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Gender Diversity in Leadership: Empirical Evidence on Firm Credit Risk

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Abstract

We study the relation between firm financial stability and gender diversity in leadership and highlight its dependence on the initial financial conditions of the firm and the role played by the women leaders. Consistent with the glass cliff and the upper echelon theories, we find that close-to-default firms are more likely to appoint women top executives and that under their leadership, subsequent firms' risk of default decreases in the short to medium term. In parallel, independent women directors are not associated with firms' past credit risk, and their presence is more likely to increase the firm's subsequent default risk, as established by the tokenism and signaling theory. Our results are robust to alternative specifications and endogeneity corrections.

Keywords: Corporate credit risk; Gender diversity; Corporate executives and board of directors' dynamics; Glass-cliff theory; Upper echelon theory; Tokenism; Signaling theory.

1. Introduction

Legislative actions in various nations have been addressing the issue of women under-representation in corporate leadership positions. In 2008, Norway enacted the first board gender quota, and required a 40% gender balance on the boards of publicly traded companies (Ahern and Dittmar, 2012; Matsa and Miller, 2013). Subsequently, Italy, France and Belgium passed comparable legislation. Germany approved a regulation requiring listed companies to have 30% female representation on supervisory boards by 2016. In the United States, California passed, in 2018, a legislation mandating that, by the end of 2019, all public corporations headquartered in the state must have at least one woman on their board. In 2022, the European Parliament has mandated that by 2026 EU companies listed on the EU stock exchanges will need to have 40% female non-executive directors or 33% among all

directors. In other nations, such as the United Kingdom and Portugal, the issue has been handled by self-regulatory measures (Kiersh, 2018). Even in cases where there are no legislative requirements or other national regulations and policies, corporations are under increasing pressure to designate women directors and executives (Bertrand et al., 2019; Terjesen et al., 2015; Terjesen and Sealy, 2016) as in recent years there has been an increasing focus on promoting gender diversity in leadership, including having more female officers in C-suites positions, with organizations striving to create more equal and inclusive workplaces (Geletkanycz, 2020; Tampakoudis et al, 2022).

Many scholars have investigated whether and how gender diversity in corporate leadership affects board decisions and firm outcomes (e.g., Milliken and Martins, 1996; Williams and O'Reilly, 1998; Lau and Murnighan, 1998; Harrison and Klein, 2007). Despite a large body of work, research on the topic remains largely inconclusive and still subject to current debate. Some studies emphasize the benefits of women inclusion on corporations (for example, in reducing corporate misconducts – see Cumming et al., 2015, Arnaboldi et al., 2021, Boulouta, 2013; Gupta et al., 2020, García Lara et al., 2017, in enhancing corporate governance practices - Adams and Ferreira, 2009, Goergen and Renneboog, 2014, and improving firm's reputation - Brammer et al., 2009) while others highlight numerous challenges and unintended consequences of such inclusions (Farrell and Hersch 2005, Adams and Ferreira 2009, Carter et al. 2010, Dobbin and Jung 2011, Ahern and Dittmar 2012, Matsa and Miller 2013, Pletzer et al. 2015, and Post and Byron, 2015).

Our paper extends the existing research on the implications of gender diversity in leadership on corporate policies, with a focus on corporate credit risk. We investigate the relationship between firms' credit risk and directors and officers (D&Os)' gender along three aspects. Firstly, we test the 'the glass cliff' theory, that refers to the tendency for women to be more likely appointed than men to leadership positions in a given firm at a time when the firm is at high risk (in this context, we look at high credit risk). Additionally, we explore how the leadership role undertaken by women (i.e., executives - CEOs and CFOs - versus board members) affects firm credit risk in the short to medium term.

We show that the effect of gender diversity in leadership changes with the firm's circumstances at specific times and depending on the roles to which women are appointed. We ground the results in financial, economic, and managerial theories. On one hand, and consistent with the glass cliff theory, we find that during times of heightened credit risk and financial turmoil, firms closer to default are more likely to appoint female managers as leaders, as other competent managers become more likely reluctant to take the initiative to step in. Our results from logistic regressions show that firms with higher past credit risk (measured by the firm's expected default frequency – EDF) are more likely to appoint a woman as CEO or CFO to replace a man. Furthermore, using panel regression analysis with fixed effects and a difference-in-difference approach, we find that under women executive leadership, firms initially at the verge of default witness a subsequent decrease in their credit risk and hence a positive

effect on their financial stability. Our results are consistent with the upper echelon and resource based theories and support a business case for gender diversity at the top management team, as enhancing corporate stability.

On the other hand, we find that firms in difficult financial situations do not necessarily appoint women directors to their boards. The probability for a woman to serve on the company board is not related to past default probability. The glass cliff applies to top-executive women serving as CEOs and CFOs, but not to women serving as board members. Moreover, we observe that the financial situation of the firm deteriorates after women appointment to the board, which is more likely to increase the probability of default over the subsequent one to three years. Our findings of subsequent negative performance coupled with the absence of the glass cliff theory for directors documented in the first hypothesis could be suggestive of the signaling and tokenism theory (Solal, 2019). In fact, finding that women directors do not stand on a glass cliff reinforces the idea that women are appointed to the board because of a commitment to diversity initiatives, rather than for reasons related to the firm's financial situation. As documented by the tokenism and signaling theory, a negative effect on firm credit risk may arise when markets and investors penalize firms with more gender diverse boards because they perceive women appointments as merely focused on diversity per se rather than on enhancing shareholder value. Moreover, when diversity is not accompanied by effective inclusion, women appointments may cause a deterioration in the decision-making dynamics in the board, which increases firm's future credit risk. Alternatively, our results of the differential impact of women top executives and directors can be explained by the fact that decisions related to credit risk are mostly done at the CEO and the CFO level, rather than at the directors' level. Executives' decision-making authority and direct involvement (Kim and Starks, 2016; Gilani et al. 2021; Cornett et al. 2016; McGuinness et al. 2017; and Bose et al., 2022), their influence over risk management practices (Schopohl et al. 2021; Kinateder et al. 2021; Chen et al. 2016; and Ho et al. 2015), and their leadership style and risk-taking behaviour (Ingersol et al. 2023; Oakley, 2000; and Li and Zeng, 2019) present alternative explanations to the documented opposing result of women executives and women directors.

In sum, we document that the impact of women leaders on corporate financial stability is conditional on the firm's financial situation and the role played by women in corporate leadership: despite their gender identity is often connected to more conservative corporate policies and outcomes compared to their male counterparts (Huang and Kisgen, 2013; Levi et al., 2014; Li and Zeng, 2019; Francis et al., 2015; Srinidhi et al., 2011), it does not uniquely and unconditionally identify their impact on firm credit risk.

To address endogeneity concerns, we employ propensity score matching (PSM) and identify firms with one or more women executive directors (board members) which are indistinguishable from firms without women executive directors (board members). Post-matching, we still find that the presence of

women as CEOs or CFOs (one or more women on the board) is negatively (positively) associated with the future expected default frequency of the firm. Our results survive also the use of an instrumental variable two-stage OLS regression and further robustness checks.

Our paper contributes to an emerging literature that suggests a differential effect of women independent directors and executives on corporate decision making (e.g., Liu et al., 2014; Chen et al., 2017; García Lara et al., 2017; Glass and Cook, 2018; Li and Zhang, 2019), and sheds light on both the intended and unintended consequences of gender diversity in leadership. Most research in this field focuses on diversity in board composition (e.g., Bilimoria, 2006; Singh et al., 2008; Skaggs, Stainback, and Duncan, 2012), while it is less understood in which way the gender of the CEO/CFO and the diversity of the board combine to affect corporate strategies. While boards exert significant influence over the firm corporate governance and overall strategy (e.g., Matsa and Miller, 2013; Shropshire, 2010; Westphal and Milton, 2000), CEOs have enormous leverage over the design and implementation of policy and practices within the firm (Graffin, Wade, Porac, and McNamee, 2008). To the extent that the firm strategy is guided by chief executives and boards jointly, understanding the ways in which gender diversity at both levels affect firm outcomes is critical.

We also add to the existing literature by specifically focusing on credit risk as a dimension of firm's risk, which – to the best of our knowledge – has not been previously investigated in the context of D&O gender diversity studies.[1] As Glass and Cook (2018) explain, most research on the impact of gender leadership diversity has focused on short-term financial performance which may obscure the full range of impact that women have on firms' policies and practices. There is evidence that women are more likely than men to emphasize non-financial performance measures in favor of equity and innovation (Eagly and Carli, 2007; McCabe et al, 2006; Wu et al. 2021). Initiatives that promote fairness, effective governance, product development, transparency, or social responsibility, may be valuable to firms in the medium or longer term but may not translate into short-term performance outcomes due to increased costs and investments (Barnett and Salomon, 2006; Matsa and Miller, 2013). Moreover, focusing on firms' credit risk exposure rather than short-term stock performance allows us to look at expectations of creditors, shareholders and major stakeholders in the firm. In addition, credit risk proxies for the default probability of the company, not price volatility, and hence directly affects the solvability and the capacity of firms to raise funds.

[1] Faccio et al. (2016) and Schopohl et al. (2021) analyse respectively the impact of women executives on corporate leverage and show that they are associated with lower leverage. Although leverage is clearly an indicator of firm's riskiness, these papers do not examine explicitly the impact of women directors on a measure of credit risk. Lu and Boateng (2018) look at the relationship between the percentage of women on board and credit risk (measured by the non-performing loans ratio and loan loss provision), but only for a small sample of UK banks. Reinwald, Zaia, and Kunze (2022) explore the glass cliff issue in the context of the signalling theory by creating a firm-crisis status dummy variable based on range of values of the Altman's Z-score. However, they do not look at the impact of firm's executives on credit risk as we do. In addition, the last two papers do not distinguish between women executives and non-executive directors.

Importantly, in our study, firms are not forced to meet a set gender quota. Our results do not support unilateral views of gender diversity advantages or disadvantages to firm credit risk. Rather, we emphasize that when moving voluntarily towards a more gender-balanced leadership, firms should take into consideration their risk level and financial situation, the role to which women are appointed, and the level of effective diversity that can facilitate inclusion rather than heightening internal contrasts.

The remainder of the paper is organised as follows. Section 2 presents the hypotheses development; Section 3 introduces the data sample and summary statistics; Section 4 discusses the main results; Sections 5 and 6 report respectively endogeneity controls and robustness checks; and Section 7 concludes.

2. Theoretical framework and hypothesis development

Research on gender diversity in leadership has mostly focused on two distinct divisions of analysis: the governance team and the top executives (CEOs/CFOs) (Jeong and Harrison, 2016). Following Gomez et al. (2018), we incorporate both divisions: the former provides for the examination of group-level mechanisms and the latter is appropriate for individual difference-based theorizing. While no single theory directly predicts the nature of the relationship between women corporate leaders and firm credit risk, we follow Carter and Dsouza (2010) in using an interdisciplinary approach based on organization, economics, and social psychology theories. Specifically, for the theoretical framework underlying our analysis we focus on: (1) the glass cliff theory, (2) the upper echelon and resource-based theories, and (3) the tokenism and signaling theories.

2.1 The glass cliff theory

The glass cliff theory refers to the tendency of organizations to appoint women to leadership positions during times of crisis or high risk, when the chances of success are low (Eagly and Carli, 2003). At times of crises and uncertainty, firms and organisations are more prone to try something new (see the theory of Kahneman and Tversky, 1979) or to question the *status quo* (Boin and Hart, 2003). In addition, women are perceived to be better at managing emotions and crises, and able to bring a more caring, collaborative, and inclusive leadership style during difficult times (Ryan and Haslam, 2005). Subject to higher expectations, women are often given less support and resources than their male counterparts and are more likely set up for failure in these precarious leadership positions. The precariousness of the "glass cliff" may also threaten the overall level of gender diversity in the company: if women are more likely to be appointed at difficult times, they are as a result less likely to succeed and thrive in leadership positions; in the long-run, this may even cause a stagnation in rates of change at the top positions. The empirical evidence on this theory is still inconclusive. On one side, Ryan and Haslam (2005) show that companies that appointed women to their boards are more likely to have consistently experienced bad stock performance in the preceding five months compared to companies that appointed men to their boards. Brady, Isaacs, Reeves, Burroway, and Reynolds, (2011) find that

companies that experienced a scandal in recent years are more likely to have women executives on their boards. Cook and Glass (2014) observe that white women and women of colour are more likely than white men to be promoted CEO of weakly performing firms. Francis et al. (2021) show that firms with lower profitability, market value, and cash prior to a CEO transition are more likely to appoint a female CEO than a male CEO. On the other side, Adams, Gupta, and Leeth (2008) find no difference in firms' financial performance around the appointment of men and women CEOs, thereby questioning the generalization of the glass cliff theory and claiming that it may be context-dependent.

2.2 The upper echelon and resource dependent theories

Based on the glass cliff theory, women are more likely appointed to leadership positions in difficult times; but whether the value of the firm improves or deteriorates subsequently does not necessarily relate to the appointment per se. It is rather explained by the differential leadership style and resources that women contribute to the firm contended by the upper echelon and resource dependence theories.

Arguments from the upper echelon theory point to the fact that corporate leaders' personal traits reveal how the decision-making process may vary. Based on the premise that men and women board members perform differently their respective responsibilities, and that the board structure affects its functioning and the way it implements these duties, board gender diversity has important implications in terms of firms' credit risk. In addition, studying women in the particular position of top executive hierarchy is of great importance in our context because existing literature suggests that characteristics of the "feminine management style", commonly associated with more collaboration, information sharing, less risk taking, more creativity, and better monitoring (Ravasi and Schultz, 2006; Palvia et al., 2014; Adams and Ferreira, 2009; Tullett, 1995; Huang and Kisgen, 2013) influence the operations of the company and the decision-making process, which ultimately impacts corporate credit risk.

Complementary to the upper echelon theory, the resource dependence theory (Pfeffer and Salancik, 1978) suggests that firms attract board members that best complement their existing resource profile by bringing unique human and social capital to the existent team. From that perspective, gender diversity in leadership can be seen as a valuable resource for a company, as it brings non-traditional approaches to problems, skills, and experiences that women leaders bring to the table. These unique perspectives are in turn expected to positively impact performance and to reduce the risk of failure. Therefore, firms should seek board members and managers who have a broad scope of knowledge across relevant demographics to add value to the firm (Sealy, 2010). This however does not preclude negative, or neutral impact of gender diversity. In fact, women directors and officers that lack experience and expertise will not necessarily benefit the decision-making process within the firm (Hillman et al, 2002).

While some studies show that women in higher business echelons, such as the boardroom or senior management can bring more effective decisions and improve corporate performance (Dezsö and Ross,

2012), there is still no consensus on a systematic positive impact (Post and Byron, 2015). A potential explanation for these findings is that men and women in the business top levels may not differ significantly (Klein, 2017), unlike gender differences in the general population.

2.3. The tokenism and signaling theories

Building on the gender bias literature and expanding on the reasoning for a negative impact of increased gender diversity in corporate leadership, Solal et al. (2019) contend that the perception of the firm's reasons for selecting a more gender-diverse board and top management team determines the market and stakeholders' reaction to gender diversity. Following Kanter's (1977) theory of tokenism, they argue that when the presence of female directors and officers is perceived as being more likely motivated by a desire to broaden diversity than by a desire to maximize returns and financial stability, this can ultimately be detrimental to the firm's credit risk. Women in this context are used as tokens and can be viewed as symbols rather than as "effective contributors to the firm" (Kanter, 1977). 'Token women leaders' will then face challenges to their leadership effectiveness, including heightened scrutiny, exaggerated stereotypes, negative evaluation bias, lower status and less influence and are often denied needed resources to exercise authority effectively (Acker, 2006; Eagly and Karau, 2002). They may often respond to this pressure by attempting to conform to the values and orientations of the dominant group in order to avoid blocked career advancement, negative performance evaluations, and devaluation of their contributions (Eagly and Karau, 2002; Fiske, Cuddy, Glick, and Xu, 2002; Hekman, Johnson, Foo, and Yang, 2017; Stern and Westphal, 2010; Westphal and Milton, 2000), hiding valuable differences resulting from their specific background and experiences (Duguid, Loyd, and Tolbert, 2012). Isidro and Sobral (2015) observe that the majority male top directors within the company board may also exert excessive influence on decision-making and often resist the influence of the women minority. As a result of all these challenges and pressures, 'token leaders' will be inhibited in terms of advancing positive organizational outcomes (Eagly et al., 2003) and their influence over corporate strategy may be limited or even disruptive (Graffin et al., 2008). In fact, if gender board diversity drives heterogeneous firm's board members to cooperate less and experience more conflict, then the presence of female directors can make the decision-making process lengthier and less effective, which may have negative consequences on the firm's financial stability.

Based on the above discussion of the relevant theories and the existing mixed empirical evidence, we state our main hypotheses in general terms as follows:

(H1). Firm's past credit risk matters for the appointment of women in leadership positions, and the impact varies with the role that they are appointed to.

(H2). Gender diversity in leadership matters for firm's future credit risk, and the impact varies with the role that women are appointed to.

3. Data sample, variables measure and univariate analysis

We test our hypotheses on a US firms' sample obtained from merging key variables on directors' characteristics collected from the BoardEx dataset and financials extracted from the Compustat dataset. From the merged dataset, we exclude all financial and real-estate firms, firms that have been delisted, firms that have less than three years of data, and less than twenty directors (where twenty is the bottom quartile number of directors across all delisted firms), and firms that have a change in PERMNO number over the time sample (most of them are delisted firms or firms that have changed name as a result of an M&A or some other reasons).[2]

The data sample spans the period from 2000 to 2017 with 405,720 observations (2,975 distinct firms) for the key EDF variable. There are 9,235 different directors (looking at distinct directors' IDs) with complete information on gender, nationality, role, suffix title, in/out board position, and network size. The directors cover 1,953 different roles; however, we focus on CEOs, CFOs, and board members. The directors display 549 different suffix-titles related to their level of education/professional attainment (which we include into three categories with rank one being the highest – doctoral degree - and three the lowest, i.e., bachelor's degree or relevant professional qualification – see Appendix A).

We measure credit risk with the Estimated Default Frequency (EDF) from the KMV-Merton Model which we obtain following Bharath and Shumway (2008). EDF is a market-based firm-specific measure of default probability based on the book value of debt and the market value of equity. A higher value indicates that the firm is closer to default. The measure is based on the structural approach of Merton (1974), i.e., credit risk is driven by the firm value process. The market information contained in the firm's stock price and its balance sheet are used to calculate this measure of implied risk of default. The timely information from the equity market provides a continuous forward-looking credit monitoring process.[3]

Table 1 Panel A reports the summary statistics for our sample of U.S. firms. Only 6% of the firms have women CEOs and/or CFOs (6% is the mean value of the dummy 'CEO_CFO_Woman' that takes value of one if either the CEO or CFO of a given firm at a given time-quarter is woman and zero otherwise). The mean value of the dummy 'Woman_on_Board' (that is equal to one if at least one woman serves as board member for a given firm at a given time and zero otherwise) is 22%: this means that around 22% of the firms have one or more women as board members. Of these firms, around 18% have only one woman board member and 4% have two. As there is only a handful of firms with more than two women board members, no meaningful test on this type of sub-sample could be performed.

[2] We have also identified different firms that report the same GVKEY identifier (most of them are firms that have been de-listed than added again to listings, but they have overlapping samples) and have eliminated the ones with the shorter time-sample period.

[3] Our estimated EDF has a correlation of around 42% with leverage, 31% with the estimated asset volatility, and 22% with the return on assets (ROA). The EDF is a very popular measure of default risk used by academics and practitioners (Moody's KMV measure is based on it). Several studies have investigated its accuracy to predict future bankruptcies. As an example, Rossi (2021) performs a horse-race between several measures and shows that the Merton EDF is the most accurate variable to predict bankruptcies, bar the introduction of modern machine learning techniques.

Note that the dummies 'CEO_CFO_Woman' and 'Woman_on_Board' are constructed as mutually exclusive: for the former we consider only CEOs/CFOs that are not board members, for the latter only women board members who are not also CEOs/CFOs of the company. Considering on one side executives that are not board members, and on the other side, non-executive directors rules away any conflict of interest that might arise when executives serve in the board that supervises them. Such separation of management and governance allows to assess the impact of women top executives and non-executives on credit risk. In fact, according to Cook and Glass (2018), the presence of a woman CEO in the board can skew the impact and relevance of gender diversity in the board as the woman CEO holds the highest level of leadership and influence on the rest of the board. In addition, we observe that in our sample of firms only in 21% of the cases women CEOs/CFOs are also board members (for men the percentage is much higher and around 46%).

The average ratio of female to male board members is around 6%: for every 100 board members, only 6 are women. Regarding the characteristics of the average sample firm, it has a relatively low credit risk (EDF of 4%), 36% (modest) leverage, 42% asset volatility, 16% cash-to-asset ratio, 1% R&D expenses over total sales, and a market-to-book ratio of around 3. The average CEO/CFO has an age of 51 years, an education rank of 2.4 (corresponding to an MBA or other Masters/Postgraduate degree), and a network size of 666 contacts. Moreover, only 1.1% of CEOs are non-U.S. nationals, and in 78% of the cases they are hired internally - this means they were covering other senior roles within the same company before being appointed as CEOs-. The average board member (who is not the CEO or CFO at the same time) is 55 years, has an education rank of 2, and a network size of 854 contacts.

Table 1 Panels B and C report average differences between firms respectively by CEO/CFO and board member gender and illustrates the results of the mean equality tests. In Table 1 Panel B we see that firms with women CEOs/CFOs are on average larger and more leveraged (i.e., they are more indebted), but have lower volatility and lower market-to-book value than firms with men CEOs/CFOs. These firms have on average higher cash ratios and R&D percentage expenses, a larger and more independent board, and a larger mix of directors' nationality (covering various senior roles). All differences across these variables between the two groups of firms (those with women CEOs/CFOs and those with men CEOs/CFOs) are statistically significant at the 1% level.

Firms with at least one woman on the board (Table 1 Panel C) have on average higher size and leverage, a less negative ROA, much lower volatility, a larger and more independent board, and a larger mix of directors' nationalities than firms without women on the board. In contrast to the results reported in Panel B, these firms have a higher market-to-book value, a lower cash ratio and lower R&D percentage expenses.

[Insert Table 1 about here]

4. Multivariate Analysis

4.1. Tests of Hypothesis 1

We test our first hypothesis using men-to-women turnover events, i.e. appointments of women CEOs/CFOs/board members who replace a male predecessor. We use firm-level panel data and look at past higher values of the credit risk measure (the expected default frequency - EDF) distribution to have a better indication of whether the firm has higher credit risk than the rest of the firms at each specific quarter. Also, looking at *past* EDF values helps to reduce endogeneity concerns. First, we use conditional logit tests where the dependent variable is the 'CEO_CFO_Woman_Appointment' dummy which is equal to one when a woman CEO/CFO is appointed to replace a male CEO/CFO, and zero afterwards. For firms that never had a woman CEO/CFO (a newly appointed one and/or a predecessor), the dummy is always equal to zero. We exclude from the definition of the female-to-male CEO turnover dummy all cases of replacement due to previous CEO's death or retirement. These circumstances can be considered as 'involuntary turnovers': they produce a 'vacant seat', but they may not help to spot a turnover associated to a difficult financial situation. Limiting the CEO turnovers sample to cases of possible forced turnovers (CEO dismissals) may signal instead a female-to-male replacement dictated by worse firms' circumstances, which are identified by the credit dummy being equal to one when the firm's EDF value is above the distribution median. To define the turnover dummy and the replacement cases, we use the latest version of the open-source dataset of Gentry, Harrison, Quigley, and Boivie (2021) that document the reasons for CEO departure from S&P 1500 firms and distinguish various forms of voluntary and involuntary departure.[4]

In the logit tests, we control for officers' personal characteristics. More specifically, we control for: i) age, since older "candidates" may be less likely to be appointed; ii) education level, as it is a proxy for higher skills and abilities developed; and iii) a dummy indicating U.S. vs. non-U.S. nationality, in order to consider CEOs/CFOs domestic/international upbringing and familiarity which may impact on their career progression. In addition, according to the resource dependence theory, more connected directors with a larger network can provide more resources to the firms (Hillman and Dalziel, 2003) and this can have a number of positive effects on the firms' performance and strategies, including their financial stability (see, amongst others, Renneboog and Zhao, 2014; Fracassi and Tate, 2012; Hochberg et al., 2007; Houston et al., 2018; Abdelbadie and Salama, 2019). Hence, it is likely that a director with a wider network size and richer 'social capital' is more likely to be appointed. These controls build on similar results evidenced by the managerial literature (e.g., Wiersema, Nishimura, and Suzuki, 2018).

The results are displayed in Table 2. In columns (1), (3), and (5) the credit dummy is equal to one if the firm's EDF is above the median value of the *previous year*'s cross-firm average EDF; in columns

[4] Gentry et al. (2021) collect news articles and SEC filings for each CEO turnover event and identify eight departure reasons. Then, they use 23 independent coders to read through the articles and categorize each turnover event into one of the eight categories. The data can be retrieved from the website: https://doi.org/10.5281/zenodo.4543893. Event year (year 0) can be identified as those years when a predecessor CEO is in his/her last year in office according to the ExecuComp CEOANN flag. The database does not include CFO turnover cases, so we are able only to distinguish cases of involuntary dismissals for CEOs.

(2), (4), and (6) the credit dummy is equal to one if EDF is above the median value of the previous *two years*' cross-firm average EDF. We observe a positive and significant effect of the credit dummy in all proposed specifications: logit regressions without fixed effects in columns (1) and (2), logit regressions with time and industry fixed effects in columns (3) and (4), and linear regressions with time and firm fixed effects in columns (5) and (6). This suggests that if the firm's default probability is higher than 50% of the sample of firms over the past one or two years, then it is more likely for the firm to appoint a woman in replacement of a male CEO/CFO and – as expected - the likelihood is impacted more by the previous-year's credit risk than the previous two years' credit risk.[5] Overall, the empirical evidence support the glass cliff theory (see section 2.1) for women serving in CEO and CFO positions. These women are likely to find opportunities to gain leadership in the firm at the firm's worst times.

Other interesting results emerging from Table 2 are as follows: *ceteris paribus*, a) the more indebted and risky (where risk is measured by asset volatility) and the more cash-hoarding the firm is, the more likely it is to have a woman appointed as its CEO or CFO after a male predecessor; b) the more independent the firm's board is, the more likely it is to have a woman appointed as its CEO/CFO after a man CEO/CFO; and c) the younger the woman is and the wider her network, the higher the likelihood of her appointment as CEO/CFO to replace a man. Based on the premise that independent directors improve board governance (Adams and Ferreira 2009), our results state that, at times of financial difficulties, better governed firms are more likely to appoint women executives, who do not necessarily serve at the board.

[Insert Table 2 about here]

Next, we repeat the regressions for women board members. The dependent variable is now 'Woman_on_Board_Appointment' dummy which is equal to one when a woman board member is appointed to replace a man board member, and zero afterwards. For firms that never had a woman board member (a newly appointed one and/or a predecessor), the dummy is always equal to zero.

The regressions results are reported in Table 3. In columns (1) to (4) we run logit panel regressions: we observe an insignificant credit dummy in all four proposed logit specifications without and with time and industry fixed effects. We also use linear estimations with firm fixed effects and the results are unchanged (they are reported in columns (5) and (6)).

These results do not support the glass cliff theory for non-executive women board members. They show that the likelihood for firms to appoint a woman board member to replace a man is not affected by the firm's past credit risk (all firm's financials, except cash ratio, are also insignificant). Interestingly,

[5] We also repeat the logit regressions using as dependent variable a 'CEO_CFO_Internal_Appointment' dummy which is equal to 1 when a new CEO/CFO is appointed via internal promotion and equal to 0 when externally hired. Interestingly, we observe that a positive relationship between past credit risk and likelihood of CEO/CFO appointment exists only for CEOs/CFOs who are promoted internally. These results are unreported for brevity but available upon request. External hiring is costly to the firm especially when the firm is close to default, which makes internal promotions more likely. The external labor market for executives is very limited and the external labor market opportunities of top executives, and especially CEOs, are limited (Cziraki and Genter, 2020). In addition, it is more likely that an internal candidate is called to lead the firm at difficult times (based on loyalty, trust, and familiarity with the firm).

we find significant results for the board-related variables. The larger and more independent the board is, the more likely it is for a woman to be appointed as a member of that board in replacement of a man. While there is no association between the firm past credit risk and the likelihood to appoint women to their board, it seems that better governed firms are more likely to appoint non-executive women directors, regardless of their financial situation.

[Insert Table 3 about here]

4.2. Tests of Hypothesis 2

Next, we test the impact of women D&O on the firm's future credit risk (Hypothesis H2). We start by running a baseline multivariate panel regression analysis with firm and time fixed effects, using a difference-in-difference (DiD) approach. In Panel A of Table 4, our key independent variable is the dummy 'CEO_CFO_Woman' which is a gender/role identifier (i.e., it is equal to one if the CEO or the CFO is a woman, zero otherwise). When firm and time fixed effects are included, by construction the coefficient of 'CEO_CFO_Woman' captures the DiD-effect on EDF due to the firm's appointment of a woman CEO and/or CFO.[6] The next one, two and three years' average EDFs are the dependent variables. We further control for the firm's ROA, leverage, asset volatility, market-to-book ratio, cash-ratio, and R&D expenses (as they are considered fundamental determinants of the firm credit risk). Other additional controls include corporate board characteristics such as board size, percentage of independent members in the board, and nationality mix of directors within the firms. The R^2s of the panel regressions are quite high, ranging between 54% and 66%.

In Table 4 Panel A, we observe that on average, the next one, two and three years' EDF decrease (i.e., credit risk decreases) when a woman executive is in leadership. This result suggests that women CEOs and CFOs reduce the credit risk of the firm. The results for women executives are not just statistically significant but also highly significant economically. Focusing, for example, on the 'CEO_CFO_Woman' dummy coefficients in first model specification, after controlling for several determinants of the firm's EDF, we observe that firms run by female CEO/CFO have on average in the next year an EDF 0.6 percent lower than those run by male CEOs/CFOs. This is a sizeable difference given that the mean sample value for EDF is 3 percent.

Overall, our results on women executives reducing future EDF are consistent with the upper echelon theory related to differential women leadership styles. Women leaders do act differently from their male counterparts in this context, and this has a decremental impact on firm credit risk. Faccio et al. (2016) also find significantly higher survival rates for companies run by female CEOs. Our result is also consistent with our previously-documented evidence on the glass cliff (in section 4.1) and the

[6] For a more detailed explanation of this DiD approach in a different setting, please refer to Chang, Chen, Wang, Zhang, and Zhang (2019) on page 483, footnote 17.

resource dependent theory: a woman CEO/CFO is more likely to start her role when the credit risk of the firm is higher; afterwards, she is also more likely to be tasked to reduce it over the short to medium term. We show that woman executives appointed in difficult times have a positive impact on the future financial stability of the firm. In terms of governance variables, firms with larger boards and more diverse boards in terms of members' nationality are less likely to default.

Panel B of Table 4 shows an opposite impact on EDF from the dummy identifying women appointed as board members. If the firm appoints at least one woman on the board, then on average, and after controlling for all other relevant attributes, its credit risk in the coming one to three years tends to increase rather than decrease. The impact of having at least a woman on the board on future EDF is positive but less statistically and economically significant than the impact (of opposite sign) that woman executives have. In fact, in the first model specification for the next year's EDF the 'Woman_on_Board' dummy is not statistically significant, while in the other specifications for the next two and three-years' EDFs the economic significance is more modest. Firms that have at least a woman board member have on average in the next year an EDF 0.2 percent higher than those with an all-men board. This is still a sizeable difference given that the mean sample value for EDF is only 3 percent, but it is a third of the economic impact of the 'CEO_CFO_Woman' dummy in absolute terms.[7]

This result may be connected to the tokenism and signaling theory explained in section 2.4. It can suggest that women are often used as 'tokens' on boards: their appointment to these positions is used as a way to signal and promote the firm's image as open and diverse and not perceived by stakeholders as a tool to improve firm's financials. In addition, women remain minoritarian in corporate boards and often face polarisation and pressure from the majoritarian male directors. Their presence in corporate boards can be associated with lower cooperation and higher conflicts that may cause bottle-necks in the decision-making process and hence lead to negative consequences for the firm.

Importantly, the two sets of results for the gender dummies illustrated in Table 4 Panel A and B survive several alternative specifications: i) when we include both gender dummies (the women CEO/CFO and women board members) in the regression, as shown in Table 4 Panel C; ii) when we control for women CEOs and CFOs using two separate dummies, in addition to the 'Woman_on_Board' dummy; and iii) when we construct the two gender-role dummies as *not* mutually exclusive (i.e., we allow 'CEO_CFO_Woman' to be equal to one if the woman CEO/CFO is also a board member and 'Woman_on_Board' to be equal to one if the woman has also a CEO or CFO role at the same time).[8]

[7] Taking the specifications in columns (2) for Panels A and B of Table 4, a one standard deviation increase in the dummy 'CEO_CFO_Woman' produces a 1.05 standard-deviation decrease in EDF; while a one standard deviation increase in the dummy 'Woman_on_Board' causes a 0.72 standard-deviation increase in EDF, *ceteris paribus*.

[8] The results for specification ii) and iii) are not reported for brevity, but they are available upon request from the authors. When we split CEOs and CFOs dummies, we find that the reduction of future default risk comes from both women chief executives and women chief financial officers.

Finally, in Table 4 Panel D, we split the firms' sample according to whether they have internally-promoted CEOs/CFOs or externally-hired CEOs/CFOs. All else equal, we see that *only* an internally-promoted woman CEO/CFO significantly reduces next year firm credit risk, while the impact of the 'CEO_CFO_Woman' dummy on the future EDF is not significant for externally-hired women executives. We also find that appointing a woman board member is no longer associated with higher firm future default probability if she sits on the board of a firm where the CEO/CFO was internally-promoted. While this result may suggest that an internally-promoted CEO/CFO has a more dominant position in the firm and over the board to dictate a credit-risk reduction policy and gain stronger consensus, it certainly warrants a separate investigation in a distinct paper.

Regarding the other control variables used in the multivariate panel regression, as expected, we find that higher firm size, leverage, and estimated asset volatility increase future EDF, while higher ROA and R&D expenses decrease future EDF. Everything else being equal, a higher cash-ratio increases EDF. Although one could expect that firms with higher cash holdings are safer and have lower credit risk, the correlation between cash and credit risk has been robustly positive and puzzling in the existing literature. Bates, Kahle, and Stulz (2009) and Acharya, Davydenko, and Strebulaev (2012) argue that riskier firms hold more cash reserves to protect themselves against adverse (expected) cash flow shocks. Next, we find that a larger board size reduces firm credit risk: this reflects the positive impact of good governance quality. However, we also observe that, after controlling for board size, a larger number of independent directors increases rather than decreases firm future credit risk. This is consistent with Adams and Ferreira (2007) who contend that a board with a high proportion of independent directors can suffer from a lack of specific knowledge and information about the firm leading to poor analysis and decisions. Several studies, such as Pathan (2009) and Shen (2005), report a negative impact of board independence on corporate outcomes. Being external voices, the larger presence of independent board members may generate more conflicts within the board (in the same way the presence of more women board members may do), slowing down the decision-making process and increasing firm credit risk.

Overall, we find a dual relationship between gender diversity and corporate financial stability. *First*, we document that the inclusion of women in the top management benefits the firm during periods of heightened financial instability. In fact, as firms draw close to bankruptcy and face financial turmoil, they become more likely to appoint female rather than male top executives (CEO and/or CFO), who – after appointment – on average succeed in decreasing the default probability over the short to medium term. *Second*, we document a detrimental impact of adding *few* women to corporate boards on firm financial stability. Suggested explanations to this puzzling effect stem from the tokenism and signaling theory (Solal et al., 2019; Kanter, 1977; Zimmer, 1988) where firms, irrespective of their financial circumstances, can use the presence of women in the boardroom as a token of strategic preference for diversity and social performance. However, added diversity does not conduct mechanically to effective

inclusion. Post appointment, this increased gender diversity may lead in fact to inefficiencies and is associated with a subsequent increase in corporate default risk. Increased heterogeneity can create issues when directors are forced to work together within the firm, it can lower cohesion within the board members and the probability that minority female directors' viewpoints will influence the overall group decisions. As a minority, token, or outlier, the female director can get intimidated by a majoritarian male presence, not be able to freely speak up her mind and express her incongruent opinions in board conversations and lack the influence to change the board's decisions. Even if she speaks up, the majority of the board members might discount her views, and her presence might even cause the majority male counterparts to express a higher overconfidence (Chen et al., 2019) reactively. From this perspective, a negative impact associated to ineffective diversity and lack of inclusion may surface through decreased communications (Smith et al., 1994), reduced consensus (Knight et al., 1999), increased interpersonal conflicts (Pelled et al., 1999), and slower decision making (Hambrick et al., 1996). Such consequences can negatively affect the process by which decisions are implemented within the board of directors (Triana et al., 2014) and can increase the firm default probability.

The literature suggests alternative explanations for why women executives and women directors might affect the company's credit risk differently (Kim and Starks, 2016; Terjesen, Sealy, and Singh, 2009; Cornett, Erhemjamts, and Tehranian, 2016). *For instance*, women in senior management positions, including CEOs and CFOs, are more *actively* involved in financial management and business decision-making. They put risk management plans into place, allocate funds, set the firm's overall risk appetite, and make crucial financial choices that have a direct impact on credit risk. Unlike top executives, directors often have an *oversight* function and participate in strategic debates without having a direct or prominent role in the day-to-day operations or the financial choices of the firm. Hence, they might influence credit risk in a more *indirect* and mediated way through their participation in board-level activities (Bose et al., 2022). A woman director may *advocate* for the formation of a board-level risk committee or require frequent briefings on credit risk exposures, so advocating a more stringent supervision structure. A woman director with experience in governance or risk management may assess and comment on the efficacy of the firm's risk management policies, ensuring a holistic approach to credit risk management (Kinateder et al., 2021; Chen, Ni, and Tong 2016). However, the board's dynamics, level of engagement, and the degree to which their viewpoints are considered when making decisions play a crucial role in determining the impact of women directors on risk management procedures (Urquhart, Zhang and Schopohl, 2021). In a nutshell, directors may dispute management's risk appetite or give opinion on credit risk-related policies, but the executive team retains final decision-making power (Gilani, Keasey and Vallascas, 2021; McGuinness, Vieito, and Wang, 2017).

Additionally, in terms of risk-taking behavior, women CEOs and CFOs frequently display a more conservative and risk-averse leadership style compared to their male colleagues. This risk-averse conduct may favor stability, long-term sustainability, and sound financial judgment, which can help to

lower credit risk. A woman CEO, for example, may prioritize keeping solid cash reserves and conservative debt levels in order to reduce the danger of liquidity difficulties or financial difficulty. A woman CFO may stress conservative financial planning and smart investing methods, thus avoiding excessive risk-taking and lowering credit risk exposure (Oakley, 2000; Li, Zeng, 2019). But it is fundamentally the collective pool of skills and experiences of the board as an entity, that contributes to the credit risk oversight duty of the diverse board of directors (Ingersoll, Cook and Glass, 2023).

[Insert Table 4 about here]

5. Endogeneity controls

Women executives and/or women board member may not be randomly assigned to firms. For instance, as Huang and Kisgen (2013) explain, boards could discriminate based on gender when selecting executives and new board members, or women may self-select into certain types of firms. Thus, our empirical framework must consider potential endogeneity issues. In addition, female representation is not uniform across all kinds of firms, regions, and job markets. For instance, Bergmann (1974) overcrowding hypothesis states that women may be excluded from "male-dominated" jobs because of an excess supply of labor in more "female-dominated" occupations. Also, female executives are more highly represented in certain sectors and may choose to work for firms with specific characteristics.

5.1 Propensity score matching

To address these endogeneity issues, we first employ a propensity score matching approach (Rosenbaum and Rubin, 1983). We assign firm-quarter observations with a woman CEO or CFO (with one or more women board members) to the 'treatment group' and those without any woman CEO or CFO (without any woman board member) to the 'control group'. We then proceed as follows. First, we estimate the probability that a firm has a woman CEO or CFO (at least one woman serving as board member). We run a panel logit regression to explain the dummy which equals one if the firm has a woman as CEO or CFO (has at least one woman on the board), and zero otherwise. In the panel logit, as explanatory variables we use firm size, ROA, leverage, volatility, MTB, cash ratio, R&D expenses, board size and independence, and directors' nationality mix. We also add time and industry fixed effects. The pseudo-R^2 for the logit regression is 1.25% for the 'CEO_CFO_Woman' dummy and 12.1% for the 'Woman_on_Board' dummy. The results of these logit regressions are tabulated in the first columns of Table 5 Panels A and C. Further, for matching purposes we use the two nearest neighbours' approach to ensure that firms in the treatment and control groups are sufficiently identical. In Table 5 Panel A we show the results of the PSM where for each firm-quarter observation with a woman CEO or CFO, we select (with replacement) two firm-quarter observations from the control group of firms without a woman CEO or CFO which are the nearest 'neighbours' in terms of propensity

score. When comparing treatment firms with similar matched control firms without any woman CEO or CFO, we still find that the presence of a CEO/CFO woman reduces the future expected default probability. In Table 5 Panel C we show the results of a PSM where for each firm-quarter observation with at least one woman serving on the board, we select (with replacement) two firm-quarter observations from the control group without any woman on board which are the nearest 'neighbours' in terms of propensity score. When comparing treatment firms with similar matched control firms without any woman board member, we still find that the presence of at least one woman in the board increases the future expected default probability (the next 2-year and 3-year average EDF). Importantly, the results displayed in Table 4 continue to hold using this PSM methodology.

Furthermore, to verify that the firm-quarter observations in the treatment and control groups are indistinguishable in terms of observable characteristics, we follow Chen et al. (2017) and Atif et al. (2019) and examine the differences in the mean of each observable characteristic between the treatment and the control firm-quarter observations. Panels B and D of Table 5 show that none of the differences in the firms' observable characteristics between the treatment and control groups is statistically significant (in Panel D there are only two exceptions: board's size and board independence which are systematically higher in the treatment group). This diagnostic test suggests that overall, the propensity score matching removes most observable differences in the explanatory variables other than those relating to having women CEOs/CFOs (or at least one woman sitting on the board).

Additionally, we also repeat the propensity-score matching exercise using different matching criteria, such as by replacing each observation in the treatment group with the *one* and then with the *three* nearest neighbours in the control group, based on their propensity scores. All key results for the gender dummies continue holding, but we have not reported them because of space constraints.

5.2 Instrumental variables and two-stage least squares

Finally, we implement an instrumental variable (IV) approach and use two-stage least squares (2SLS) to extract the exogenous component of the dummies 'CEO_CFO_Woman' and 'Woman_on_Board'. The challenge in using 2SLS is the identification of an exogenous instrumental variable that does not have a direct relationship with the dependent variable (EDF – expected probability of default), while is related to the gender dummies. We use one of the U.S. State-level gender equality indexes proposed by Sugarman and Straus (1988). Huang and Kisgen (2013) adopt a gender equality index from this paper as instrumental variable too. In particular, we focus on the *political* gender equality index which measures the level of female representation in legislatures and other elected offices and therefore captures women's participation in societal decision-making and political power at a State-level. The six indicators of political equality combined into the index are: percentage of women who are members in Congress, State Senate, and State House, percent of women who are court judges, percent of women mayors and governing board members. We conjecture that the higher the number

(and therefore propensity) of women to lead in the politics, society, and judicial system of a State, the more likely it is for women to take up corporate top-leadership positions (CEOs/CFOs and/or board members) in firms located in that State. We assign the State-level political gender equality value to each firm based on the firm's headquarters location, with higher values indicating more favourable gender equality. Table 6 Panel A Column 1 (Column 3) reports the results from the first-stage OLS regression with the 'CEO_CFO_Woman' dummy ('Woman_on_Board') as the dependent variable. The coefficients of our instrumental variable in the first stage are positive and statistically significant at the 1% level, suggesting a strong relation between State-level political gender equality and the likelihood of having a woman CEO/CFO (board member) in a firm headquartered in that State. Columns 2 and 4 of Table 6 report the results for the second-stage regressions with the next year's average EDF as the dependent variable and the fitted values of the gender dummies as key control variables. Importantly, the results that women CEOs/CFOs (board members) have a negative (positive) impact on the next year average EDF of the company remain robust.[9]

Andrews et al. (2019) suggest that an F-statistic from the first stage regression that is below 10 can indicate a weak instrument. Our F-statistic is 8.26 for the 'CEO_CFO_Woman' dummy regression (this is not far from the recommended threshold, and it is equivalent to the F-statistics reported by Huang & Kisgen (2013) – 8.42 - when using a gender equality index as instrument) and 51.84 for the 'Woman_on_Board' dummy regression, which is much higher than the recommended threshold. In addition, the Wald tests χ^2s from the first-stage regressions (17.05 and 17.64) are large and comparable with the χ^2 obtained by Huang & Kisgen (2013) in Table 6 of their paper (15.34). Our instrument satisfies the relevance condition. The political gender equality index has a very low negative pairwise correlation with EDF (-2.45%); we therefore have reasonable reassurance that the instrument also satisfies the exogeneity condition.

[Insert Tables 5 and 6 about here]

6. Further analysis

6.1 Robustness checks: alternative variables, sub-periods analysis, and a different DiD analysis approach

We perform additional analysis and run a battery of checks of the results reported in Table 4 to show that they are robust to alternative specifications, variable measurements, and sub-period selection. First, in Table 7 we repeat the panel regression for EDF replacing the 'Woman_on_Board' dummy used in Table 4 Panel B with the ratio of female-to-male board members which is often used as a direct measure of board gender diversity. The sign and significance of the gender variable's estimated coefficient is again confirmed: the higher the proportion of women to men in the board, the higher the next year(s)' expected default frequency of the firm.

[9] In unreported results we observe similar estimated coefficients and significance also when checking the next two and three years' average EDF.

Next, in Table 8 Panel A, we present the results of a DiD panel OLS regression like the baseline one presented in Table 4 Panel C but excluding the pro-longed financial crisis period of 2008-2011 when credit risk is higher for firms across many industries/sectors due to the external circumstances and higher systemic risk. The results still show that with a woman executive (CEO or CFO) in charge, the next one, two or three years' EDF become lower (the future credit risk of the firm is lower), while with at least one woman on board the future EDF becomes higher. Table 8 Panel B shows instead the results from the same DiD panel regression *during* the extended financial crisis period. The 'reducing' impact of the 'CEO_CFO_Woman' dummy on the future EDF is now much stronger, while the significance of the 'detrimental' impact of the appointment of a non-executive woman board member almost disappears. This is what we should expect from an analysis focused on a period of extremely high systemic credit risk according to our Hypothesis H2. On the one hand, if women CEOs/CFOs are more prone and/or entrusted to reduce credit risk, they would be more so in a period of systemic credit risk. On the other hand, while the presence of women in the company board may induce an increase in future EDF in 'regular' times because of increased board conflicts with majoritarian men leaders, this detrimental impact disappears in a more turbulent period when the board comes 'together' in stronger agreement to stir the firm away from the potential damages caused by the global credit crisis.

[Insert Tables 7 and 8 about here]

Further, we use alternative specifications of the dependent (default risk) variable to measure future firm credit risk. In Table 9, we report the results from the DiD baseline panel regression where we replace the next (one to three) years EDFs with credit default swap (CDS) spreads for each firm (reference entity). Our main results for the gender dummies are all confirmed in at least one of the specifications proposed (i.e., next one, two-, or three-years' credit risk). In Table 10, we tabulate the results from the DiD panel regression using the next (one to three) years default probabilities from the Ohlson O-score ($p(default) = \frac{e^{O-score}}{1+e^{O-score}}$) as dependent variables. Table 10 confirms the result for the 'CEO_CFO_Woman' dummy but with scarce statistical significance: in Panel A the negative coefficients of the dummy for the next-year default probability is only close to a 10% significance level. The positive sign and statistically significance of the estimated coefficient for the 'Woman_on_Board' dummy are instead confirmed using the Ohlson O-score default probabilities.

All panel OLS regressions performed in Tables 4-10 control for firm and year fixed effects and use standard errors clustered at the firm level.

[Insert Tables 9 and 10 about here]

Finally, according to Baker, Larcker, and Wang (2022), the traditional DiD panel design we have followed in the baseline regressions in Tables 4-10 can be biased when the 'events' happen in a 'staggered' manner, as in our design the appointments of (and the transition to) women executives and

women board members is scattered across the sample of firms/quarters. The point is well explained also by Faccio, Marchica, and Mura (2016). The specific concern with our baseline DiD based on when a woman is appointed as CEO/CFO or board member is that these transitions may occur at various "special" times and may not capture the specific 'gender impact'. The inclusion of firm fixed effects in the DiD panel regression models helps to address the selection concern, but it is not sufficient. To better address this concern, we focus on the appointments of women *replacing men* and borrow the methodology of Huang and Kisgen (2013). We apply a different DiD analysis approach that compares the firm's credit risk before and after transitions from a male to a female executive/director.[10] We use for the tests a sample including three years before and three years after a transition, excluding the year of the transition. We require an executive/director to be in power for at least three years (the year he or she is hired and two years following) to ensure that he or she has had significant time to make an impact on corporate financial decisions (and hence credit risk). We also require that the firm have at least two years of financial data before the executive transition to mitigate serial correlation bias from difference-in-differences approaches (see Bertrand, Duflo, and Mullainathan, 2004). As illustrated by Tables 11 and 12 our main results hold: the firm's future expected default probability (over the one- to three-year horizon) is reduced after a woman CEO/CFO is appointed to replace a man CEO/CFO, while the EDF increases (over the one- to two-year horizon) after a the appointment of a woman board member in replacement of a male board member.

[Insert Tables 11 and 12 about here]

6.2 How do women leaders impact future expected default probability?

Finally, in light of our results showing that women CEOs/CFOs (board members) reduce (increase) firms' credit risk after they are appointed, we now test how on average they are likely to achieve this result, i.e., what financial characteristics of the firm change after their appointments. Specifically, we look at the impact of a woman CEO/CFO and woman board member on several firm financial characteristics, cost-related items, and risk measures and in Table 13 we report the statistically significant findings. Panel A reports the results for the next year's, two-years' and three- years' average earnings volatility as dependent variable, Panel B the results for R&D expenses, Panel C for current leverage as ratio of total current liabilities over total assets, and Panel D for cash ratio. The key independent variables are again the 'CEO_CFO_Woman' and 'Woman_on_Board' dummies (which are defined as mutually exclusive).

[10] As in Datta, Doan, and Toscano (2021) and Faccio, Marchica, and Mura (2016) we use the new methodology as a further endogeneity check, rather than as main baseline regression. As Huang and Kisgen (2013) explain, one advantage of our baseline panel DiD specification is that all firms can be included in the sample (also those that have female-to-male, male-to-female-to-male, or male-to- female-to-female transitions).

On the one hand, we observe that women CEOs/CFOs have a negative impact on next one, two- and three-years' firm earnings volatility and current leverage and on the next two- and three-years' R&D expenses, while they have a positive impact on future cash ratios and therefore firm financial liquidity. On the other hand, we also continue observing a positive impact of the 'Woman_on_Board' dummy on earnings volatility, R&D expenses, current leverage, and a negative but milder and less significant impact only on the three-years-ahead cash ratio. These results are in line with those related to the expected default frequency, which also increases with higher volatility, higher leverage, and lower liquidity.

[Insert Table 13 about here]

7. Conclusions

This paper unveils an interesting relationship between the firm credit risk and gender diversity in corporate leadership. Our empirical evidence shows that the likelihood for women to be appointed as the firm's CEOs or CFOs after a man predecessor is higher for firm with above median credit risk. This evidence confirms the 'glass cliff' theory: women are pushed to top management roles when these roles are most risky. Interestingly, while confirmed for women CEOs and CFOs, the glass cliff theory does not apply to the appointment of women board members. Firms witnessing difficult financial times do not necessarily appoint women to their boards.

We further document that the impact of women D&O on the firm's future default probability is different depending on their role and the corporate context. On the one hand, and consistent with the upper echelon and resource dependence theories, the appointment of women CEOs and/or CFOs brings a new leadership style and additional resources to the firms, which reduces firm's future credit risk (in the next one to three years). Those women tend to act prudentially in leadership, particularly when their own reputation is at stake, and when they stand on a 'glass cliff'. On the other hand, we find that having at least one woman serving on the firm's board increases the firm's credit risk over the next one to three years. The absence of the glass cliff effect documented earlier, coupled with the decreased financial performance reinforce the eventuality of tokenism and signaling theory being here at play, as unintended consequences for women appointment to the boardroom.

We conclude that the effect of gender diversity on firms is complex and often context dependent. Gender identity does not uniquely identify women's credit risk attitude and management. It is rather a more intricate mix of gender, leadership role, board dynamics, market interpretation of information, corporate governance practices and personal exposure that determines the impact women have on firm credit risk when they take leadership positions. A woman in a top executive decision-making position, originally appointed in difficult times, takes the lead and stirs the firm towards a lower credit risk profile. We do not observe the same result when woman participates in the board of directors since a gender-diverse board functioning entails complex dynamics and can be interpreted as revealing a preference

for diversity and a weaker commitment to shareholder value and financial stability. Consequently, firms with at least one women director will be penalized.

The glass cliff theory highlights the importance of not just appointing women to leadership positions, but also providing them with the support and resources they need to succeed. To promote gender diversity in leadership, organizations must first create an environment that welcomes and supports women in leadership positions (moving away from tokenism), through building policies that support equitable distribution of opportunities and resources among men and women leaders, and promoting a culture that encourages equity and inclusivity, which can help reduce prejudice and bias within and outside the organization. Future research could investigate which further company choices or contextual variables may help or hinder the board diversity cue, and explicitly explore the possibility of negative signaling and how firms can mitigate it.

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Table 1. Summary statistics

Panel A. This table reports summary statistics of our main variables defined in Appendix A. The data pertaining to the characteristics of the directors has been consolidated at the firm level.

	N	Mean	SD	Min	p50	max
Credit Risk Variable:						
Expected Default Frequency (EDF)	103,399	0.036	0.121	0.000	0.000	0.509
Credit-risk dummy	103,399	0.442	0.491	0.000	0.000	1.000
Gender Diversity Variables:						
CEO_CFO_Woman	103,399	0.059	0.235	0.000	0.000	1.000
Woman_on_Board	103,399	0.217	0.412	0.000	0.000	1.000
Female_to_Male_Board_Ratio	103,399	0.064	0.136	0.000	0.000	0.500
CEO_CFO_Woman_after_Man	103,399	0.005	0.069	0.000	0.000	1.000
Woman_on_Board_after_Man	103,399	0.012	0.107	0.000	0.000	1.000
Firm Characteristics:						
Firm size	103,399	6.539	2.013	2.508	6.562	10.490
ROA	103,399	-0.003	0.050	-0.221	0.009	0.063
Leverage	103,399	0.362	0.208	0.029	0.333	0.825
Volatility	103,399	0.424	0.225	0.135	0.367	1.109
MTB	103,399	2.879	3.191	-3.284	2.055	15.510
Cash Ratio	103,399	0.163	0.195	0.002	0.087	0.851
R&D	103,399	0.011	0.023	0.000	0.000	0.116
Board Size	92,417	8.473	2.260	2.000	8.000	22.000
% Independent Board	97,893	0.358	0.214	0.053	0.333	1.000
Board Nationalitymix	81,849	0.079	0.154	0.000	0.000	0.900
CEOs Characteristics:						
Director Age	71,902	51.709	7.819	28.000	52.000	73.000
Networksize	71,902	6.656	8.102	0.080	3.900	98.300
Rank_Edu	71,902	2.346	0.585	1.000	2.000	3.000
Nationality Dummy	71,902	0.011	0.189	0.000	0.000	1.000
Internally-promoted CEO Dummy	71,902	0.777	0.416	0.000	1.000	1.000

Board members Characteristics:						
Director Age	71,902	55.033	8.421	29.000	57.000	84.000
Networksize	71,902	8.543	11.656	0.060	4.670	151.080
Rank_Edu	71,902	2.075	0.304	1.000	2.000	3.000

Panel B. This Table reports differences in firm average characteristics by CEO/CFO's gender.

	Firms without women CEO/CFO (N = 97,325)		Firms with women CEO/CFO (N = 6,074)			
	Mean	SD	Mean	SD	Mean Diff.	t-stat
Firm Size	6.5291	0.0064	6.6920	0.0282	-0.1628***	-6.1164
ROA	-0.0033	0.0002	-0.0029	0.0006	-0.0004	-0.6521
Leverage	0.3613	0.0007	0.3673	0.0027	-0.0059***	-2.1512
Volatility	0.4242	0.0007	0.4173	0.0030	0.0068***	2.2930
MTB	2.8935	0.0102	2.6400	0.0388	0.2535***	6.0077
Cash Ratio	0.1621	0.0006	0.1741	0.0023	-0.0120***	-4.6699
R&D	0.0112	0.0001	0.0118	0.0003	-0.0006**	-1.9263
Board Size	8.4543	0.0074	8.7642	0.0320	-0.3099***	-10.2592
% Independent Board	0.3552	0.0008	0.4025	0.0029	-0.0473***	-15.8337
Nationalitymix	0.0784	0.0005	0.0876	0.0021	-0.0092***	-4.3645

Panel C. This Table reports differences in firm characteristics by board member' gender.

	Firms without women board member (N = 81,120)		Firms with women board member (N =22,279)			
	Mean	SD	Mean	SD	Mean Diff.	t-stat
Firm Size	6.3516	0.0069	7.2202	0.0133	-0.86873***	-57.9891
ROA	-0.0040	0.0002	-0.0007	0.0003	-0.0032***	-8.5504
Leverage	0.3564	0.0007	0.3811	0.0014	-0.0247***	-15.7115
Volatility	0.4359	0.0008	0.3794	0.0014	0.0565***	33.3395
MTB	2.8306	0.0110	3.0535	0.0225	-0.2230***	-9.2431
Cash Ratio	0.1645	0.0007	0.1563	0.0012	0.0082***	5.5560
R&D	0.0114	0.0001	0.0105	0.0001	0.0008***	4.8351
Board Size	8.2149	0.0080	9.3680	0.0149	-1.1532***	-68.1139
% Independent Board	0.3268	0.0008	0.4436	0.0014	-0.1167***	-71.5225
Nationalitymix	0.0752	0.0006	0.0914	0.0011	-0.0162***	-13.4729

Table 2. Conditional Logit Test for Hypothesis 1 – Likelihood of appointment of a CEO/CFO woman replacing a male predecessor (for CEOs including only cases of forced turnover/dismissals)

This table presents estimates of panel regressions on firm-level data in which the dependent variable is the dummy 'CEO_CFO_Woman_Appointment'. The key independent variables are credit dummies equal to one if the firm's expected default frequency (EDF) is higher than the previous *one-year* or *two-year* cross-firm *average* EDF. All firm characteristics used as independent variables (e.g., firm size, ROA, leverage, etc.) are from the previous quarter. Data are at a quarterly frequency. All variables are defined in Appendix A. Columns (1) to (2) report the results for *logit* regressions; columns (3) to (4) also for logit regressions but with and time (quarter) and industry fixed effects. z-statistics are reported in parentheses. *** means p-value<0.01, ** p-value<0.05, * p-value<0. Odds ratio can be calculated as exp(estimated coefficients). Columns (5) and (6) report estimates of least squares panel regressions on firm-level panel data with time (quarter) and *firm* fixed effects. Standard errors are double-clustered by time and firm. t-statistics are reported in parentheses. *** means p-value<0.01, ** p-value<0.05, * p-value<0.

Dependent Variable: **CEO_CFO_Woman_after_Man** (=1 in appointment years, 0 afterwards)						
	(1) Credit dummy based on previous year cross-firm average EDF	(2) Credit dummy based on previous 2-year cross-firm average EDF	(3) Credit dummy based on previous year cross-firm average EDF	(4) Credit dummy based on previous 2-year cross-firm average EDF	(5) Credit dummy based on previous year cross-firm average EDF	(6) Credit dummy based on previous 2-year cross-firm average EDF
Credit-risk	0.274**	0.222*	0.292**	0.251*	0.167**	0.146*
	(2.12)	(1.70)	(2.12)	(1.77)	(2.16)	(1.79)
Firm Size	-0.011	-0.008	0.002	0.004	0.004	0.005
	(-0.29)	(-0.22)	(0.06)	(0.10)	(0.19)	(0.23)
ROA	0.141	0.144	0.140	0.145	0.088	0.088
	(0.22)	(0.23)	(0.21)	(0.21)	(0.20)	(0.20)
Leverage	0.990***	0.938***	0.963***	0.924***	0.544***	0.520***
	(3.20)	(2.99)	(2.97)	(2.80)	(2.88)	(2.66)
Volatility	0.477**	0.462**	0.444**	0.435**	0.338*	0.328*
	(2.46)	(2.34)	(2.12)	(2.05)	(1.89)	(1.82)
MTB	-0.126	-0.132	-0.162	-0.163	-0.055	-0.056
	(-0.07)	(-0.07)	(-0.08)	(-0.08)	(-0.69)	(-0.70)
Cash Ratio	0.984***	0.978***	0.983***	0.978***	0.573***	0.571***
	(3.47)	(3.45)	(3.25)	(3.24)	(2.67)	(2.66)
R&D	0.430	0.413	0.511	0.511	0.685	0.665
	(0.35)	(0.33)	(0.47)	(0.47)	(0.45)	(0.44)
Age	-0.027**	-0.027**	-0.022*	-0.022*	-0.013	-0.013
	(-2.19)	(-2.19)	(-1.74)	(-1.74)	(-1.49)	(-1.49)
Network	0.016*	0.016*	0.018**	0.018**	0.013	0.013
Size	(1.83)	(1.83)	(1.98)	(1.98)	(1.56)	(1.56)
Rank	0.106	0.108	0.146	0.147	0.093	0.094
Education	(0.72)	(0.73)	(0.97)	(0.98)	(0.91)	(0.92)
Board Size	0.001	0.001	0.002	0.002	0.001	0.001
	(0.03)	(0.05)	(0.06)	(0.08)	(0.03)	(0.06)
% Independent Board	0.413*	0.408*	0.600**	0.593**	0.331**	0.327**
	(1.69)	(1.67)	(2.32)	(2.30)	(2.18)	(2.15)

Nationality Dummy	0.103 (0.32)	0.100 (0.31)	0.169 (0.52)	0.168 (0.51)	0.087 (0.47)	0.088 (0.47)
Time FE	NO	NO	YES	YES	YES	YES
Industry FE	NO	NO	YES	YES	NO	NO
Firm FE	NO	NO	NO	NO	YES	YES
Pseudo R-squared	0.092	0.088	0.115	0.112	0.171	0.173
Observations	71,902	71,902	71,902	71,902	71,902	71,902

Table 3. Test for Hypothesis 1 – Likelihood of appointment of a woman board member replacing a male predecessor.

This table presents estimates of panel regressions on firm-level data in which the dependent variable is the dummy 'Woman_on_Board_Appointment'. The key independent variables are credit dummies equal to one if the firm's expected default frequency (EDF) is higher than the previous *one-year* or *two-year* cross-firm *average* EDF. All firm characteristics used as independent variables (e.g., firm size, ROA, leverage, etc.) are from the previous quarter. Data are at a quarterly frequency. All variables are defined in Appendix A. Columns (1) to (2) report the results for *logit* regressions; columns (3) to (4) also for *logit* regressions but with and time (quarter) and industry fixed effects. z-statistics are reported in parentheses. *** means p-value<0.01, ** p-value<0.05, * p-value<0. Odds ratio can be calculated as exp(estimated coefficients). Columns (5) and (6) report estimates of least squares panel regressions on firm-level panel data with time (quarter) and *firm* fixed effects. Standard errors are double-clustered by time and firm. t-statistics are reported in parentheses. *** means p-value<0.01, ** p-value<0.05, * p-value<0.

Dependent Variable: **Woman_on_Board_after_Man** (=1 in appointment years, 0 afterwards)						
	(1) Credit dummy based on previous year cross-firm average EDF	(2) Credit dummy based on previous 2-year cross-firm average EDF	(3) Credit dummy based on previous year cross-firm average EDF	(4) Credit dummy based on previous 2-year cross-firm average EDF	(5) Credit dummy based on previous year cross-firm average EDF	(6) Credit dummy based on previous 2-year cross-firm average EDF
Credit-risk	0.109	0.117	0.213	0.280	0.061	0.387
	(0.54)	(0.56)	(0.97)	(1.20)	(0.15)	(0.92)
Firm Size	-0.010	-0.009	0.053	0.053	1.108**	1.102**
	(-0.17)	(-0.16)	(0.88)	(0.89)	(2.16)	(2.15)
ROA	1.301	1.309	1.384	1.402	1.383	1.372
	(1.47)	(1.48)	(1.47)	(1.48)	(0.77)	(0.77)
Leverage	0.356	0.358	0.476	0.530	-0.634	-0.269
	(0.76)	(0.77)	(0.96)	(1.08)	(-0.49)	(-0.20)
Volatility	0.190	0.193	0.240	0.261	0.546	0.643
	(0.64)	(0.64)	(0.82)	(0.90)	(0.68)	(0.78)
MTB	-5.141	-5.197	-5.942	-5.994	-0.295	-0.231
	(-0.27)	(-0.28)	(-0.29)	(-0.30)	(-0.44)	(-0.34)
Cash Ratio	1.418***	1.421***	1.167**	1.178**	1.705	1.657
	(3.26)	(3.26)	(2.55)	(2.57)	(1.00)	(0.98)
R&D	-0.114	-0.129	0.977	0.993	1.818	1.772
	(-0.05)	(-0.05)	(0.39)	(0.39)	(0.32)	(0.31)

Age	-0.025**	-0.025**	-0.010	-0.010	0.012	0.011
	(-2.53)	(-2.53)	(-0.99)	(-0.99)	(0.32)	(0.29)
Network	-0.006	-0.006	-0.003	-0.003	0.007	0.007
Size	(-0.59)	(-0.59)	(-0.31)	(-0.31)	(0.22)	(0.22)
Rank	-0.094	-0.093	-0.059	-0.059	0.113	0.112
Education	(-0.72)	(-0.72)	(-0.45)	(-0.45)	(0.18)	(0.18)
Board Size	0.101**	0.100**	0.082*	0.081*	0.436***	0.433***
	(2.41)	(2.40)	(1.89)	(1.87)	(2.67)	(2.65)
% Independent	0.754**	0.751**	1.459***	1.455***	4.690***	4.670***
Board	(2.24)	(2.23)	(4.01)	(4.00)	(3.46)	(3.45)
Nationality	0.214	0.214	0.201	0.199	1.197	1.093
Dummy	(0.45)	(0.45)	(0.42)	(0.41)	(0.60)	(0.54)
Time FE	NO	NO	YES	YES	YES	YES
Industry FE	NO	NO	YES	YES	NO	NO
Firm FE	NO	NO	NO	NO	YES	YES
Pseudo R-squared	0.162	0.163	0.184	0.187	0.219	0.219
Observations	71,902	71,902	71,902	71,902	71,902	71,902

Table 4. Baseline DiD panel regression (firm-level data)

This table presents estimates of the DiD multivariate panel OLS regression in which the dependent variables are the ***next*** *year,* ***next*** *two-year or* ***next*** *three-year average* EDF. The key independent variables are the 'CEO_CFO_Woman' and 'Woman_on_Board' dummies. All firm characteristics used as independent variables (e.g., firm size, ROA, leverage, …) are from the current quarter. Data are at a quarterly frequency. All variables are defined in Appendix A. The coefficients on the CEO_CFO_Woman dummy and Woman_on_Board dummy are multiplied by 10^2. Coefficients on the MTB are multiplied by 10^3. The t-statistics reported in parentheses are based on standard errors clustered by firm and quarter (Petersen, 2009). ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A. Control only for 'CEO_CFO_Woman' dummy

	EDF		
	Next year average	Next 2-year average	Next 3-year average
CEO_CFO_Woman	-0.574***	-0.539***	-0.369***
	(-3.49)	(-3.77)	(-3.07)
Firm Size	0.002**	0.015***	0.022***
	(2.27)	(15.96)	(25.54)
ROA	-0.069***	-0.063***	-0.048***
	(-4.48)	(-7.97)	(-8.36)
Leverage	0.267***	0.137***	0.070***
	(59.69)	(38.15)	(22.91)
Volatility	0.041***	0.008***	-0.002
	(12.67)	(3.31)	(-1.13)
MTB	0.001	0.008	0.003
	(0.06)	(0.99)	(0.80)
Cash Ratio	0.019***	0.008**	0.006**
	(4.70)	(2.44)	(2.25)
R&D	-0.071***	-0.046***	-0.006
	(-3.45)	(-3.23)	(-0.38)
Board size	-0.001***	-0.000	-0.000

	(-3.21)	(-0.89)	(-1.41)
% Independent Board	0.019***	0.026***	0.021***
	(6.52)	(9.97)	(9.21)
Nationalitymix	-0.006*	-0.012***	-0.010***
	(-1.70)	(-3.67)	(-3.33)
Observations	76,172	76,172	76,172
Adj. R-squared	0.532	0.576	0.645
Time FE	YES	YES	YES
Firm FE	YES	YES	YES

Panel B. Control only for 'Woman_on_Board' dummy

	EDF		
	Next year average	Next 2-year average	Next 3-year average
Woman_on_Board	0.136	0.213**	0.228***
	(1.29)	(2.31)	(2.74)
Firm Size	0.002**	0.015***	0.022***
	(2.32)	(16.04)	(25.63)
ROA	-0.069***	-0.063***	-0.049***
	(-4.49)	(-8.01)	(-8.41)
Leverage	0.267***	0.137***	0.070***
	(59.65)	(38.11)	(22.85)
Volatility	0.041***	0.008***	-0.002
	(12.71)	(3.34)	(-1.11)
MTB	0.001	0.008	0.003
	(0.06)	(0.99)	(0.81)
Cash Ratio	0.018***	0.008**	0.006**
	(4.67)	(2.40)	(2.21)
R&D	-0.071***	-0.046***	-0.006
	(-3.46)	(-3.26)	(-0.40)
Board size	-0.001***	-0.000	-0.000*
	(-3.33)	(-1.13)	(-1.70)
% Independent Board	0.017***	0.024***	0.020***
	(5.87)	(9.02)	(8.30)
Nationalitymix	-0.006	-0.011***	-0.009***
	(-1.60)	(-3.51)	(-3.16)
Observations	76,172	76,172	76,172
Adj. R-squared	0.532	0.576	0.645
Time FE	YES	YES	YES
Firm FE	YES	YES	YES

Panel C. Control for both dummies 'CEO_CFO_Woman' and 'Woman_on_Board'

	EDF		
	Next year average	Next 2 years average	Next 3 years average
CEO_CFO_Woman	-0.592***	-0.566***	-0.401***
	(-3.59)	(-3.95)	(-3.31)
Woman_on_Board	0.165	0.242***	0.251***
	(1.57)	(2.62)	(3.00)
Firm Size	0.002**	0.015***	0.022***

	(2.26)	(15.96)	(25.55)
ROA	-0.069***	-0.063***	-0.049***
	(-4.48)	(-7.99)	(-8.40)
Leverage	0.267***	0.137***	0.070***
	(59.70)	(38.16)	(22.89)
Volatility	0.041***	0.008***	-0.002
	(12.67)	(3.31)	(-1.14)
MTB	0.001	0.008	0.003
	(0.06)	(0.99)	(0.81)
Cash Ratio	0.019***	0.008**	0.006**
	(4.69)	(2.43)	(2.24)
R&D	-0.071***	-0.046***	-0.006
	(-3.45)	(-3.24)	(-0.39)
Board size	-0.001***	-0.000	-0.000*
	(-3.35)	(-1.16)	(-1.73)
% Independent Board	0.018***	0.024***	0.020***
	(5.96)	(9.10)	(8.34)
Nationalitymix	-0.006*	-0.012***	-0.010***
	(-1.70)	(-3.66)	(-3.30)
Observations	76,172	76,172	76,172
Adj. R-squared	0.532	0.576	0.645
Time FE	YES	YES	YES
Firm FE	YES	YES	YES

Panel D. Split sample according to internally-hired vs. externally-hired CEOs/CFOs, control for both dummies 'CEO_CFO_Woman' and 'Woman_on_Board'.

	EDF Next year average	
	Internally-promoted CEO	Externally-hired CEO
CEO_CFO_Woman	-0.875***	-0.224
	(-3.78)	(-0.62)
Woman_on_Board	0.003	0.415**
	(0.02)	(2.30)
Firm Size	0.005***	-0.001
	(2.93)	(-0.34)
ROA	-0.102***	-0.059***
	(-7.34)	(-2.59)
Leverage	0.241***	0.271***
	(39.49)	(37.37)
Volatility	0.042***	0.034***
	(9.69)	(6.60)
MTB	0.012	-0.006
	(0.28)	(-1.37)
Cash Ratio	0.011**	0.024***
	(1.99)	(3.85)
R&D	-0.094***	-0.070**
	(-4.32)	(-2.01)
Board size	-0.001	-0.002***
	(-1.64)	(-3.52)
% Independent Board	0.026***	0.012**
	(5.95)	(2.47)
Nationalitymix	-0.023***	0.013**

	(-4.32)	(2.12)
Observations	41,308	34,864
Adj. R-squared	0.549	0.579
Time FE	YES	YES
Firm FE	YES	YES

Table 5. Propensity Score Matching (PSM)

This table presents estimates of the PSM regression, in which the dependent variables are the ***next*** *year,* ***next*** *two-year or next three- year average* EDF. The key independent variables are the CEO_CFO_Woman and the Woman_on_Board dummies. For each firm with a woman CEO or CFO (at least a woman board member), we select with replacement from the group of firms without any woman CEO or CFO (without any woman board member(two firms which are the nearest neighbors in terms of propensity score. The propensity score is estimated from the logit regressions in Columns 1. The coefficients of CEO_CFO_Woman and Woman_on_Board are multiplied by 10^2. The coefficients of MTB are multiplied by 10^3. All variables are defined in Appendix A. The t-statistics reported in parentheses are based on standard errors clustered by firm and quarter (Petersen, 2009). ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A. PSM based only on 'CEO_CFO_Woman' dummy: results

Dep. Variable:	**CEO_CFO_Woman**	**EDF** (matched sample from control group)		
	Logit regression	Next year average	Next 2-year average	Next 3-year average
CEO_CFO_Woman		-0.611**	-0.821***	-0.453**
		(-2.37)	(-3.63)	(-2.37)
Firm Size	0.058***	0.003*	0.017***	0.025***
	(5.34)	(1.84)	(10.51)	(15.55)
ROA	0.529**	-0.110***	-0.056***	-0.034***
	(2.18)	(-6.19)	(-4.03)	(-3.26)
Leverage	0.081	0.253***	0.129***	0.073***
	(1.02)	(34.35)	(20.71)	(13.15)
Volatility	-0.011	0.042***	0.008*	-0.002
	(-0.16)	(7.14)	(1.92)	(-0.61)
MTB	-0.030	0.017	0.012*	-0.016
	(-0.57)	(1.64)	(1.70)	(-0.31)
Cash Ratio	0.772***	0.012*	0.007	0.006
	(8.16)	(1.82)	(1.19)	(1.11)
R&D	-0.597	-0.095***	-0.022	0.029
	(-0.99)	(-2.82)	(-0.83)	(1.14)
Board size	0.039***	-0.001**	-0.000	-0.000
	(4.51)	(-2.10)	(-1.01)	(-0.31)
% Independent Board	1.203***	0.014***	0.019***	0.019***
	(17.49)	(2.86)	(4.23)	(4.63)
Nationalitymix	0.077	-0.017***	-0.022***	-0.014***
	(0.82)	(-2.64)	(-4.04)	(-2.84)
Observations	76,172	29,156	29,156	29,156
Adj. R-squared	0.0125	0.574	0.629	0.681
Firm FE	NO	YES	YES	YES
Time FE	YES	YES	YES	YES
Industry FE	YES	NO	NO	NO

Panel B - PSM based only on 'CEO_CFO_Woman' dummy: Differences in treatment vs. control firms' average characteristics

	Control	Treatment	Difference	t-stat
Firm Size	6.9203	6.9171	0.0031	0.0871
ROA	-0.0016	-0.0023	0.0007	0.7889
Leverage	0.3627	0.3663	-0.0036	-0.9672
Volatility	0.4052	0.4062	-0.0010	-0.2531
MTB	2.4988	2.7924	-0. 2935	-0.4026
Cash Ratio	0.1791	0.1759	-0.0031	0.8496
R&D	0.0117	0.0117	<0.0001	0.0545
Board size	8.9145	8.9369	-0.0224	-0.5415
% Board independence	0.3816	0.3880	-0.0063*	-1.6665
Nationalitymix	0.0922	0.0879	0.0043	1.5248

Panel C. PSM based only on 'Woman_on_Board' dummy: results

Dep. Variable:	**Woman_on_Board**	**EDF** (matched sample from control group)		
	Logit regression	Next year average	Next 2-year average	Next 3-year average
Woman_on_Board		0.169	0.298**	0.286**
		(1.02)	(2.06)	(2.11)
Firm Size	0.100***	0.003*	0.017***	0.025***
	(15.28)	(1.89)	(10.61)	(15.62)
ROA	-0.028	-0.110***	-0.056***	-0.035***
	(-0.21)	(-6.21)	(-4.08)	(-3.31)
Leverage	-0.035	0.253***	0.128***	0.073***
	(-0.73)	(34.32)	(20.67)	(13.11)
Volatility	-0.410***	0.042***	0.008*	-0.002
	(-8.80)	(7.14)	(1.91)	(-0.63)
MTB	-0.030	0.017	0.012*	-0.002
	(-1.47)	(1.64)	(1.68)	(-0.32)
Cash Ratio	0.584***	0.012*	0.007	0.006
	(9.94)	(1.82)	(1.18)	(1.09)
R&D	0.226	-0.095***	-0.022	0.029
	(0.72)	(-2.83)	(-0.83)	(1.14)
Board size	0.214***	-0.001**	-0.001	-0.000
	(40.84)	(-2.13)	(-1.10)	(-0.42)
% Board	3.593***	0.013***	0.017***	0.017***
independence	(80.85)	(2.58)	(3.71)	(4.19)
Nationalitymix	-0.077	-0.016***	-0.021***	-0.013***
	(-1.33)	(-2.58)	(-3.87)	(-2.71)
Observations	76,172	29,156	29,156	29,156
Adj. R-squared	0.121	0.573	0.629	0.681
Firm FE	NO	YES	YES	YES
Time FE	YES	YES	YES	YES
Industry FE	YES	NO	NO	NO

Panel D - PSM based only on 'Woman_on_Board' dummy: Differences in treatment vs. control firms' average characteristics

	Control	Treatment	Difference	t-stat
Firm Size	6.8806	6.9223	-.0417*	-1.7916
ROA	-0.0019	-0.0021	0.0002	0.3162
Leverage	0.3653	0.3696	-0.0042*	-1.7258
Volatility	0.4011	0.397	0.0041	1.5977
MTB	3.7369	3.6034	0.1335	0.1519
Cash Ratio	0.1630	0.1631	-0.0001	-0.0459
R&D	0.0109	0.0113	-0.0004	-1.4892
Board size	8.8826	8.9742	-0.0917***	-3.5386
% Board independence	0.3547	0.3747	-0.0200***	-8.5526
Nationalitymix	0.0815	0.0826	-0.0011	-0.5841

Table 6. Two stage OLS regression – Instrumental variable: Political gender equality index by U.S. State

This table presents estimates of the 2SLS regression, in which the dependent variables are the ***next*** *year,* ***next*** *two-year or* ***next*** *three- year* **EDF**. The key independent variables are CEO_CFO_Woman_fitted which is estimated from the first-stage regression in Column 1 and Woman_on_Board_fitted which is estimated from the first-stage regression in Column 3. The coefficients of CEO_CFO_Woman_fitted and the Woman_on_Board_fitted are multiplied by 10^2. The coefficients of MTB are multiplied by 10^3. The t-statistics reported in parentheses are based on standard errors clustered by firm and quarter (Petersen, 2009). ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	CEO_CFO_Woman		**Woman_on_Board**	
	First-stage	Second-stage Next year Average EDF	First-stage	Second-stage Next year Average EDF
Political gender equality index	0.052***		0.264***	
	(3.02)		(9.16)	
CEO_CFO_Woman_fitted		-0.579***		
		(-3.52)		
Woman_on_Board_fitted				0.203*
				(1.92)
Firm Size	0.004***	0.002**	0.019***	0.002**
	(6.25)	(2.06)	(15.99)	(2.17)
ROA	0.024**	-0.069***	0.013	-0.069***
	(2.50)	(-4.47)	(0.85)	(-4.46)
Leverage	-0.003	0.267***	-0.027***	0.267***
	(-0.59)	(59.28)	(-3.22)	(59.22)
Volatility	0.005	0.041***	-0.015*	0.041***
	(1.01)	(12.39)	(-1.87)	(12.43)
MTB	-0.017*	-0.001	-0.101***	-0.001
	(-1.80)	(-0.11)	(-4.91)	(-0.13)
Cash Ratio	0.053***	0.017***	0.060***	0.018***
	(8.08)	(4.40)	(6.03)	(4.48)
R&D	0.010	-0.070***	-0.127***	-0.071***
	(0.38)	(-3.42)	(-2.94)	(-3.44)
Board size	0.002***	-0.001***	0.035***	-0.001***
	(3.22)	(-3.50)	(38.44)	(-3.42)

% Independent	0.078***	0.018***	0.633***	0.018***
Board	(16.32)	(6.07)	(78.53)	(6.10)
Nationalitymix	0.009	-0.006	-0.013	-0.005
	(1.42)	(-1.50)	(-1.34)	(-1.38)
Observations	75,117	75,117	75,117	75,117
Adj. R-squared	0.011	0.532	0.166	0.532
Time FE	YES	YES	YES	YES
Firm FE	NO	YES	YES	YES
Industry FE	YES	NO	NO	NO
F-statistic	8.26***		51.84***	
[P-value]	[0.00]		[0.00]	
Wald Test (Chi-squared statistics)	17.05***		17.64***	
[P-value]	[0.00]		[0.00]	

Table 7. DiD panel regression (firm-level data) – Alternative gender-role dummy control: Female_to_Male_Board_Ratio

This table presents estimates of the DiD multivariate panel OLS regression in which the dependent variables are the ***next*** *year*, ***next*** *two-year or* ***next*** *three- year average* EDF. The key independent variables now is Female_to_Male_Board_Ratio. All firm characteristics used as independent variables (e.g., firm size, ROA, leverage, …) are from the current quarter. Data are at a quarterly frequency. All variables are defined in Appendix A. The coefficients of Female_to_Male_Board_Ratio is multiplied by 10^2. Coefficients on the MTB are multiplied by 10^3. The t-statistics reported in parentheses are based on standard errors clustered by firm and quarter (Petersen, 2009). ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	EDF		
	Next year average	Next 2-year average	Next 3-year average
Female_to_Male_Board_ Ratio	1.049***	0.943***	0.700***
	(3.62)	(3.66)	(2.96)
Firm Size	0.002**	0.015***	0.022***
	(2.29)	(16.02)	(25.61)
ROA	-0.069***	-0.063***	-0.049***
	(-4.49)	(-8.01)	(-8.41)
Leverage	0.267***	0.137***	0.070***
	(59.65)	(38.10)	(22.85)
Volatility	0.041***	0.008***	-0.002
	(12.71)	(3.34)	(-1.11)
MTB	0.001	0.008	0.003
	(0.06)	(0.99)	(0.81)
Cash Ratio	0.018***	0.008**	0.006**
	(4.65)	(2.38)	(2.20)
R&D	-0.071***	-0.047***	-0.007
	(-3.47)	(-3.28)	(-0.41)
Board size	-0.001***	-0.001	-0.001
	(-3.28)	(-1.00)	(-1.51)
% Independent Board	0.018***	0.025***	0.021***
	(6.17)	(9.61)	(8.95)
Nationalitymix	-0.006	-0.011***	-0.009***

	(-1.57)	(-3.49)	(-3.15)
Observations	76,172	76,172	76,172
Adj. R-squared	0.532	0.576	0.645
Time FE	YES	YES	YES
Firm FE	YES	YES	YES

Table 8. DiD panel regression (firm-level data) – Sub-periods analysis

This table presents estimates of the DiD multivariate panel OLS regression in which the dependent variables are the ***next*** *year,* ***next*** *two-year or* ***next*** *three- year average* EDF. The key independent variables are the 'CEO_CFO_Woman' and 'Woman_on_Board' dummies. All firm characteristics used as independent variables (e.g., firm size, ROA, leverage, …) are from the current quarter. Data are at a quarterly frequency. All variables are defined in Appendix A. The coefficients on the CEO_CFO_Woman dummy and Woman_on_Board dummy are multiplied by 10^2. Coefficients on the MTB are multiplied by 10^3. The t-statistics reported in parentheses are based on standard errors clustered by firm and quarter (Petersen, 2009). ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: Exclusion of extended Global Financial Crisis period (2008 -2011)

	EDF		
	Next year average	Next 2-year average	Next 3-year average
CEO_CFO_Woman	-0.471***	-0.379**	-0.356**
	(-2.64)	(-2.11)	(-2.17)
Woman_on_Board	0.220**	0.453***	0.463***
	(2.03)	(4.13)	(4.34)
Firm Size	-0.004***	0.011***	0.020***
	(-3.85)	(10.70)	(19.98)
ROA	-0.051***	-0.049***	-0.038***
	(-3.58)	(-4.71)	(-4.79)
Leverage	0.229***	0.139***	0.087***
	(43.50)	(28.86)	(20.53)
Volatility	0.039***	0.013***	0.005*
	(10.46)	(3.93)	(1.73)
MTB	0.007	0.017	0.007
	(0.40)	(1.53)	(1.41)
Cash Ratio	0.008*	0.002	0.005
	(1.90)	(0.38)	(1.44)
R&D	-0.054***	-0.035**	-0.016
	(-2.85)	(-2.00)	(-0.86)
Board size	-0.001***	-0.001	-0.001***
	(-3.92)	(-1.61)	(-2.75)
% Independent Board	0.017***	0.022***	0.019***
	(5.35)	(6.71)	(6.09)
Nationalitymix	-0.014***	-0.017***	-0.011***
	(-3.65)	(-4.35)	(-2.93)
Observations	52,456	52,456	52,456
Adj. R-squared	0.544	0.586	0.665
Time FE	YES	YES	YES
Firm FE	YES	YES	YES

Panel B: Inclusion only of extended Global Financial Crisis period (2008 -2011)

	EDF		
	Next year average	Next 2-year average	Next 3-year average
CEO_CFO_Woman	-2.450***	-2.395***	-1.441***
	(-4.73)	(-6.59)	(-5.38)
Woman_on_Board	0.596*	0.344	0.051
	(1.75)	(1.45)	(0.28)
Firm Size	0.093***	0.072***	0.053***
	(18.81)	(20.11)	(20.44)
ROA	-0.082**	-0.067***	-0.043***
	(-2.56)	(-5.84)	(-5.86)
Leverage	0.196***	0.052***	0.028***
	(17.47)	(7.49)	(5.77)
Volatility	-0.013**	-0.036***	-0.027***
	(-2.01)	(-7.43)	(-7.74)
MTB	0.000	0.003	0.006
	(0.01)	(0.95)	(1.47)
Cash Ratio	-0.014	-0.021***	-0.003
	(-1.36)	(-2.93)	(-0.72)
R&D	0.119**	0.100***	0.114***
	(2.33)	(3.63)	(6.13)
Board size	0.000	0.001	0.001
	(0.11)	(0.77)	(1.45)
% Independent Board	0.008	0.014**	0.008
	(0.81)	(1.99)	(1.54)
Nationalitymix	0.003	-0.002	-0.013**
	(0.23)	(-0.24)	(-2.02)
Observations	23,716	23,716	23,716
Adj. R-squared	0.650	0.712	0.775
Time FE	YES	YES	YES
Firm FE	YES	YES	YES

Table 9. DiD panel regression (firm-level data) – CDS Spread as alternative dependent variable

This table presents the result of a robustness check using CDS spreads as dependent variables in the DiD panel regression. The t-statistics reported in parentheses are based on standard errors clustered by firm and quarter (Petersen, 2009). ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	CDS Spread		
	Next year average	Next 2-year average	Next 3-year average
CEO_CFO_Woman	-0.175***	-0.009	0.051
	(-2.96)	(-0.14)	(0.80)
Woman_on_Board	0.068	0.117***	0.078**
	(1.53)	(2.70)	(1.97)
Firm Size	0.340***	0.838***	1.084***
	(3.46)	(8.00)	(10.88)
ROA	-6.341***	-5.973***	-5.790***
	(-3.21)	(-3.46)	(-4.91)
Leverage	5.046***	2.709***	0.612**

	(13.95)	(9.04)	(2.36)
Volatility	0.829*	1.144***	0.824**
	(1.88)	(2.88)	(2.00)
MTB	-2.588	-14.281*	-12.649**
	(-1.15)	(-1.73)	(-2.05)
Cash Ratio	1.604***	1.245***	0.808***
	(3.85)	(3.74)	(2.81)
R&D	0.548	-2.459	-4.228
	(0.13)	(-0.75)	(-1.52)
Board size	0.034	0.007	-0.017
	(1.40)	(0.37)	(-1.16)
% Independent Board	-0.473**	-0.347*	-0.024
	(-2.38)	(-1.75)	(-0.14)
Nationalitymix	0.573*	0.273	-0.165
	(1.81)	(0.80)	(-0.54)
Observations	13,475	13,475	13,475
Adj. R-squared	0.552	0.658	0.746
Time FE	YES	YES	YES
Firm FE	YES	YES	YES

Table 10. DiD panel regression (firm-level data) – Default probability from O-score as alternative dependent variable

This table presents robustness check using default probability from O-score as dependent variables. The failure probability is transferred from following formula: default probability = exp(O-score)/(1+exp(O-score)). The t-statistics reported in parentheses are based on standard errors clustered by firm and quarter (Petersen, 2009). ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Default probability from O-score		
	Next year average	Next 2-year average	Next 3-year average
CEO_CFO_Woman	-0.424	-0.280	0.177
	(-1.61)	(-1.09)	(0.67)
Woman_on_Board	0.470***	0.352**	0.178
	(2.71)	(2.07)	(1.06)
Firm Size	-0.083***	-0.069***	-0.057***
	(-42.94)	(-36.54)	(-30.89)
ROA	0.072***	0.009	-0.020*
	(6.12)	(0.79)	(-1.93)
Leverage	0.543***	0.425***	0.320***
	(93.07)	(75.05)	(58.38)
Volatility	-0.028***	-0.026***	-0.022***
	(-6.67)	(-6.86)	(-6.06)
MTB	0.029**	0.016**	0.007
	(2.23)	(2.41)	(0.74)
Cash Ratio	-0.151***	-0.097***	-0.061***
	(-18.34)	(-12.25)	(-7.94)
R&D	0.011	-0.054*	-0.095***
	(0.32)	(-1.91)	(-2.84)
Board size	0.001	0.000	-0.001
	(1.38)	(0.82)	(-1.50)
% Independent Board	-0.000	0.011**	0.016***
	(-0.08)	(2.40)	(3.37)
Nationalitymix	0.000	0.002	0.004

	(0.04)	(0.28)	(0.65)
Observations	65,953	65,953	65,953
Adj. R-squared	0.836	0.866	0.889
Time FE	YES	YES	YES
Firm FE	YES	YES	YES

Table 11. DiD panel regressions for male-to-female CEO/CFO transitions following Huang and Kisgen (2013)

This table presents estimates of the DiD multivariate panel OLS regression in which the dependent variables are the *next year, next two-year or next three- year average* EDF. The key independent variables are the 'CEO_CFO_Woman_after_Man', which is equal to one when a woman is appointed to replace a man as CEO/CFO, and zero otherwise. All firm characteristics used as independent variables (e.g., firm size, ROA, leverage, …) are from the current quarter. Data are at a quarterly frequency. All variables are defined in Appendix A. The coefficients on the CEO_CFO_Woman_after_Man dummy are multiplied by 10^2. Coefficients on the MTB are multiplied by 10^3. The t-statistics reported in parentheses are based on standard errors clustered by firm and quarter (Petersen, 2009). ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Dependent Variable: **EDF**		
	Next year average	Next 2-year average	Next 3-year average
CEO_CFO_Woman_after_Man	-0.733***	-0.605***	-0.359**
	(-2.85)	(-2.83)	(-2.00)
Firm Size	0.011***	0.019***	0.021***
	(6.78)	(14.35)	(18.50)
ROA	-0.112***	-0.065***	-0.048***
	(-11.49)	(-8.08)	(-7.10)
Leverage	0.217***	0.111***	0.060***
	(39.64)	(24.42)	(15.79)
Volatility	0.048***	0.020***	0.006**
	(12.60)	(6.46)	(2.42)
MTB	0.148***	0.059**	0.028
	(4.21)	(2.02)	(1.15)
Cash Ratio	0.045***	0.034***	0.029***
	(6.48)	(5.94)	(6.09)
R&D	-0.064**	-0.014	0.011
	(-2.44)	(-0.63)	(0.61)
Board size	-0.000	-0.000	-0.001
	(-0.25)	(-0.82)	(-1.49)
% Independent Board	0.011**	0.023***	0.028***
	(2.38)	(6.13)	(8.64)
Nationalitymix	-0.000	-0.007	-0.003
Observations	19,937	19,937	19,937
Adj. R-squared	0.465	0.522	0.606
Firm FE	YES	YES	YES
Time FE	YES	YES	YES

Table 12. DiD panel regressions for male-to-female board member transitions following Huang and Kisgen (2013)

This table presents estimates of the DiD multivariate panel OLS regression in which the dependent variables are the ***next*** *year,* ***next*** *two-year or* ***next*** *three- year average* EDF. The key independent variables are the 'Woman_on_Board_after_Man', which is equal to one when a woman is appointed to replace a man as board member, and zero otherwise. All firm characteristics used as independent variables (e.g., firm size, ROA, leverage, …) are from the current quarter. Data are at a quarterly frequency. All variables are defined in Appendix A. The coefficients on the 'Woman_on_Board_after_Man' dummy are multiplied by 10^2. Coefficients on the MTB are multiplied by 10^3. The t-statistics reported in parentheses are based on standard errors clustered by firm and quarter (Petersen, 2009). ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Dependent Variable: **EDF**		
	Next year average	Next 2-year average	Next 3-year average
Woman_on_Board_after_Man	0.165	0.393***	0.394***
	(1.26)	(3.63)	(4.41)
Firm Size	0.011***	0.019***	0.021***
	(7.45)	(15.44)	(20.63)
ROA	-0.124***	-0.071***	-0.057***
	(-7.97)	(-7.13)	(-8.72)
Leverage	0.202***	0.105***	0.063***
	(35.47)	(24.31)	(17.75)
Volatility	0.043***	0.012***	-0.001
	(9.18)	(3.69)	(-0.22)
MTB	0.000	0.000**	0.000**
	(0.11)	(2.23)	(2.22)
Cash Ratio	0.024***	0.010***	0.009***
	(5.23)	(2.77)	(2.86)
R&D	-0.106***	-0.022	0.023
	(-3.71)	(-1.00)	(1.30)
Board size	-0.000	-0.000	-0.001**
	(-0.20)	(-0.84)	(-2.04)
% Independent Board	0.008**	0.019***	0.020***
	(2.12)	(5.76)	(7.47)
Nationalitymix	0.001	-0.009**	-0.010***
	(0.19)	(-2.29)	(-2.92)
Observations	40,382	40,382	40,382
Adj. R-squared	0.473	0.532	0.620
Firm FE	YES	YES	YES
Time FE	YES	YES	YES

Table 13. Baseline DiD panel regression on earnings volatility, R&D expenses, current leverage, and cash ratio.

This table presents estimates of multivariate panel OLS regression in which the dependent variables are the next year, two-year or three- year average earnings volatility (Panel A), R&D expenses (Panel B, R&D multiplied by 10), current leverage as ratio of total current liabilities over total assets (Panel C), and cash ratio (Panel D). The key independent variables are the 'CEO_CFO_Woman' and 'Woman_on_Board' dummies. All firm characteristics included as independent variables are those used in Table 4 (firm size, ROA, …) and are from the current quarter. Earnings volatility is defined as the standard deviation of the operating returns on assets (ROA) over a 5-year rolling window - σ(ROA) – multiplied by 100. In Panels B, C, and D we omit controls for R&D, leverage, and cash ratio respectively (as those are the dependent variables). All board characteristics included as independent variables are those used in Table 4. All variables are defined in Appendix A. The coefficients on the (mutually exclusive) 'CEO_CFO_Woman' and 'Woman_on_Board' dummies are multiplied by 10^2. The t-statistics reported in parentheses are based on standard errors clustered by firm and quarter (Petersen, 2009). ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A.		**Earnings Volatility**	
	Next year average	Next 2 years	Next 3 years
CEO_CFO_Woman	-0.133**	-0.210***	-0.243***
	(-2.45)	(-3.73)	(-4.06)
Woman_on_Board	0.123***	0.144***	0.117***
	(3.26)	(4.17)	(3.63)
Firm Controls	YES	YES	YES
Board Controls	YES	YES	YES
Time FE	YES	YES	YES
Firm FE	YES	YES	YES
Observations	65,953	65,953	65,953
Adj. R-squared	0.787	0.820	0.848
Panel B.		**R&D**	
	Next year average	Next 2 years	Next 3 years
CEO_CFO_Woman	-0.161	-0.629***	-0.760***
	(-0.64)	(-2.73)	(-3.56)
Woman_on_Board	0.602***	0.324**	0.066
	(3.18)	(2.00)	(0.52)
Firm Controls	YES	YES	YES
Board Controls	YES	YES	YES
Time FE	YES	YES	YES
Firm FE	YES	YES	YES
Observations	65,953	65,953	65,953
Adj. R-squared	0.820	0.881	0.922
Panel C.		**Current Leverage**	
	Next year average	Next 2 years	Next 3 years
CEO_CFO_Woman	-0.534***	-0.541***	-0.278*
	(-3.10)	(-3.34)	(-1.87)
Woman_on_Board	0.403***	0.496***	0.334***
	(3.65)	(4.98)	(3.48)
Firm Controls	YES	YES	YES
Board Controls	YES	YES	YES
Time FE	YES	YES	YES
Firm FE	YES	YES	YES

Observations	65,953	65,953	65,953
Adj. R-squared	0.765	0.838	0.878
Panel D.		**Cash Ratio**	
	Next year average	Next 2 years	Next 3 years
CEO_CFO_Woman	0.244**	0.229**	0.310***
	(2.27)	(2.30)	(3.29)
Woman_on_Board	-0.012	-0.094	-0.144**
	(-0.15)	(-1.31)	(-2.16)
Firm Controls	YES	YES	YES
Board Controls	YES	YES	YES
Time FE	YES	YES	YES
Firm FE	YES	YES	YES
Observations	65,953	65,953	65,953
Adj. R-squared	0.767	0.826	0.866

Appendix A. Variables' Definition

Variable	Definition and Source
Expected Default Frequency (EDF)	Expected Default Frequency (i.e., Default Probability) obtained from the KMV-Merton model. Authors' own calculations using data from Compustat and CRSP.
Woman_on_Board	Takes value of one if at least one woman serves as board member (and the woman is not also CEO/CFO) and zero otherwise. Source: BoardEx.
CEO_CFO_Woman	Takes value of one if either the CEO or CFO is a woman (and she is not a board member) and zero otherwise. Source: BoardEx.
Woman_on_Board_after_Man	Takes value of one if woman is appointed to serves as board member (and the woman is not also CEO/CFO) and she replaces a man; it is zero otherwise. Source: BoardEx.
CEO_CFO_Woman_after_Man	Takes value of one if a woman is appointed as either the CEO or CFO (and she is not a board member) and she replaces a man; it is zero otherwise. Source: BoardEx.
Female_Ratio	The ratio of females to males on the board. Source: BoardEx.
Firm size	The natural logarithm of total assets of a firm at the end of the fiscal year. Source: Compustat.
ROA	Net Income/Tot Assets. Source: Compustat.
Leverage	Total Liabilities/(Market Value of Outstanding Equity + Total Liabilities). Source: Compustat.
Current Leverage	Total Current Liabilities/Total Assets. Source: Compustat.

Volatility	Asset Volatility. Authors' own calculations using data from Compustat and CRSP.
MTB	Market capitalisation scaled by book value of equity at the end of the fiscal year. Source: Compustat.
Cash Ratio	Cash-to-asset ratio. Source: Compustat.
R&D	Research and development expenses divided by total sales. Source: Compustat.
Earnings Volatility	Standard deviation of the operating returns on assets (ROA) over a 5-year rolling window, σ(ROA), multiplied by 100. Authors' own calculations using data from Compustat.
Board Size	Total number of directors on board. Item "Number of Directors on Board" from BoardEx.
% Independent Board	The number of independent directors expressed as a percentage of board size. We count then number of independent directors using item "NED" from BoardEx and divide it by board size.
Nationalitymix	The proportion of Directors from different countries. Item "Nationality Mix" at the firm level from BoardEx.
Tenure	The number of years a director serves in a specific role. Source: BoardEx.
Director Age	Age of the director. Source: BoardEx.
Networksize	Network size of selected individual (number of overlaps through employment, other activities, and education). Source: BoardEx.
Rank_Edu	Numerical rank of education from 1 to 3. 1 = Highest degree being a doctorate level degree. 2 = Highest degree being a Master or Postgraduate level degree. 3 = Highest degree being a Bachelor degree and/or professional certificate and/or membership to professional association/s. Codified using item 'Suffixtitle' from BoardEx.
Nationality Dummy	Dummy equals to 1 if nationality is U.S., zero otherwise. Source: BoardEx.
Internally-promoted CEO/CFO	Dummy equals to 1 if the appointed CEO/CFO is an existing employee of the firm, zero otherwise (in case of externally-hired CEO/CFO)
Internally-selected board member	Dummy equals to 1 if board member is an individual who has covered *any* role within the firm before being appointed as board member, zero otherwise (in case of externally-appointed board members).