***	-0.195***	-0.162***	-0.171***
	(54.63)	(67.75)	(7.38)	(7.73)	(6.28)	(6.63)
Age_t	0.041***	0.041***	0.042***	0.042***	0.042***	0.043***
	(89.34)	(90.02)	(85.44)	(85.92)	(84.59)	(85.05)
Age squared_t	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(71.95)	(72.68)	(69.03)	(69.59)	(68.03)	(68.55)
Assets_{t-1}	-0.024***	-0.024***	-0.028***	-0.027***		
	(23.70)	(23.41)	(26.60)	(26.38)		
Last year return in $\%_t$	-0.000**	-0.000**	-0.000**	-0.000**		
	(2.25)	(2.11)	(2.23)	(2.11)		
Idiosyncratic Volatility in $\%_t$	0.000	0.000	0.000	0.000		
	(1.50)	(1.45)	(0.58)	(0.56)		
Market to Book_{t-1}	-0.000	-0.000	-0.000	-0.000		
	(0.79)	(0.95)	(0.10)	(0.27)		
Controls x Female dummy	No	No	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	No	No
Year FE	Yes	Yes	Yes	Yes	No	No
Firm x Year FE	No	No	No	No	Yes	Yes
Adjusted R^2	0.160	0.159	0.161	0.161	0.125	0.124
Observations	749724	749724	747512	747512	748914	748914

Table 4: cont'd

Panel B: Likelihood to become CEO	(1)	(2)	(3)	(4)	(5)	(6)
Education Score$_{t-1}$	0.030***		0.031***		0.035***	
	(7.44)		(7.51)		(4.44)	
Education Score$_{t-1}$ x Female dummy	0.039***		0.042***		0.050*	
	(2.60)		(2.74)		(1.81)	
Top 50 ranked college$_{t-1}$		0.065***		0.064***		0.090***
		(7.95)		(7.89)		(5.68)
Top 50 ranked college$_{t-1}$ x Female dummy		0.149***		0.168***		0.222***
		(4.56)		(4.96)		(3.62)
Female dummy	-0.244***	-0.239***	-1.732***	-1.687***	-1.266**	-1.167**
	(11.39)	(15.14)	(5.42)	(5.27)	(2.32)	(2.15)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Controls x Female dummy	No	No	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	No	No
Year FE	Yes	Yes	Yes	Yes	No	No
Firm x Year FE	No	No	No	No	Yes	Yes
Adjusted R^2	0.184	0.185	0.184	0.185	-0.532	-0.528
Observations	50227	50227	50227	50227	32975	32975

Table 5: Do signals of professional experience increase female directors' probability to enter a leadership position?

This table presents results on the impact of professional experience signals on female directors' likelihood to enter a leadership position in Panel A and to become CEO on female executives likelihood to become CEO in Panel B. Results in Panel A are based on the full BoardEx sample, results in Panel B are based on the Execucomp sample. Generalist Index is defined as in Custódio et al. (2013). Same Industry Experience is an indicator equal to one if a director worked in the same industry before, and zero otherwise. Female dummy is an indicator variable that takes the value of one if a director is female, and zero otherwise. All variables are defined in detail in Appendix Table A1. In columns (3) - (6), the control variables are interacted with the female indicator variable. The regression includes firm and year fixed effects in columns (1) - (4) and firm-year fixed effects in columns (5) and (6). t-statistics based on standard errors clustered by firm-year level are shown in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Panel A: Likelihood to enter a leadership position	(1)	(2)	(3)	(4)	(5)	(6)
Generalist Index$_t$	0.058***		0.057***		0.059***	
	(82.04)		(81.16)		(80.74)	
Generalist Index$_t$ x Female dummy	0.002		0.006***		0.004***	
	(1.28)		(3.86)		(2.77)	
Same Industry Experience$_t$		0.045***		0.043***		0.045***
		(28.08)		(26.53)		(26.83)
Same Industry Experience$_t$ x Female dummy		0.013***		0.026***		0.023***
		(3.56)		(7.19)		(6.45)
Female dummy	-0.113***	-0.114***	-0.151***	-0.174***	-0.130***	-0.154***
	(62.92)	(65.92)	(6.01)	(6.95)	(5.03)	(5.97)
Age$_t$	0.038***	0.040***	0.039***	0.041***	0.040***	0.042***
	(84.21)	(88.13)	(81.41)	(84.96)	(80.28)	(83.51)
Age squared$_t$	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(68.94)	(70.87)	(66.82)	(68.55)	(65.73)	(67.08)
Assets$_{t-1}$	-0.025***	-0.024***	-0.028***	-0.028***		
	(24.56)	(23.72)	(27.46)	(26.73)		
Last year return in %$_t$	-0.000**	-0.000**	-0.000**	-0.000**		
	(2.06)	(2.13)	(2.04)	(2.14)		
Idiosyncratic Volatility in %$_t$	0.000	0.000	0.000	0.000		
	(1.53)	(1.41)	(0.62)	(0.57)		
Market to Book$_{t-1}$	-0.000	-0.000	0.000	-0.000		
	(0.28)	(0.83)	(0.65)	(0.01)		
Controls x Female dummy	No	No	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	No	No
Year FE	Yes	Yes	Yes	Yes	No	No
Firm x Year FE	No	No	No	No	Yes	Yes
Adjusted R^2	0.170	0.160	0.172	0.162	0.136	0.125
Observations	749724	749724	749724	749724	748914	748914

Table 5: cont'd

Panel B: Likelihood to become CEO	(1)	(2)	(3)	(4)	(5)	(6)
Generalist Index$_t$	0.040***		0.040***		0.062***	
	(15.63)		(15.62)		(10.98)	
Generalist Index$_t$ x Female dummy	0.051***		0.050***		0.046***	
	(6.96)		(6.53)		(2.99)	
Same Industry Experience$_t$		0.014*		0.015*		0.002
		(1.78)		(1.84)		(0.09)
Same Industry Experience$_t$ x Female dummy		0.173***		0.162***		0.208***
		(5.78)		(5.34)		(3.35)
Female dummy	-0.291***	-0.258***	-0.893***	-1.357***	-0.291	-0.793
	(17.62)	(15.48)	(2.86)	(4.34)	(0.56)	(1.51)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Controls x Female dummy	No	No	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	No	No
Year FE	Yes	Yes	Yes	Yes	No	No
Firm x Year FE	No	No	No	No	Yes	Yes
Adjusted R^2	0.191	0.183	0.191	0.183	-0.512	-0.535
Observations	50227	50227	50227	50227	32975	32975

Table 6: Gender gaps across skill signals terciles

This table presents gender gaps conditional on female and male directors belonging to the same tercile of a given skill signal. We group all directors with the lowest number of a given skill signal into Tercile 1, and directors with the highest number of skill signals into Tercile 3. For skill signals based on binary variables, we only group directors into two groups, correspondingly. In the next step, for each tercile, we calculate the difference between female and male directors' likelihood to be in a leadership position in Panel A, to be CEO in Panel B, and the difference between female and male directors' compensation in Panel C. Results in Panel A are based on the full BoardEx sample, results in Panel B and Panel C are based on the Execucomp sample. Compensation is measured as the inverse hyperbolic sine of Execucomp's total compensation variable. Average differences between female and male directors for each tercile are reported in columns (1) to (3). The difference in gender gaps between the lowest (Tercile 1) and highest (Tercile 3) tercile are reported in column (4). t-statistics based on robust standard errors are shown in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Panel A: Gender gaps in the likelihood to be in a leadership position

	Tercile 1 (low) (1)	Tercile 2 (2)	Tercile 3 (high) (3)	Difference T1 - T3 (4)
Top50 ranked college	-0.142***		-0.124***	-0.018***
	(-83.55)		(-36.56)	(-4.63)
Education Score	-0.140***	-0.139***	-0.107***	-0.033***
	(-58.78)	(-4.22)	(-13.73)	(-3.75)
Generalist Index	-0.144***	-0.139***	-0.121***	-0.023***
	(-77.21)	(-39.64)	(-35.41)	(-6.00)
Industry Experience	-0.143***		-0.119***	-0.024***
	(-83.84)		(-37.06)	(-6.62)

Panel B: Gender gaps in the likelihood to be CEO

	Tercile 1 (low) (1)	Tercile 2 (2)	Tercile 3 (high) (3)	Difference T1 - T3 (4)
Education Score	-0.131***	-0.153***	-0.040	-0.091
	(-9.69)	(-8.90)	(-0.66)	(-1.44)
Top50 ranked college	-0.174***		-0.061***	-0.113***
	(-14.17)		(-3.17)	(-4.98)
Generalist Index	-0.272***	-0.122***	-0.055***	-0.218***
	(-19.39)	(-4.78)	(-3.57)	(-9.75)
Industry Experience	-0.181***		-0.067***	-0.114***
	(-14.38)		(-3.72)	(-5.20)

Panel C: Gender gaps in compensation

	Tercile 1 (low) (1)	Tercile 2 (2)	Tercile 3 (high) (3)	Difference T1 - T3 (4)
Education Score	-0.089***	-0.079**	0.519***	-0.608***
	(-3.12)	(-2.13)	(3.33)	(-4.39)
Top50 ranked college	-0.160***		0.101**	-0.261***
	(-6.09)		(2.39)	(-5.18)
Generalist Index	-0.306***	-0.140**	0.042	-0.349***
	(-9.60)	(-2.52)	(1.38)	(-7.14)
Industry Experience	-0.221***		0.182***	-0.403***
	(-8.05)		(5.10)	(-8.34)

Table 7: Does female representation in the nomination committee matter?

This table investigates whether female representation in the nomination committee matters for female executives' likelihood to become CEO. Education Score is defined as in Graham et al. (2012). Top 50 ranked college is an indicator equal to one if a director graduated from a Top 50 ranked college, and zero otherwise. Generalist Index is defined as in Custódio et al. (2013) Same Industry Experience is an indicator equal to one if a director worked in the same industry before, and zero otherwise. Nom is an indicator variable that takes the value of one if there is at least one female director in the nomination committee of a company, and zero otherwise. Female dummy is an indicator variable that takes the value of one if a director is female, and zero otherwise. Controls are the same as in Tables 4 - 5 and the control variables are interacted with the female indicator variable. The regression includes firm-year fixed effects. t-statistics based on standard errors clustered by firm-year level are shown in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Likelihood to become CEO	(1)	(2)	(3)	(4)
Education Score$_{t-1}$	0.035***			
	(5.14)			
Education Score$_{t-1}$ x Female dummy	0.080***			
	(3.07)			
Education Score$_{t-1}$ x Nom	-0.001			
	(0.10)			
Education Score$_{t-1}$ x Nom x Female dummy	-0.064*			
	(1.95)			
Top 50 ranked college$_{t-1}$		0.074***		
		(5.35)		
Top 50 ranked college$_{t-1}$ x Female dummy		0.318***		
		(5.84)		
Top 50 ranked college$_{t-1}$ x Nom		-0.019		
		(1.20)		
Top 50 ranked college$_{t-1}$ x Nom x Female dummy		-0.184***		
		(2.88)		
Generalist Index$_t$			0.038***	
			(8.88)	
Generalist Index$_t$ x Female dummy			0.065***	
			(4.60)	
Generalist Index$_t$x Nom			-0.008*	
			(1.66)	
Generalist Index$_t$x Nom x Female dummy			-0.027*	
			(1.72)	
Same Industry Experience$_t$				0.031**
				(2.35)
Same Industry Experience$_t$ x Female dummy				0.173***
				(3.42)
Same Industry Experience$_t$x Nom				-0.050***
				(3.44)
Same Industry Experience$_t$x Nom x Female dummy				-0.053
				(0.91)
Nom x Female dummy	0.160***	0.157***	0.108***	0.102***
	(3.49)	(4.95)	(3.07)	(2.99)
Nom	-0.002	0.001	0.009	0.014**
	(0.15)	(0.14)	(1.10)	(2.00)
Female dummy	-1.392***	-1.239***	-0.514	-0.988***
	(4.12)	(3.72)	(1.56)	(3.03)
Controls	Yes	Yes	Yes	Yes
Controls x Female	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.197	0.198	0.202	0.196
Observations	36618	36618	36618	36618

Table 8: The impact of female outside directors on female directors' likelihood to enter a leadership position

This table investigates whether our main results are stronger for outside hires. Education Score is defined as in Graham et al. (2012). Top 50 ranked college is an indicator equal to one if a director graduated from a Top 50 ranked college, and zero otherwise. Generalist Index is defined as in Custódio et al. (2013). Same Industry Experience is an indicator equal to one if a director worked in the same industry before, and zero otherwise. Outside is an indicator variable that takes the value of one if a director has not worked for the company before the current employment, and zero otherwise. Female dummy is an indicator variable that takes the value of one if a director is female, and zero otherwise. Controls are the same as in Tables 4 - 5 and he control variables are interacted with the female indicator variable. The regression includes firm-year fixed effects. *t*-statistics based on standard errors clustered by firm-year level are shown in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Likelihood to enter a leadership position	(1)	(2)	(3)	(4)
Education Score$_{t-1}$	0.0249***			
	(24.37)			
Education Score$_{t-1}$ x Female dummy	-0.0018			
	(0.74)			
Education Score$_{t-1}$ x Outside	-0.0144***			
	(10.72)			
Education Score$_{t-1}$ x Outside x Female dummy	0.0155***			
	(4.94)			
Top50 ranked college$_{t-1}$		0.0201***		
		(8.55)		
Top50 ranked college$_{t-1}$ x Female dummy		0.0136**		
		(2.42)		
Top50 ranked college$_{t-1}$ x Outside		-0.0340***		
		(10.88)		
Top50 ranked college$_{t-1}$ x Outside x Female dummy		0.0019		
		(0.26)		
Generalist Index$_t$			0.0923***	
			(91.16)	
Generalist Index$_t$x Female dummy			-0.0048*	
			(1.88)	
Generalist Index$_t$x Outside			-0.0390***	
			(30.82)	
Generalist Index$_t$x Outside x Female dummy			0.0153***	
			(4.82)	
Same Industry Experience$_t$				0.0685***
				(27.42)
Same Industry Experience$_t$x Female dummy				0.0191***
				(3.11)
Same Industry Experience$_t$x Outside				-0.0033
				(1.06)
Same Industry Experience$_t$x Outside x Female dummy				-0.0033
				(0.43)
Outside x Female dummy	0.0281***	0.0442***	0.0290***	0.0425***
	(6.32)	(13.32)	(8.39)	(12.83)
Outside	-0.1145***	-0.1237***	-0.1239***	-0.1365***
	(56.89)	(81.11)	(77.02)	(86.57)
Female dummy	-0.1963***	-0.2131***	-0.1479***	-0.1933***
	(7.50)	(8.17)	(5.64)	(7.41)
Controls	Yes	Yes	Yes	Yes
Controls x Female dummy	Yes	Yes	Yes	Yes
Firm x Year FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.139	0.138	0.155	0.140
Observations	748914	748914	748914	748914

Table 9: The impact of conservative gender norms on (female) directors' likelihood to enter a leadership position

This table shows the impact of conservative gender norms in a firm's headquarter state on our main results. Education Score is defined as in Graham et al. (2012). Top 50 ranked college is an indicator equal to one if a director graduated from a Top 50 ranked college, and zero otherwise. Generalist Index is defined as in Custódio et al. (2013). Same Industry Experience is an indicator equal to one if a director worked in the same industry before, and zero otherwise. Cons is an indicator variable that takes the value of one if a firm's headquarter state voted for republicans in at least 4 out of the 5 president elections between 2000 and 2019, and zero if a firm's headquarter state voted for democrats in at least 4 out of the 5 president elections between 2000 and 2019 otherwise. Female dummy is an indicator variable that takes the value of one if a director is female, and zero otherwise. Controls are the same as in Tables 4 - 5 and the control variables are interacted with the female indicator variable. The regressions include firm-year fixed effects. t-statistics based on standard errors clustered by firm-year level are shown in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Likelihood to enter a leadership position	(1)	(2)	(3)	(4)
Education Score$_{t-1}$	0.0096***			
	(9.02)			
Education Score$_{t-1}$ x Female dummy	0.0009			
	(0.38)			
Education Score$_{t-1}$ x Cons	0.0072***			
	(3.54)			
Education Score$_{t-1}$ x Cons x Female dummy	0.0024			
	(0.56)			
Top50 ranked college$_{t-1}$		-0.0107***		
		(4.62)		
Top50 ranked college$_{t-1}$ x Female dummy		0.0046		
		(0.91)		
Top50 ranked college$_{t-1}$ x Cons		0.0132***		
		(2.95)		
Top50 ranked college$_{t-1}$ x Cons x Female dummy		0.0275***		
		(2.70)		
Generalist Index$_t$			0.0489***	
			(43.79)	
Generalist Index$_t$x Female dummy			0.0071***	
			(3.20)	
Generalist Index$_t$x Cons			0.0232***	
			(12.07)	
Generalist Index$_t$x Cons x Female dummy			-0.0042	
			(0.99)	
Same Industry Experience$_t$				0.0309***
				(12.33)
Same Industry Experience$_t$x Female dummy				0.0195***
				(3.79)
Same Industry Experience$_t$x Cons				0.0355***
				(7.67)
Same Industry Experience$_t$x Cons x Female dummy				0.0300***
				(2.84)
Cons x Female dummy	-0.0151**	-0.0168***	-0.0053	-0.0153***
	(2.56)	(3.76)	(1.14)	(3.47)
Female dummy	-0.0929***	-0.1025***	-0.0583*	-0.0818**
	(2.81)	(3.10)	(1.75)	(2.47)
Controls	Yes	Yes	Yes	Yes
Controls x Female dummy	Yes	Yes	Yes	Yes
Firm x Year FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.107	0.107	0.119	0.108
Observations	447242	447242	447242	447242

Table 10: The impact of education signals on (female) executives' compensation

This table presents results on the impact of education signals on female directors' compensation. Compensation is measured as the inverse hyperbolic sine of Execucomp's total compensation variable. Education Score is defined as in Graham et al. (2012). Top 50 ranked college is an indicator equal to one if a director graduated from a Top 50 ranked college, and zero otherwise. All variables are defined in detail in Appendix Table A1. In columns (3) - (6), the control variables are interacted with the female indicator variable. The regression includes firm and year fixed effects in columns (1) - (4) and firm-year fixed effects in columns (5) and (6). t-statistics based on standard errors clustered by firm-year level are shown in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Education $Score_{t-1}$	0.037***		0.037***		0.040***	
	(6.49)		(6.51)		(4.47)	
Education $Score_{t-1}$ x Female dummy	0.041*		0.052**		0.069*	
	(1.85)		(2.31)		(1.94)	
Top 50 ranked $college_{t-1}$		0.049***		0.049***		0.054***
		(4.45)		(4.41)		(2.98)
Top 50 ranked $college_{t-1}$ x Female dummy		0.203***		0.240***		0.307***
		(4.37)		(5.06)		(4.02)
Female dummy	-0.242***	-0.250***	-1.511***	-1.461***	-0.849	-0.695
	(7.34)	(10.69)	(2.88)	(2.77)	(0.99)	(0.81)
Age_t	0.095***	0.096***	0.092***	0.093***	0.087***	0.089***
	(18.60)	(18.80)	(17.58)	(17.76)	(11.25)	(11.45)
Age $squared_t$	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(18.43)	(18.61)	(17.47)	(17.64)	(10.71)	(10.90)
Total $Assets_{t-1}$	0.239***	0.239***	0.240***	0.240***		
	(23.75)	(23.77)	(23.80)	(23.86)		
Last year return in $\%_t$	0.001***	0.001***	0.001***	0.001***		
	(12.48)	(12.56)	(12.27)	(12.36)		
Idiosyncratic Volatility in $\%_t$	-0.006***	-0.006***	-0.006***	-0.006***		
	(3.57)	(3.54)	(3.81)	(3.77)		
Market to $Book_{t-1}$	0.011***	0.011***	0.011***	0.011***		
	(10.15)	(10.14)	(10.18)	(10.18)		
Controls x Female	No	No	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	No	No
Year FE	Yes	Yes	Yes	Yes	No	No
Firm x Year FE	No	No	No	No	Yes	Yes
Adjusted R^2	0.601	0.601	0.601	0.601	0.600	0.600
Observations	49660	49660	49660	49660	32252	32252

Table 11: The impact of professional experience signals on (female) executives' compensation

This table presents results on the impact of professional experience on (female) executives' compensation. Compensation is measured as the inverse hyperbolic sine of Execucomp's total compensation variable (tdc1). Generalist Index is defined as in Custódio et al. (2013). Same Industry Experience is an indicator equal to one if a director worked in the same industry before, and zero otherwise. All variables are defined in detail in Appendix Table A1. In columns (3) - (6), the control variables are interacted with the female indicator variable. The regressions include firm and year fixed effects in columns (1) - (4) and firm-year fixed effects in columns (5) and (6). *t*-statistics based on standard errors clustered by firm-year level are shown in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Generalist Index	0.071***		0.071***		0.088***	
	(17.91)		(17.87)		(12.50)	
Generalist Index x Female dummy	0.037***		0.038***		0.050*	
	(2.88)		(2.89)		(1.88)	
Same Industry Experience		0.081***		0.081***		0.080***
		(6.85)		(6.84)		(3.78)
Same Industry Experience x Female dummy		0.236***		0.232***		0.320***
		(5.40)		(5.27)		(3.90)
Female dummy	-0.277***	-0.280***	-0.559	-0.982*	0.371	-0.186
	(10.98)	(11.69)	(1.07)	(1.89)	(0.45)	(0.22)
Age	0.085***	0.093***	0.084***	0.091***	0.077***	0.087***
	(16.60)	(18.23)	(15.94)	(17.38)	(9.83)	(11.22)
Age squared	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(16.73)	(18.04)	(16.11)	(17.24)	(9.55)	(10.67)
Total Assets_{t-1}	0.241***	0.241***	0.242***	0.242***		
	(23.92)	(23.96)	(23.96)	(24.01)		
Last year return in %	0.001***	0.001***	0.001***	0.001***		
	(12.64)	(12.61)	(12.41)	(12.38)		
Idiosyncratic Volatility in %	-0.006***	-0.006***	-0.006***	-0.006***		
	(3.73)	(3.57)	(3.94)	(3.77)		
Market to Book_{t-1}	0.011***	0.011***	0.011***	0.011***		
	(10.34)	(10.19)	(10.39)	(10.20)		
Controls x Female	No	No	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	No	No
Year FE	Yes	Yes	Yes	Yes	No	No
Firm x Year FE	No	No	No	No	Yes	Yes
Adjusted R^2	0.605	0.601	0.605	0.601	0.609	0.601
Observations	49660	49660	49660	49660	32252	32252

Appendix: Data Sources and Variable Definitions

Table A1: Data sources and variable definitions

(i) BoardEx: Information about directors including employment and professional experience,

(ii) Compustat: Firm characteristics based on annual reports,

(iii) CRSP: Share price information from the Center for Research in Security Prices,

(iv) Execucomp: Compensation data for the S&P 1500 companies derived from company's annual reports,

(v) KFL: Kenneth French's data library.

Table A1: cont'd

Variable name	Description	Source
Age	Age of a director in years.	BoardEx / Execucomp
CEO	Indicator equal to one if a director is the CEO of the firm, and zero otherwise.	BoardEx, ExecuComp
CEO Experience	Indicator equal to one if a director was CEO in a listed firm before the current employment, and zero otherwise.	BoardEx
Conglomerate Experience	Indicator equal to one if a director worked at a listed firm with more than one segment before the current employment, and zero otherwise.	BoardEx
Cons	Indicator equal to one if a firm's headquarter state has voted for republicans in at least 4 out of the 5 presidential elections between 2000 and 2019, and zero if a firm's headquarter state has voted for democrats in at least 4 out of the 5 presidential elections between 2000 and 2019.	BoardEx / Compustat
Education Score	A variable equal to one if the highest degree is a Bachelor's degree, 2 if the highest degree is a Master's degree, 3 if the highest degree is a PhD, and 0 otherwise (Graham et al., 2012).	BoardEx
Female dummy	Indicator equal to one if a director is female, and zero otherwise.	BoardEx
Generalist Index	Generalist Index is defined as in Custódio et al. (2013), estimated as 0.268 x Number of Positions + 0.312 x Number of Firms + 0.309 x Number of Industries + 0.281 x CEO Experience + 0.153 x Conglomerate Experience.	BoardEx
Idiosyncratic Volatility	The squared residual estimated from a five-year rolling window CAPM regression of monthly returns.	CRSP and KFL
Industry	Classified according to the 2-digit SIC classification.	BoardEx / Compustat
Nom	Indicator equal to one if there is at least one female director in the nomination committee of a company, and zero otherwise.	BoardEx

Table A1: cont'd

Last year return (in%)	Annual stock return.	CRSP
Leadership position	A dummy variable equal to one for directors who are CEO, Chairman/-woman, Vice Chair, President, CFO, COO, or Other Chief Officer, and zero otherwise.	BoardEx
Leadership promotion	Indicator that is equal to one if a director enters a leadership position in year t, and equal to zero for the previous year in which the director was not already in this leadership position.	BoardEx
Market to Book	The ratio of the market value of equity at the fiscal year end divided by the book value of equity for the fiscal year. The book value of equity is calculated as shareholder equity, plus deferred taxes and credits, minus the book value of preferred stock. The market value of equity is the product of price and number of shares outstanding.	Compustat and CRSP
Number of Board Seats	Number of Board Seats of a director.	BoardEx
Number of Industries	Number of different four-digit SIC code industries a director worked in before the current employment.	BoardEx
Number of Firms	Number of different firms a director worked in before the current employment.	BoardEx
Number of Positions	Number of different positions a director worked in before the current employment.	BoardEx
Outside	Indicator that is equal to one if a director has not worked for the company before the current employment, and zero otherwise.	BoardEx
Same Industry Experience	Indicator that is equal to one if a director worked in the same industry before, and zero otherwise.	BoardEx
Top 50 ranked college	Indicator that is equal to one if the director graduated from a Top 50 ranked college, and zero otherwise. Top 50 ranked college is defined according to Forbes America's Top Colleges List.	BoardEx, Forbes
Total Compensation	Total compensation in a year (tdc1). We use the inverse hyperbolic sine of total compensation in our regressions.	Execucomp
Total Assets	A firm's book value of total assets. We use the inverse hyperbolic sine transformation of total assets in our regressions.	Compustat

Appendix (For Online Publication)

This Online Appendix contains additional empirical results for the paper "The Value of Skill Signals for Women's Careers".

Additional Results

Table OA1: List of Top 50 ranked colleges

This table shows the Top 50 colleges in the US according to the Forbes top colleges ranking taken from https://www.forbes.com/top-colleges/.

1	University of California, Berkeley	26	Brown University
2	Yale University	27	University of Washington, Seattle
3	Princeton University	28	University of North Carolina, Chapel Hill
4	Stanford University	29	United States Military Academy
5	Columbia University	30	University of Virginia
6	Massachusetts Institute of Technology	31	University of Illinois, Urbana-Champaign
7	Harvard University	32	Wellesley College
8	University of California, Los Angeles	33	Washington University in St. Louis
9	University of Pennsylvania	34	Georgia Institute of Technology
10	Northwestern University	35	Emory University
11	Dartmouth College	36	Bowdoin College
12	Duke University	37	Johns Hopkins University
13	Cornell University	38	Tufts University
14	Vanderbilt University	39	University of California, Santa Barbara
15	University of California, San Diego	40	California Institute of Technology
16	Amherst College	41	University of Notre Dame
17	University of Southern California	42	University of Maryland, College Park
18	Williams College	43	Swarthmore College
19	Pomona College	44	Middlebury College
20	University of California, Davis	45	University of Texas, Austin
21	Georgetown University	46	Claremont McKenna College
22	University of Michigan, Ann Arbor	47	University of California, Irvine
23	University of Chicago	48	Colgate University
24	Rice University	49	Carnegie Mellon University
25	University of Florida	50	Texas A&M University, College Station

Table OA2: Do skill signals increase female directors' probability to enter a leadership position? - Logit regressions

This table presents average marginal effects for the likelihood of a director to enter a leadership position in Panel A and to become CEO in Panel B using logit regressions. Results in Panel A are based on the full BoardEx sample, results in Panel B are based on the Execucomp sample. Education Score is defined according to Graham et al. (2012). Top 50 ranked college is an indicator that is equal to one if a director graduated from a Top 50 ranked college, and zero otherwise. Generalist Index is defined as in Custódio et al. (2013). Same Industry Experience is an indicator equal to one if a director worked in the same industry before, and zero otherwise. Controls are the same as in Tables 4 - 5. The regressions include industry fixed effects (based on 2-digit industry classification) and year fixed effects. *t*-statistics based on standard errors clustered by firm-year level are shown in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Panel A: Gender gaps in the likelihood to enter a leadership position				
	(1)	(2)	(3)	(4)
Education Score$_{t\text{-}1}$	0.010***			
	(13.73)			
Education Score$_{t\text{-}1}$ x Female dummy	0.010***			
	(5.44)			
Top50 ranked college$_{t\text{-}1}$		-0.003		
		(1.61)		
Top50 ranked college$_{t\text{-}1}$ x Female dummy		0.013***		
		(3.30)		
Generalist Index$_{t}$			0.043***	
			(66.61)	
Generalist Index$_{t}$x Female dummy			0.011***	
			(7.06)	
Same Industry Experience$_{t}$				0.025***
				(16.37)
Same Industry Experience$_{t}$x Female dummy				0.028***
				(7.54)
Female dummy	-0.651***	-0.658***	-0.579***	-0.631***
	(15.01)	(15.14)	(13.36)	(14.56)
Controls	Yes	Yes	Yes	Yes
Controls x Female dummy	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	749735	749735	749735	749735

Table OA2: cont'd

Panel B: Gender gaps likelihood to become CEO				
	(1)	(2)	(3)	(4)
Education Score$_{t-1}$	0.039***			
	(14.68)			
Education Score$_{t-1}$ x Female dummy	0.045***			
	(3.55)			
Top 50 ranked college$_{t-1}$		0.062***		
		(11.98)		
Top 50 ranked college$_{t-1}$ x Female dummy		0.134***		
		(5.59)		
Generalist Index			0.050***	
			(27.99)	
Generalist Index x Female dummy			0.047***	
			(5.64)	
Same Industry Experience				0.059***
				(12.14)
Same Industry Exp x Female dummy				0.097***
				(4.38)
Female dummy	-2.650***	-2.668***	-1.642**	-2.191***
	(3.69)	(3.52)	(2.47)	(3.14)
Controls	Yes	Yes	Yes	Yes
Controls x Female	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	50264	50264	50264	50264

Table OA3: Do skill signals increase female directors' probability to enter a leadership position? - Two-way clustered standard errors

This table shows the robustness of our main results on female directors' likelihood to enter a leadership position (Panel A), to become CEO (Panel B) and to receive higher compensation (Panel C) using two-way clustered standard errors. Results in Panel A are based on the full BoardEx sample, results in Panel B and Panel C are based on the Execucomp sample. Education Score is defined according to Graham et al. (2012). Top 50 ranked college is an indicator that is equal to one if the director graduated from a Top 50 ranked college, and zero otherwise. Generalist Index is defined as the Generalist Ability Index from Custódio et al. (2013). Same Industry Experience is an indicator that is equal to one if a director worked in the same industry before, and zero otherwise. Female dummy is an indicator variable that takes the value of one if a director is female, and zero otherwise. We include the same control variables as in Tables 4 - 11. Regressions include firm and year fixed effects. t-statistics based on standard errors clustered by firm and year are shown in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Panel A: Gender gaps in the likelihood to enter a leadership position	(1)	(2)	(3)	(4)
Education Score$_{t-1}$	0.018***			
	(24.98)			
Education Score$_{t-1}$ x Female dummy	0.006***			
	(4.03)			
Top50 ranked college$_{t-1}$		0.006***		
		(3.66)		
Top50 ranked college$_{t-1}$ x Female dummy		0.013***		
		(3.63)		
Generalist Index$_t$			0.057***	
			(81.16)	
Generalist Index$_t$x Female dummy			0.006***	
			(3.86)	
Same Industry Experience$_t$				0.043***
				(26.53)
Same Industry Experience$_t$x Female dummy				0.026***
				(7.19)
Female dummy	-0.183***	-0.192***	-0.151***	-0.174***
	(7.30)	(7.65)	(6.01)	(6.95)
Controls	Yes	Yes	Yes	Yes
Controls x Female dummy	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.162	0.161	0.172	0.162
Observations	749724	749724	749724	749724

Table OA3: cont'd

Panel B: Gender gaps likelihood to become CEO	(1)	(2)	(3)	(4)
Education Score$_{t-1}$	0.031***			
	(2.95)			
Education Score$_{t-1}$ x Female dummy	0.042			
	(1.49)			
Top 50 ranked college$_{t-1}$		0.064***		
		(3.36)		
Top 50 ranked college$_{t-1}$ x Female dummy		0.168**		
		(2.53)		
Generalist Index			0.040***	
			(5.54)	
Generalist Index x Female dummy			0.050***	
			(4.10)	
Same Industry Experience				0.015
				(0.86)
Same Industry Experience x Female dummy				0.162***
				(2.91)
Female dummy	-1.732***	-1.687***	-0.893	-1.357**
	(3.28)	(3.20)	(1.69)	(2.64)
Controls	Yes	Yes	Yes	Yes
Controls x Female dummy	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.184	0.185	0.191	0.183
Observations	50227	50227	50227	50227

Table OA3: cont'd

Panel C: Gender gaps in compensation	(1)	(2)	(3)	(4)
Education Score$_{t-1}$	0.037***			
	(2.87)			
Education Score$_{t-1}$ x Female dummy	0.052			
	(1.40)			
Top 50 ranked college$_{t-1}$		0.049*		
		(2.05)		
Top 50 ranked college$_{t-1}$ x Female dummy		0.240***		
		(2.89)		
Generalist Index			0.071***	
			(9.57)	
Generalist Index x Female dummy			0.038*	
			(1.99)	
Same Industry Experience				0.081***
				(3.83)
Same Industry Experience x Female dummy				0.232***
				(2.96)
Female dummy	-1.511	-1.461	-0.559	-0.982
	(1.41)	(1.37)	(0.50)	(0.92)
Controls	Yes	Yes	Yes	Yes
Controls x Female dummy	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.601	0.601	0.605	0.601
Observations	49660	49660	49660	49660

Table OA4: Do skill signals increase female directors' probability to be promoted to a leadership position?

This table presents results on the impact of female directors' skill signals on their likelihood to be promoted to a leadership position. Promotion to leadership position is defined as an indicator variable that is only equal to one if a director enters a leadership position for the first time, and that is equal to zero for the previous year in which the director was not yet in this leadership position. Panel A shows results for signals of higher education. Education Score is defined according to Graham et al. (2012). Top 50 ranked college is an indicator that is equal to one if a director graduated from a Top 50 ranked college, and zero otherwise. Panel B shows results for signals of professional experience. Generalist Index is defined as in Custódio et al. (2013). Same Industry Experience is an indicator that is equal to one if a director worked in the same industry before, and zero otherwise. Female dummy is an indicator variable that takes the value of one if a director is female, and zero otherwise. We include the same control variables as in Tables 4 - 5. In columns (3) - (6), the control variables are interacted with the female indicator variable. The regression includes firm and year fixed effects in columns (1) - (4) and firm-year fixed effects in columns (5) and (6). *t*-statistics based on standard errors clustered by firm-year level are shown in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Panel A: Education based skill signals	(1)	(2)	(3)	(4)	(5)	(6)
Education Score$_{t-1}$	0.004***		0.004***		0.003***	
	(5.99)		(6.24)		(5.41)	
Education Score$_{t-1}$ x Female dummy	0.002		0.000		0.001	
	(1.56)		(0.31)		(0.49)	
Top50 ranked college$_{t-1}$		-0.004***		-0.003**		-0.004***
		(2.68)		(2.51)		(2.74)
Top50 ranked college$_{t-1}$		0.007**		0.005*		0.004
x Female dummy		(2.28)		(1.82)		(1.42)
Female dummy	-0.024***	-0.023***	-0.158***	-0.162***	-0.144***	-0.147***
	(13.69)	(17.35)	(9.29)	(9.48)	(8.22)	(8.39)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Controls x Female dummy	No	No	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	No	No
Year FE	Yes	Yes	Yes	Yes	No	No
Firm x Year FE	No	No	No	No	Yes	Yes
Adjusted R^2	0.063	0.063	0.064	0.064	0.083	0.083
Observations	426532	426532	424607	424607	419132	419132

Table OA4: cont'd

Panel B: Professional experience	(1)	(2)	(3)	(4)	(5)	(6)
Generalist Index$_t$	0.022***		0.022***		0.020***	
	(30.18)		(30.34)		(27.80)	
Generalist Index$_t$x Female dummy	0.006***		0.005***		0.004**	
	(3.77)		(3.11)		(2.51)	
Same Industry Experience$_t$		0.033***		0.033***		0.030***
		(22.38)		(22.08)		(20.30)
Same Industry Experience$_t$ x Female dummy		0.008***		0.009***		0.007**
		(2.72)		(3.04)		(2.19)
Female dummy	-0.025***	-0.023***	-0.142***	-0.155***	-0.127***	-0.139***
	(18.49)	(17.81)	(8.31)	(9.13)	(7.22)	(7.96)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Controls x Female dummy	No	No	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	No	No
Year FE	Yes	Yes	Yes	Yes	No	No
Firm x Year FE	No	No	No	No	Yes	Yes
Adjusted R^2	0.067	0.065	0.068	0.066	0.086	0.085
Observations	426532	426532	426532	426532	419132	419132

Table OA5: Which components of the Generalist index increase (female) directors' likelihood to enter a leadership position?

This table presents results on the impact of general management skills on (female) directors' likelihood to enter a leadership position in Panel A and to become CEO in Panel B. Results in Panel A are based on the full BoardEx sample, results in Panel B are based on the Execucomp sample. Number of Positions (Firms/Industries) is defined as the number of different positions (firms/industries) the director worked in before the current employment. CEO Experience is a dummy variable that is equal to one if a director was CEO in another firm before the current employment, and zero otherwise. Conglomerate Experience is an indicator that is equal to one if a director worked at a firm with more than one segment before the current employment, and zero otherwise. All variables are defined in detail in Appendix Table A1. The regressions include firm and year fixed effects. t-statistics based on standard errors clustered by firm-year level are shown in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Panel A: Gender gaps likelihood to enter a leadership position	(1)	(2)	(3)	(4)	(5)
Number of Positions	0.036***				
	(75.64)				
Number of Positions x Female dummy	0.003**				
	(2.53)				
Number of Firms		0.051***			
		(43.30)			
Number of Firms x Female dummy		0.009***			
		(5.30)			
Number of Industries			0.058***		
			(75.11)		
Number of Industries x Female dummy			0.004**		
			(2.21)		
CEO Exp				0.232***	
				(49.04)	
CEO Exp x Female dummy				0.072***	
				(3.00)	
Conglomerate Exp					0.085***
					(57.48)
Conglomerate Exp x Female dummy					0.0028
					(0.88)
Female dummy	-0.139***	-0.128***	-0.130***	-0.176***	-0.153***
	(5.37)	(4.95)	(5.02)	(6.81)	(5.92)
Controls	Yes	Yes	Yes	Yes	Yes
Controls x Female dummy	Yes	Yes	Yes	Yes	Yes
Firm x Year FE	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.134	0.134	0.134	0.127	0.129
Observations	748914	748914	748914	748914	748914

Table OA5: cont'd

Panel B: Gender gaps likelihood to become CEO	(1)	(2)	(3)	(4)	(5)
Number of Positions	0.037***				
	(9.29)				
Number of Positions x Female dummy	0.029**				
	(2.27)				
Number of Firms		0.052***			
		(9.23)			
Number of Firms x Female dummy		0.037**			
		(2.57)			
Number of Industries			0.058***		
			(9.89)		
Number of Industries x Female dummy			0.052***		
			(3.21)		
CEO Exp				0.198***	
				(7.32)	
CEO Exp x Female dummy				0.224*	
				(1.67)	
Conglomerate Exp					0.176***
					(12.81)
Conglomerate Exp x Female dummy					0.195***
					(3.77)
Female dummy	-0.519	-0.383	-0.300	-0.759	-0.368
	(0.99)	(0.73)	(0.57)	(1.45)	(0.70)
Controls	Yes	Yes	Yes	Yes	Yes
Controls x Female dummy	Yes	Yes	Yes	Yes	Yes
Firm x Year FE	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	-0.519	-0.516	-0.514	-0.526	-0.508
Observations	32975	32975	32975	32975	32975

Table OA6: Do skill signals increase (female) directors' likelihood to become Executive Vice President?

This table presents results on the impact of female directors' skill signals on their likelihood to become Executive Vice President. We exclude all directors in a leadership position. Panel A presents results for signals of higher education. Education Score is defined according to Graham et al. (2012). Top 50 ranked college is an indicator that is equal to one if a director graduated from a Top 50 ranked college, and zero otherwise. Panel B presents results for signals of professional experience. Generalist Index is defined as in Custódio et al. (2013). Same Industry Experience is an indicator that is equal to one if a director worked in the same industry before, and zero otherwise. Female dummy is an indicator variable that takes the value of one if a director is female, and zero otherwise. We include the same control variables as in Tables 4 - 5. In columns (3) - (6), the control variables are interacted with the female indicator variable. The regression includes firm and year fixed effects in columns (1) - (4) and firm-year fixed effects in columns (5) and (6). t-statistics based on standard errors clustered by firm-year level are shown in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Panel A: Education based skill signals	(1)	(2)	(3)	(4)	(5)	(6)
Education Score$_{t-1}$	0.008***		0.008***		0.008***	
	(13.81)		(13.89)		(14.26)	
Education Score$_{t-1}$ x Female dummy	0.010***		0.010***		0.009***	
	(8.97)		(8.70)		(8.04)	
Top50 ranked college$_{t-1}$		0.023***		0.023***		0.023***
		(17.31)		(17.62)		(17.47)
Top50 ranked college$_{t-1}$ x Female dummy		0.005*		0.003		0.005*
		(1.86)		(1.17)		(1.66)
Female dummy	-0.040***	-0.031***	0.125***	0.123***	0.123***	0.121***
	(24.52)	(25.14)	(7.52)	(7.43)	(7.13)	(7.01)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Controls x Female dummy	No	No	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	No	No
Year FE	Yes	Yes	Yes	Yes	No	No
Firm x Year FE	No	No	No	No	Yes	Yes
Adjusted R^2	0.289	0.289	0.289	0.289	0.276	0.276
Observations	445462	445462	445462	445462	437304	437304

Table OA6: cont'd

Panel B: Professional experience	(1)	(2)	(3)	(4)	(5)	(6)
Generalist $Index_t$	0.002***		0.002**		0.002**	
	(2.68)		(2.29)		(2.56)	
Generalist $Index_t$x Female dummy	0.014***		0.016***		0.015***	
	(10.09)		(11.23)		(10.68)	
Same Industry $Experience_t$		0.005***		0.004***		0.003**
		(3.33)		(2.71)		(2.25)
Same Industry $Experience_t$x Female dummy		0.020***		0.024***		0.022***
		(7.06)		(8.44)		(7.58)
Female dummy	-0.038***	-0.034***	0.140***	0.129***	0.138***	0.126***
	(29.88)	(27.79)	(8.50)	(7.77)	(8.03)	(7.31)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Controls x Female dummy	No	No	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	No	No
Year FE	Yes	Yes	Yes	Yes	No	No
Firm x Year FE	No	No	No	No	Yes	Yes
Adjusted R^2	0.288	0.288	0.289	0.289	0.276	0.275
Observations	445462	445462	445462	445462	437304	437304

Table OA7: The impact of professional experience signals on (female) executives' compensation - The impact of CEOs

This table presents results on the impact of professional experience on (female) executives' compensation. In Panel A, we exclude all CEOs from our sample and in Panel B, we include all non-CEO observation and only the CEO observations if a director becomes CEO for the first time in our sample. Compensation is measured as the inverse hyperbolic sine of Execucomp's total compensation variable (tdc1). Generalist Index is defined as in Custódio et al. (2013). Same Industry Experience is an indicator equal to one if a director worked in the same industry before, and zero otherwise. All variables are defined in detail in Appendix Table A1. Control variables are interacted with the female indicator variable. The regressions include firm and year fixed effects. *t*-statistics based on standard errors clustered by firm-year level are shown in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Panel A: without CEOs	(1)	(2)	(3)	(4)
Education Score$_{t-1}$	0.011			
	(1.22)			
Education Score$_{t-1}$ x Female dummy	0.062**			
	(2.06)			
Top 50 ranked college$_{t-1}$		0.030		
		(1.53)		
Top 50 ranked college$_{t-1}$ x Female dummy		0.144**		
		(2.12)		
Generalist Index			0.037***	
			(5.04)	
Generalist Index$_{t-1}$ x Female dummy			0.039*	
			(1.90)	
Same Industry Experience$_t$				0.081***
				(3.81)
Same Industry Experience$_t$ x Female dummy				0.203***
				(3.30)
Female dummy	-2.060**	-2.123**	-1.726*	-1.980**
	(2.14)	(2.17)	(1.78)	(2.03)
Controls x Female dummy	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.618	0.618	0.619	0.618
Observations	19620	19620	19620	19620

Table OA7: cont'd

Panel B: CEOs only once	(1)	(2)	(3)	(4)
Education Score$_{t-1}$	0.024***			
	(2.92)			
Education Score$_{t-1}$ x Female dummy	0.041			
	(1.42)			
Top 50 ranked college$_{t-1}$		0.041**		
		(2.37)		
Top 50 ranked college$_{t-1}$ x Female dummy		0.140**		
		(2.18)		
Generalist Index$_{t}$			0.059***	
			(9.34)	
Generalist Index$_{t}$ x Female dummy			0.026	
			(1.30)	
Same Industry Experience$_{t-1}$				0.127***
				(7.12)
Same Industry Experience$_{t-1}$ x Female dummy				0.169***
				(2.89)
Female dummy	-1.605**	-1.628**	-1.136	-1.389*
	(2.04)	(2.03)	(1.45)	(1.76)
Controls	Yes	Yes	Yes	Yes
Controls x Female dummy	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.584	0.584	0.587	0.585
Observations	24371	24371	24371	24371

Table OA8: Which components of the Generalist Index matter for (female) executives' compensation?

This table presents results on the impact of the components of the Generalist Index on (female) executives' compensation. Compensation is measured as the inverse hyperbolic sine of Execucomp's total compensation (tdc1). Number of Positions (Firms/Industries) is defined as the number of different positions (firms/industries) a director worked in before the current employment. CEO Experience is a dummy variable that is equal to one if a director was CEO in another firm before the current employment, and zero otherwise. Conglomerate Experience is an indicator that is equal to one if a director worked at firm with more than one segment before the current employment, and zero otherwise. All variables are defined in detail in Appendix Table A1. The regressions include firm-year fixed effects. *t*-statistics based on standard errors clustered by firm-year level are shown in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
Number of Positions	0.054^{***}				
	(10.87)				
Number of Positions x Female dummy	0.032				
	(1.60)				
Number of Firms		0.072^{***}			
		(9.78)			
Number of Firms x Female dummy		0.042^{*}			
		(1.72)			
Number of Industries			0.083^{***}		
			(11.55)		
Number of Industries x Female dummy			0.049^{*}		
			(1.93)		
CEO Exp				0.210^{***}	
				(5.64)	
CEO Exp x Female dummy				0.563^{***}	
				(2.78)	
Conglomerate Exp					0.221^{***}
					(13.92)
Conglomerate Exp x Female dummy					0.2233^{***}
					(3.21)
Female dummy	0.092	0.266	0.303	-0.054	0.246
	(0.11)	(0.32)	(0.36)	(0.06)	(0.29)
Controls	Yes	Yes	Yes	Yes	Yes
Controls x Female dummy	Yes	Yes	Yes	Yes	Yes
Firm x Year FE	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.606	0.607	0.608	0.602	0.608
Observations	32252	32252	32252	32252	32252