Your gender identity is who you are: Female CEOs and corporate debt structure

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Abstract

By leveraging sample data from S&P 1500 companies for the 1993–2021 period, we execute an empirical examination of the effects of chief executive officer (CEO) gender on a company's debt structure. We find that after endogeneity is controlled, companies whose CEOs are women issue less debt compared with those whose CEOs are men. We posit that CEOs who are women are more risk averse compared with CEOs who are men; this may drive the negative relationship of female CEO gender with firm leverage. Furthermore, the influence exerted by CEO gender is greater when a company's CEO is younger, the level of market competition is higher, and the risk of litigation is higher. In terms of debt structure, firms managed by female CEOs prefer to maintain positive debt capacity and have longer debt maturity periods. Finally, our results reveal that CEO gender exerts a stronger influence on debt structure than does CFO gender. Taken together, our evidence suggests gender differences exist in decision-making on corporate debt borrowing.

JEL classification: G12; G32; G34; J16

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1. Introduction

In general, economic agents have gender-specific differences in their risk, social, and competitive preferences.[1] However, economists and policymakers remain doubtful that these observed gender differences are present among the top executives of public firms, who are generally well-educated and have substantial work experience. Over the past 20 years, women have been increasingly taking up chief executive officer (CEO) positions in public US firms. A growing body of research in the economics and finance field has begun probing the influence exerted by female executives on accruals quality and other measures (Barua et al., 2010), such as accounting conservatism (Francis et al., 2015; Ho et al., 2015), the risk of a crash in stock prices (Li and Zeng, 2019), corporate risk-taking (Faccio et al., 2016), and executives' access to information (Inci et al., 2017) and bank loans (Luo et al., 2018). In this study, we investigate whether, and through which channel, CEO gender affects corporate debt structure.

For our study, we formulate several hypotheses; we subsequently verify them by sampling from the S&P index a total of 1500 companies and using 28,389 effective firm–year observations (FYOs) for the 1993–2021 period. Some factors, such as CEO and firm characteristics, corporate governance, and board gender diversity, are controlled for. Our ordinary least squares (OLS) regression findings indicate that companies whose CEOs are women have a 2.7% (2.9%) lower book (market) leverage value than do those whose CEOs are men; in addition, companies whose CEOs are men have an average book (market) leverage value of approximately 11.2% (14.4%). The empirical relationship that exists between CEO gender and corporate debt structure may be spurious owing to omitted variables, simultaneity, or measurement errors. Along with OLS regression analyses, we adopt four identification methods to ameliorate possible endogeneity-induced estimation biases, which are discussed as follows:

Our first identification method entails applying propensity score matching (PSM) to ameliorate possible confounding-variable-induced biases in the treatment effect estimates obtained from a brief comparison of leverage between companies with male and female CEOs. We apply propensity score estimations for every firm with a female CEO by running a probit regression using the observable variables we control in our

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[1] Further details can be found in the study of Croson and Gneezy (2009).

OLS regression. We subsequently use the estimated propensity scores as a basis to compile a group of companies with male CEOs (i.e., the control group) and a group of those with female CEOs (i.e., the treatment group) through 1:1 nearest neighbor matching (caliper: 1%). Consistent with our OLS regression results, we observe that the level of leverage noted in the treatment group is lower than that noted in the control group.

Our second identification method is Heckman's (1979) two-step selection method. It considers the endogeneity of a firm–CEO match that results from some choices of female CEOs related to unobserved firm characteristics. The first step (stage 1) involves a probit regression process, in which firms' decisions to appoint female CEOs are modeled. The second step (stage 2) entails a regression process that involves applying the inverse Mills ratio, which we estimate in stage 1, as an independent variable for correcting potential biases in selection. Li and Prabhala (2007) recommend that an explanatory variable be applied in the stage 1 regression equation; however, they do not recommend including such an explanatory variable in the stage 2 regression equation. Such a variable should be related to the choice of female CEOs but not debt structure. Hence, in accordance with Huang and Kisgen's (2013) suggestions, we achieve identification restriction by employing the gender equality score of the US state in which a firm is headquartered. Our second identification method demonstrates that firm leverage is inversely related to female CEO gender.

Our third identification method involves a difference-in-differences (DID) design. We examine the influence of a male-to-female CEO changeover on leverage compared with the influence of a male-to-male CEO changeover. Our findings demonstrate that a male-to-female CEO changeover engenders significantly lower leverage ratios over a 3-year period than does a male-to-male CEO changeover.

Finally, our fourth method entails the use of a fixed-effects model for alleviating possible endogeneity concerns caused by unobserved heterogeneity among businesses and those ascribed to time-varying heterogeneity among industries; we apply this method in accordance with Gormley and Matsa's (2014) suggestion. That is, in our baseline panel regression model, we incorporate fixed effects for firms and fixed industry–year interaction effects. We observe that the negative impact of female CEO gender on corporate debt levels remains robust in our model with high-dimensional fixed effects. Overall, our four identification methods provide findings suggesting that female CEO gender has a negative relationship with firm leverage after potential endogeneity concerns are addressed.

We investigate two plausible channels through which businesses with female CEOs have relatively low external debt market borrowings. Previous management studies related to gender indicate that CEOs who are women exhibit higher risk aversion levels and lower overconfidence levels when compared with CEOs who are men. To understand which of these two traits (i.e., risk aversion and overconfidence) has a more important effect on corporate debt structure, we differentiate the effects of these two traits, which enhances our study's contribution to the relevant literature. Specifically, we follow Li and Zeng (2019) and separately regress CEO gender on two CEO risk aversion proxies and on one CEO overconfidence proxy. The residuals of the two regression analyses represent the variation in CEO gender that is related to CEO risk aversion, in addition to representing the proportion of the change in CEO gender that is unrelated to CEO overconfidence. We examine whether these two residuals are related to corporate debt structure. Our results demonstrate that only the part of CEO gender change that is unrelated to overconfidence has a significant and negative relationship with a firm's leverage; this thus signifies that leverage variations can primarily be explained by any variation in a CEO's aversion to risk, not variations in CEO overconfidence. Only the risk aversion mechanism is supported by our empirical evidence.

We investigate cross-sectional variations in any relationships of CEO gender with corporate debt structure. First, our cross-sectional analyses reveal that CEO gender affects the corporate debt structure of a firm more significantly when that firm is headed by a younger CEO. Young CEOs exhibit a higher preference for risky ventures than do older CEOs (for example, see Serfling, 2014; Li et al., 2017); for this reason, our empirical findings indicate that female CEOs' risk aversion may mitigate younger CEOs' risk-taking tendency. Second, as revealed by our analyses, the impact exerted by female CEO gender on corporate debt structure is significantly higher among businesses with a higher ex-ante litigation risk; this finding agrees with the view that

CEOs who are women are exhibit higher levels of compliance with financial market regulations and are more sensitive to ex-ante litigation risks (see Francis et al., 2015; Ho et al., 2015). Third, our study demonstrates that the impact exerted by female CEO gender on corporate debt structure is greater for businesses operating in industries with stronger market competition. This suggests that the aforementioned risk aversion mechanism is more pronounced when market competition increases the likelihood of a female CEO losing their job. The results of these cross-sectional analyses further support the risk aversion mechanism through which firms with female CEOs issue less debt.

We explore whether CEO gender affects debt structure decisions within a firm. First, we adopt Byoun's (2008) empirical model to estimate a company's target total debt–to–total asset ratio. If a company's actual debt level is lower than the model-predicted level, then the company can be considered to have a lower likelihood of experiencing financial distress; this is because the company will have sufficient financial slack to borrow externally in the future. In line with the risk aversion mechanism, our study identifies a positive influence of female CEO gender on debt capacity. Second, we investigate whether firms whose CEOs are women have a higher tendency of issuing long- or short-term debts. Considering that short-term debts incur a higher refinancing risk and are associated with more scrutiny during refinancing negotiations, our study hypothesizes that female CEO gender would positively affect debt maturity. The results of our research support this prediction, which is also in line with the risk aversion mechanism.

In our supplementary tests, we reveal that corporate governance is not the main driver of the debt level–CEO relationship. Furthermore, we observe that CEO gender, when compared with chief financial officer (CFO) gender, exerts a more pronounced impact on debt levels. We also noted that despite the introduction of additional control variables (i.e., analyst coverage, institutional ownership, CEO fixed compensation, CEO tenure, firm efficiency, and managerial ability), our main findings remain robust. Moreover, we demonstrate the robustness of our initial results when market turbulence and regulation changes are encountered during our sample period.

Our executed study's contribution to the relevant literature is threefold. First, the study presents robust evidence demonstrating that CEO gender is related to the debt structure of firms; this finding is valuable for research on the effects of top executive gender on corporate outcomes. Second, similar to the psychology and sociology literature, the finance literature shows that top executives of public companies have gender differences in making important firm decisions. Sociology and cognitive psychology studies suggest that women exhibit greater levels of risk aversion (see Brooks et al., 2019; Levin et al., 1988; Sund′en & Surette, 1998;) and less overconfidence (see Barber & Odean, 2001; Feingold, 1994; Niederle & Vesterlund, 2007; Svenson, 1981) than do men. However, which of these traits has the strongest effect on top executives' major firm decisions is unclear. Accordingly, our study's valuable contribution lies in its identification of the underlying mechanism by which female CEOs tend to borrow less externally. Third, on the basis of our assessment of the relevant literature, we determine that our executed study is the first to probe how CEO gender affects a firm's debt capacity and debt maturity. We demonstrate that companies with CEOs who are women are more likely to maintain a positive capacity for debt and issue long-term debt. Finally, our research is similar to that of Faccio et al. (2016), who employ a sample of European firms in the Amadeus database, which contains data on the top 250,000 European public and private companies,[2] to explore the effect of CEO gender on risk-taking in companies. We demonstrate that the influence exerted by CEO gender on a firm's debt levels prevails not only in bank-based financial systems in Europe but also in those in the Unites States, where public firms are less constrained by external financing and have a lower representation of women on executive boards.

The organization of this paper's subsequent sections is described as follows: The second section provides a review of previous studies related to our paper and presents the developed hypotheses. The third section presents details on summary statistics, the source of our study data, key variable definitions, and the study design. Moreover, the fourth section presents the primary empirical results. The fifth section details the results

[2] The Amadues Top 250,000 database covers both public and private firms.

of supplementary tests and presents further discussion on our main results' robustness. The sixth section provides our study conclusion.

2. Relevant literature and hypotheses

In a perfect capital market, as defined by researchers (Modigliani & Miller, 1958), a firm's value and its capital structure are unrelated. By introducing various frictions into the perfect capital market, subsequent studies show that capital structure can be explained by market timing theory (Baker & Wurgler, 2002), the trade-off theory of capital structure (Kraus & Litzenberger, 1973), pecking order theory (Myers, 1984), proxy theory (Jensen & Meckling, 1976; Jensen, 1986), and the signaling hypothesis (Ross, 1977). Moreover, studies examine whether firm characteristics or managerial traits affect firms' decisions related to capital structure, including information asymmetry (Houston & James, 1996), tangible assets (Denis & Mihov, 2003), corporate governance (Bebchuk et al., 2009), firm age (Kieschnick & Moussawi, 2018), and managers' personal preferences (Cronqvist et al., 2012; Korkeam¨aki et al., 2017).

Previous psychology and behavioral economics studies suggest that women can be more averse to risk and less overconfident compared with men. First, in accordance with survey participants' responses to hypothetical scenarios, Barsky et al. (1997) construct a preference parameter related to risk tolerance and suggest that the level of risk tolerance is lower among female participants than it is among male participants. Most studies based on archival and survey data confirm that compared with men, women exhibit greater levels of risk aversion with respect to making financial decisions, allocating assets in retirement savings plans, and managing personal portfolios (see Agnew et al., 2003; Brooks et al., 2019; Jianakoplos & Bernasek, 1998). Because a company's leverage positively affects its likelihood of financial distress (Kaplan & Zingales, 1997; Whited & Wu, 2006), we hypothesize that more risk-averse CEOs who are women would have less external borrowings than would CEOs who are men. Second, one study (Huang & Kisgen, 2013) suggests that executives who are women are less likely to have overconfidence during decision-making on financial decisions (e.g., investment choices) than executives who are men. Consistent with Huang and Kisgen's (2013) findings, studies demonstrate that compared with men, women generally exhibit lower levels of overconfidence with respect to driving test performance, exam answers, investment, and compensation package choices (see Barber and Odean, 2001; Lundeberg et al., 1994; Niederle & Vesterlund, 2007; Svenson, 1981;). Because female CEOs with less overconfidence tend to conservatively estimate a project's net present value (NPV), we expect that female CEOs would pursue less investment activities and in turn borrow less from the external credit market than would male CEOs. Considering the link of emerging evidence on gender-specific differences between CEOs to the potential risks associated with firm leverage, we conjecture that, ceteris paribus, companies with CEOs who are women borrow less externally than do companies with CEOs who are men. Accordingly, our relevant hypotheses are as follows:

***H1:** Female CEO gender negatively affects leverage.*

***H2:** Female CEO gender negatively affects leverage owing to greater risk aversion.*

***H3:** Female CEO gender negatively affects leverage owing to lower overconfidence.*

3. Data, variable definitions, and sample description

3.1. Sample

Our sample comprises US public firms with executive data in ExecuComp for the 1993–2021 period (inclusive).[3] We include only firms that have data on accounting and stock returns in the Compustat and The Center for Research in Security Prices (CRSP) databases, respectively. Moreover, we retrieve corporate debt structure data from the S&P Capital IQ platform. We also search the Institutional Shareholder Services (ISS) database to retrieve data on managerial entrenchment and board directors. Because the ExecuComp database was established in 1992, we choose 1993 as the first year in our sample (Colla et al., 2013). Following previous studies on capital structure, we do not include financial industry companies (Standard Industrial Classification [SIC] code 6000–6999) because the external financing–related choices of such companies may not provide the same information as that provided by nonfinancial companies. In

[3] Compustat ExecuComp database contains data on firms present in the S&P 1500 index.

addition, nonfinancial and financial firms differ in their debt structure. To prevent any outliers from influencing our results, we apply winsorization to continuous accounting variables at the 99th and 1st percentiles. After we apply the aforementioned data filters, an effective sample containing 28,389 FYOs remains, providing the opportunity to monitor CEO gender and corporate debt structure while concurrently ensuring that specific characteristics of firms and CEOs are controlled for.

3.2. Dependent variable: Debt structure

Our study addresses the empirical relationship of CEO gender with firm debt structure. In accordance with the capital structure literature, we adopt market and book leverage (*MLev* and *BLev*, respectively) to act as proxies for corporate debt structure (see Ortiz-Molina, 2007; Rajan & Zingales, 1995):

$$BLev_{i,t} = \frac{Current\ Debt_{i,t} + Long-term\ Debt_{i,t}}{Total\ Assets_{i,t}} \qquad (1)$$

$$MLev_{i,t} = \frac{Current\ Debt_{i,t} + Long-term\ Debt_{i,t}}{Current\ Debt_{i,t} + Long-term\ Debt_{i,t} + Market\ Value\ of\ Equity_{i,t}} \qquad (2)$$

To further examine the different characteristics of corporate debt structure, we apply four proxy variables: *BDebtCap*, an indicator variable; *MDebtCap*, an indicator variable; *LDebt*, an indicator variable; and *DLDebt*, an indicator variable. *BDebtCap* is equal to 1 if a company's debt book value is below its estimated target book value of debt and is equal to 0 otherwise. *MDebtCap* is equal to 1 provided that a firm's debt market value falls below the firm's estimated target market value of debt and is equal to 0 otherwise; target debt levels are estimated through the models of Byoun (2008) and Lemmon and Zender (2010). Moreover, *BDebtCap* and *MDebtCap* indicate whether a firm retains its financial flexibility for potential future external borrowing. *LDebt* is derived as follows: firm long-term debt/total debt. Finally, *DLDebt* is equal 1 provided that the *LDebt* value of a company is above its 3-digit SIC industry mean and is equal to 0 otherwise. Companies that rely heavily on short-term financing are more vulnerable to liquidity shocks than are those with long-term debt financing; the reason for this is that short-term debt facilities must be refinanced more frequently. *LDebt* and *DLDebt* represent the debt structure of a firm based on its debt maturities.

3.3. Research design

The independent variable we focus on in our baseline regression is CEO gender: $Female_{i,t}$. The indicator variable $Female_{i,t}$ equals 1 given that firm *i* has a female CEO during fiscal year *t*; otherwise, it is 0. An executive is identified as a firm's CEO if the corresponding ExecuComp's data item "CEOANN" is "CEO" (Jiang et al., 2010). Our baseline regression model is

$$Debt\ structure_{i,t} = \beta_0 + \beta_1 Female_{i,t-1} + \Gamma' Control \text{ variables}_{i,t} + \theta_j + \mu_t + \varepsilon_{i,t} \quad (3),$$

with *i* representing the firm index, *t* representing the year index, and *j* representing the industry index.

Following relevant research on corporate debt structure determinants (see Boubaker et al., 2018; Dakua, 2019; Denis & Mihov, 2003;), we include controls for three sets of variables with potential effects on the CEO gender–firm debt structure empirical relationship. The first set comprises firm characteristics, involving firm size ($Size_{t-1}$), market-to-book ratio (MTB_{t-1}), firm profitability ($Profitability_{t-1}$), fixed assets ($FAsset_{t-1}$), a firm debt rating indicator ($Rating_{t-1}$), and firm age ($FirmAge_{t-1}$). The second set comprises CEO characteristics, involving CEO total compensation ($CEOCompt_{t-1}$), CEO pay slice ($CEOPower_{t-1}$), and CEO age ($CEOAge_{t-1}$). The third set comprises the proxies related to corporate governance and board gender diversity, including the managerial entrenchment index ($EIndex_{t-1}$), ratio of female directors to total directors ($DirGenRatio_{t-1}$), and total number of board directors ($Director_{t-1}$). On the basis of 3-digit SIC (θ_j), we opt to include year (μ_t) as well as industry fixed effects. In addition, we cluster standard errors at the year level as well as at the firm level (Petersen, 2009). Please see Appendix A for detailed definitions regarding each of the aforementioned variables.

Size captures a company's information asymmetry and external borrowing ability (Houston & James, 1996). *MT B* indicates a firm's future growth opportunities. As indicated by agency theory, a company's opportunities for future growth are negatively related to its optimal leverage ratios (Myers, 1977, 1984). *Profitability* denotes a firm's capacity to pay a debt principal as well as interest with its operating cash flow (Kieschnick & Moussawi, 2018). *FAsset* measures a firm's asset tangibility. As stated by trade-off theory, a company's external borrowing ability is higher if the company's tangible assets are higher (Denis and Mihov, 2003; Williamson, 1988). *Rating* indicates whether a firm's long-term debt is rated by credit agencies. Researchers (Cheng & Subramanyam, 2008) argue that debt credit ratings mitigate information asymmetry and reduce credit risks. *FirmAge* indicates a company's life cycle stage. One research team (Kieschnick & Moussawi, 2018) demonstrates that company age is positively associated with the probability that the company uses debt financing but is negatively associated with the level of debt a company actually employs. In addition to controlling for these six firm characteristics, we control for three CEO attributes related to CEO risk-taking activities and manager–shareholder conflicts of interest. *CEOComp* constitutes a proxy for the personal loss incurred by a CEO in the event of firm defaulting. *CEOP ower* denotes a CEO's ability to take rents from their company (Bebchuk et al., 2011) and is derived as the ratio of total CEO compensation to total compensation of the five highest-paid executives. *CEOAge* indicates a CEO's age during the corresponding firm–year. As reported by Serfling (2014), older CEOs prefer taking less risk than do younger CEOs, and *CEOAge* is negatively related to debt financing activities. Finally, we control for corporate governance and board gender diversity. *EIndex*, a management entrenchment index derived by Bebchuk et al. (2009), involves six crucial antitakeover clauses. Kieschnick and Moussawi (2018) indicate that for firms, better corporate governance provides better access to the external financing market. Moreover, according to the literature, gender-diverse corporate boards tend to have more success at monitoring firm activities than do boards without gender diversity (Adams & Ferreira, 2009). Some researchers (Ahmed & Atif, 2021; Poletti-Hughes & Martinez Garcia, 2022) indicate that female directors influence a firm's debt financing decisions. We control for *DirGenRatio* and *Director* in order to exclude an alternative explanation that the monitoring activities of a gender-diverse board can affect the relationship of CEO gender with debt structure.

3.4. Summary statistics

US firms tend to hire more female CEOs over time. Figure 1 shows that less than 0.5% of nonfinancial S&P 1500 firms had female CEOs in fiscal year 1993, but the female CEO ratio increased to 7% in 2021. This increase in female representation in

CEO positions started in the early 2000s. The years 2002 to 2021 saw a sevenfold increase in the female CEO ratio. Over the same period, we observe a decreasing trend in corporate debt ratios, except for that during the years 2019 to 2021. This pattern leads us to pose the following research question: Can increased female representation in corporate leadership roles explain the decrease in corporate external borrowing?

We present in Table 1 summary statistics related to every variable included in the present study's baseline empirical tests (see panel A). The means (medians) of *BLev* and *MLev* are 24.2% (20.6%) and 20.2% (14.4%); these are similar to those reported by Ortiz-Molina (2007) and Kieschnick and Moussawi (2018). Approximately 60.0% and 57.7% of the FYOs for the present study sample have positive book-value debt capacity and positive market-value debt capacity, respectively. The distribution of long-term debt ratios is skewed to the right, and that of bank debt ratios is skewed to the left. The mean and median *LDebt* values are 91.5% and 98.1%, respectively. Approximately 71.2% of our sample's FYOs have long-term debt ratios above the sample mean. Table 1, panel A indicates that female CEOs represent approximately 2.5% of the FYOs in our sample. Overall, we determine that the summary statistics for our control and channel variables are in agreement with relevant statistics provided in related corporate finance research.

We also present in Table 1 summary statistics for our debt structure variables, which are organized by CEO gender (see panel B). The final two columns present the t-test results pertaining to the differences in mean variable values and the Wilcoxon test results pertaining to differences in median values between companies with male and female CEOs. On average, the market and book leverage levels of companies whose CEOs are women are below those of companies whose CEOs are men, and statistically significant differences exist between the two firm groups at the 10% level and at the 1% level. We observe that companies whose CEOs are women have a higher likelihood of exhibiting positive debt capacity than do those whose CEOs are men, in terms of both *BDebtCap* and *MDebtCap*. Companies managed by female CEOs exhibit a tendency to have more long-term debt than do companies managed by male CEOs.

4. Main empirical findings

4.1. Baseline regression analyses

We execute baseline regression analyses using Equation (3) to probe the relationship of CEO gender with corporate debt, and Table 2 shows the derived results. As indicated in Columns 1 and 3, we add only the fixed effects of year and industry in the regression model, without including control variables. We note that the $Femalet-1$ coefficients are negative, and they exhibit statistical significance (5% level), which is in line with our prediction. Companies with CEOs who are women have, on average, a 2.7% lower book leverage and a 3.0% lower market leverage compared with companies with male CEOs. Because our sample companies have, on average, a 24.2% book value of leverage and a 20.2% market value of leverage, the decrease in leverage associated with female CEOs is economically important.

As indicated in Columns 2 and 4, we add control variables in our model, and these are board gender diversity, corporate governance, CEO characteristics, and firm characteristics. We observe an increase in adjusted R^2 from 0.050 in Column 1 to 0.097 in Column 2 and from 0.031 in Column 3 to 0.120 in Column 4, suggesting that our control variables help explain the variations of the leverage ratios in the baseline model. Columns 2 and 4 reveal that the $Female_{t-1}$ coefficients are negative and have statistical significance (level: 5%). After we include these control variables, we note that for companies with CEOs who are women, the average value of book leverage is 2.7% lower and the average value of market leverage is 2.9% than those for companies with CEOs who are men. These findings support our H1.

Regarding the control variables, MTB_{t-1}, $Profitability_{t-1}$, and $FAsset_{t-1}$ are negatively associated with the two leverage ratios. An increase of 1 standard deviation (SD) in MTB_{t-1} results in a 3.0% (-0.023×1.322) decrease in $BLev_t$ and a 5.3% (-0.040×1.322) decrease in $MLev_t$. An increase of 1 SD in $Profitabilityt-1$ results in a 2.0% (-0.011×1.846) decrease in $BLev_t$ and a 1.8% (-0.010×1.846) decrease in $MLev_t$. An increase of 1 SD in $FAsset_{t-1}$ results in a 1.6% (-0.047 0.341) decrease in $BLev_t$ and a 1.3% (-0.039×0.341) decrease in $MLev_t$. The economic influence exerted by CEO gender on the two leverage ratios is comparable to that exerted by these three control variables, indicating that CEO gender is an essential factor related to corporate debt structure. We reveal that $Size_{t-1}$ and $CEOCompt_{t-1}$

positively affect a firm’s leverage ratios.

4.2. Endogeneity

As indicated in Section 4.1, the results derived from our executed baseline regression reveal female CEO gender to be negatively related to firm leverage. However, the relationship of CEO gender with capital structure decisions could be influenced by two endogeneity-related issues. First, self-selection bias may arise if female CEOs choose to work in firms with a less aggressive capital structure policy. In addition, reverse causality may arise if firms with more conservative corporate boards choose a lower capital structure and also appoint female CEOs. Second, an unobserved heterogeneity concern may arise if unobservable company characteristics are correlated with CEO gender as well as capital structure. We mitigate potential endogeneity issues using four identification methods: a PSM approach, Heckman’s two-step selection method, a DID framework, and a high-dimensional fixed effects model.

4.2.1. PSM

We alleviate possible self-selection biases engendered by female CEOs not being randomly assigned to firms by using PSM. We create two groups through PSM: a treatment group (comprising companies with CEOs who are women) and a control group (comprising companies with CEOs who are men). We apply a probit model to evaluate the likelihood of a company hiring a female CEO; *Femalet* is the dependent variable, and the 12 control variables in Table 2 (Columns 2 and 4) are the independent variables. Table 3 (Panel A, Column 1) presents the results derived from our executed probit regression. Our study reveals that *MTB*, *FAsset*, *FirmAge*, and *DirGenRatio* positively affect the likelihood of a company hiring a female CEO, and *Rating*, *CEOAge*, and *Director* negatively affect the likelihood of a company hiring a female CEO. The covariate coefficients indicate significantly different characteristics between companies managed by male and female CEOs. As mentioned, we apply a 1-to-1 matching approach by using the probit model–estimated propensity scores; that is, we require that every firm in our treatment group should be matched to a firm in the control group that has the nearest propensity score, in addition to requiring that the propensity score discrepancy between a treatment and matched control group firm must be less than a caliper width of 1%.

We next conduct two efficiency tests for confirming that the control and treatment groups have comparable observed characteristics. First, we execute a re-estimation of the probit model for the sample after matching. Table 3 (Panel A, Column 2) lists the results derived from our regression. No estimated coefficient is statistically significant, demonstrating the two groups' indistinguishability in terms of observable characteristics. In terms of absolute values, the estimated coefficients that are presented in Column 2 are markedly smaller than the relevant coefficients that are presented in Column 1, indicating that the Column 2 results are not solely ascribed to a decrease in FYOs between the sample before and after the matching process. The pseudo-R^2 values derived for the sample before and after the matching process are 0.176 and 0.004, respectively, signifying that PSM eliminates almost every observable difference between the control and treatment groups, excluding CEO gender. For our comparison of the observable characteristics, mean-difference tests are conducted. Table 3 (Panel B) reveals that no discrepancy between the two groups' observable characteristics is statistically significant at the 10% level. Taken together, our efficiency tests indicate that any difference in corporate debt structure between the two groups is likely ascribed to CEO gender rather than the observable firm and CEO characteristics applied in the baseline regression.

We next conduct a comparison of the two groups with respect to book leverage and market leverage. Table 3 (Panel C) lists shows all the average treatment effects, as estimated using PSM. We note that any disparity in book leverage and market leverage between the control and treatment groups is negative and exhibits statistical significance (level: 1%); this concurs with the results derived from our executed baseline regression (as described in Section 4.1).

4.2.2. Heckman's two-step estimation method with panel data (xtheckman)

Our PSM approach helps alleviate selection bias ascribed to observable variables, but female CEOs may choose to work for firms with certain unobserved characteristics correlated with corporate debt structure. To mitigate this concern related to endogeneity concern, Heckman's (1979) two-step estimation method with panel data (xtheckman) is applied, which helps control any self-selection bias and reveals the pure effect of a CEO's gender on debt structure. In stage 1 of the regression, we estimate an empirical model to investigate the choices made by companies with male and female CEOs. In stage 2 of the regression, the study addresses potential selection bias in the baseline regression model. According to Li and Prabhala (2007), a variable that affects the selection of female CEOs but not debt structure decisions should be included in a stage 1 regression, but no such variable should be applied as an independent variable in a stage 2 regression. In one study (Sugarman & Straus, 1988), the researchers give each US state a gender equality score ranging between 19.2 (Mississippi) and 59.9 (Oregon). A higher gender equality score indicates that a state's job market is more friendly to women. A company with headquarters in a state with a higher gender equality score has a higher likelihood of having a CEO who is a woman. However, doubt remains regarding whether a state's gender equality score would affect a company's external borrowing decisions other than through its direct effect on CEO gender. Similar to Huang and Kisgen (2013), we employ states' gender status equality scores (*Gender_Equality*) based on firm headquarters' location as a stage 1 regression variable; this is also the approach suggested by Li and Prabhala (2007).

Table 4 lists the results derived from our second identification method. Specifically, Column 1 reveals that in the selection step, the $Gender\_Equality_{t-1}$ coefficient is positive and has statistical significance. The stage 1 regression results indicate a relationship of *Gender_Equality* with a firm's likelihood of hiring a female CEO. We next use our stage 1 regression for *Inverse Mills Ratio* estimation. During the outcome step, we add the control variable *Inverse Mills Ratio* to adjust for any selection bias. Columns 2 and 3 reveal that after the potential endogeneity is controlled in the stage 2 regression, the estimated $Female_{t-1}$ coefficients are negative and hold statistical significance.

4.2.3. DID framework

Our third identification method is a DID method that we use to compare the influence of a male-to-female CEO changeover on leverage with the influence of a male-to-male CEO changeover on leverage in a specific period. For this comparison, the control sample comprises firms involving a male-to-male CEO changeover. The

DID estimator is a panel data (repeated cross-section) estimator, which mitigates concerns regarding omitted variable bias and strengthens the relationship of CEO gender with a company's debt structure; an exogenous shock is applied to CEO gender. Any difference in capital structure changes before and after either changeover likely arises due to the impact of a change in CEO gender rather than the differences between the two transition groups before the changeover.

We construct a matching sample of firms involving a male-to-female CEO changeover and a male-to-male CEO changeover, in accordance with the approach of another study (Huang & Kisgen, 2013).[4] The CEO turnover year is the year a new CEO is appointed. The sample for the DID analysis includes FYOs for 3 years prior to and 3 years subsequent to new CEO being appointed. We drop the transition year in the DID sample. Regarding selection criteria, our DID sample includes only changeovers for which the new CEO remains in the CEO position for more than 3 consecutive years. Moreover, our DID sample includes only companies that have obtainable financial data in Compustat for more than 2 years prior to a CEO changeover. Accordingly, our DID sample contains 2,834 male-to-male CEO changeovers and 88 male-to-female CEO changeovers. The DID regression model is described in the following equation:

$$\begin{aligned} \text{Debt structure}_{i,t} = {} & \beta_0 + \beta_1 FeTran_i \times TranPost_{i,t} + \beta_2 FeTran_i + \beta_3 TranPost_{i,t} + \\ & \gamma' Control \text{ variables}_{i,t} + \theta_j + \mu_t + \varepsilon_{i,t} \end{aligned} \tag{4}$$

where $FeTran_i$ is an indicator variable that equals 1 if firms experience a male-to-female CEO changeover and 0 if firms experience a male-to-male CEO changeover. The indicator variable $TranPOst_{i,t}$ is 1 if firm–year *t* is subsequent to the year a CEO is appointed; otherwise, it is 0. *Control variables* are those reported in our regression model for the baseline. θ_j and $\mu_t$are industry and year fixed effects, respectively.

Our DID model specification has three major advantages. First, a new CEO must keep their position for more than 3 years to enable sufficient time for them to adjust their company's debt structure. Second, our sample contains a number of FYOs before and after the appointment of new CEOs, which provides us with a balanced DID sample and removes any noise from transition years. Third, to reduce the impact of

[4] Similar to Huang and Kisgen (2013), we cannot compare female-to-female CEO switches with female-to-male CEO switches because the number of such changes is too small.

unobservable and time-invariant firm characteristics, our DID model compares male-to-female CEO changeovers with male-to-male CEO changeovers. We deem it unlikely that a decrease in two leverage ratios during CEO changeover periods can be alternatively explained by unobservable omitted variables because such latent variables must have coincidentally changed during the CEO turnover window and have no relation to the transition itself.

We summarize in Table 5 our derived DID regression results. The estimated $FeTran_i \times TranPOst_{i,t}$ coefficients are negative and have statistical significance (level: 10%). This indicates that firms hold lower book and market leverage after an appointment of a female CEO than after an appointment of a male CEO. The findings provided in Section 4.1 remain robust in the DID framework.

4.2.4. High-dimensional fixed effects model

Our executed baseline regression analyses entail controlling for fixed effects of industry and year. According to Lemmon et al. (2008), variations in leverage ratios are mainly ascribed to time-invariant effects that are unobserved; these effects produce a stable capital structure. The correlation of CEO gender with corporate debt levels could be affected by unobservable and time-invariant company characteristics that we do not control for in the baseline regression analyses. Our PSM method only matches firms based on observed firm characteristics and may not mitigate estimation bias introduced by latent variables. Gormley and Matsa (2014) indicate that a high-dimensional fixed-effects model can alleviate endogeneity due to unobserved heterogeneity. We take their suggestions and control for unobserved heterogeneity among different firms; furthermore, we control for time-varying heterogeneity among different industries. Specifically, in our baseline regression analyses, we enter the fixed effects of year and firm, with Table 6 (Columns 1 and 3) listing the relevant results. The study additionally controls for firm fixed effects and industry–year interaction effects, with Table 6 (Columns 2 and 4) presenting the derived results. The $Female_{t-1}$ coefficients are negative and hold statistical significance (level: 1%) in our high-dimensional fixed effects model. We observe no influence of these factors on our primary results.

4.2.5. Summary of identification results

We summarize the estimated coefficients of $Female_{t-1}$ in our identification tests and report them in Appendix B. The study reveals negative coefficients with statistical significance (see all eight columns in Appendix B). The estimated coefficients for $Female_{t-1}$ in Columns 5–8 (Heckman two-step method with panel data and high-dimensional fixed effects model) are consistent with the estimates derived from the baseline regression analyses; by contrast, the coefficients in Columns 3 and 4 (PSM) are larger than those derived from the baseline regression. However, in our PSM estimation sample, we discard unmatched observations in the control and treatment samples. The sample size for the PSM-based regression is greatly reduced. Therefore, the statistical significance and magnitude of OSL- and PSM-based regression coefficients cannot be directly compared.

4.3. Channels

Behavioral studies reveal that compared with men, women can exhibit greater levels of risk aversion and lower levels of overconfidence. Either risk aversion or a lack of confidence may cause companies whose CEOs are women to borrow less externally compared with companies whose CEOs are men. Thus, we test the effect of the underlying mechanism through which CEO gender may influence corporate debt structure decisions. Few previous managerial gender studies directly compare the roles of risk aversion and overconfidence in corporate outcomes. Differentiating the impact of risk aversion and overconfidence extends (hereafter referred to as channels) the contribution of this study to research on female managers in corporate finance. Evidence on these two channels may help mitigate the confounding effect of unobservable firm characteristics.

For our analyses, we adopt measures of risk preference and overconfidence tendency related to CEO compensation incentives. First, in accordance with procedures adopted in a major strand of managerial compensation studies (Coles et al., 2006; Core & Guay, 2002), we use the *Vega* and *Delta* of a CEO's option portfolio to evaluate their risk aversion. *Delta* measures how sensitive a CEO's wealth is to stock price, and *Vega* measures how sensitive a CEO's wealth is stock return volatilities. Second, we use CEO stock options (*Option*) and management earnings forecast (*Forecast*) as proxies for

CEO overconfidence (Hirshleifer et al., 2012; Hribar & Yang, 2016; Libby & Rennekamp, 2012; Malmendier & Tate, 2005).

To investigate whether CEO risk aversion or overconfidence provides an explanation for the empirical relationship of CEO gender with corporate debt structure, we include the aforementioned variables and their interaction terms with $Female_{i,t-1}$ in our baseline Equation (3), which is presented as follows:

$$\begin{aligned} Debt\ structure_{i,t} = \beta_0 + \beta_1 Female_{i,t-1} + \beta_2 \text{Proxy}_{i,t-1} + \beta_3 Female_{i,t-1} \times \text{Proxy}_{i,t-1} + \\ \gamma' Control \text{ variables}_{i,t-1} + \theta_j + \mu_t + \varepsilon_{i,t} \end{aligned} \tag{5}$$

$Debt\ structure_{i,t}$ includes book leverage and market leverage. $Proxy_{i,t-1}$ represents $Delta_{i,t-1}$, $Vega_{i,t-1}$, $Option_{i,t-1}$, and $Forecast_{i,t-1}$, respectively. Specifically, $Delta_{i,t-1}$ is the pay–performance sensitivity of firm *i*'s CEO; it denotes an increase in a CEO's option portfolio value for every 1% increment in firm *i*'s stock price (Core & Guay, 2002). $Vega_{i,t-1}$ represents the risk-taking incentive of firm *i*'s CEO; it denotes an increase in a CEO's option portfolio value for every 1% increment in firm *i*'s stock return volatility (Core & Guay, 2002). $Option_{i,t-1}$ indicates whether the CEO of firm *i* is overconfident; the $Option_{i,t-1}$ value is 1 if the CEO has ever had options that are, at a minimum, 67% in the money until the option's expiration year over the sample period; otherwise, the value is 0 (Hirshleifer et al., 2012; Malmendier & Tate, 2005). The indicator variable $Forecast_{i,t-1}$ is 1 if a firm publishes a management earnings forecast and 0 otherwise (Hribar & Yang, 2016; Libby & Rennekamp, 2012).

We list in Table 7 the results derived from our channel tests. The $Female_{t-1} \times Delta_{t-1}$ and $Female_{t-1} \times Vega_{t-1}$ coefficients are negative and hold statistical significance, but the $Female_{t-1}$ coefficients are not statistically significant (Columns 1–4), signifying that CEO risk aversion is the mechanism through which CEO gender affects corporate debt structure. The $Female_{t-1}$ coefficients are negative with statistical significance, but the $Female_{t-1} \times Option_{t-1}$ and $Female_{t-1} \times Forecast_{t-1}$ coefficients are not statistically significant (Columns 5 and 8), signifying that CEO gender's influence on corporate debt structure cannot be explained by CEO overconfidence. This indicates that the empirical link between CEO gender and the two leverage ratios is mainly explained by CEO risk aversion, not CEO overconfidence.

Although both the risk aversion and overconfidence channels are potential explanations for why female and male CEOs make different debt structure decisions, the empirical results in this section support only H2, which pertains to the risk aversion channel.

5. Supplementary tests

5.1. Cross-sectional analyses

To examine whether CEO gender's influence on corporate debt structure exhibits cross-sectional variations with respect to CEO and firm characteristics, we execute three cross-sectional analyses. Specifically, to investigate whether and the extent to which CEO and firm characteristics affect our baseline results, we add CEO age, industry litigation risk, and industry competition and their interaction terms with $Female_{t-1}$ to Equation (3).

5.1.1. CEO age

The personal wealth of CEOs is usually tied to firm performance through their incentive compensation packages. However, a CEO's pay–performance sensitivity is related to their age. If younger CEOs have a permanent increase in their compensation, then they can enjoy this pay increase for a longer period than can older CEOs (Andreou et al., 2017). Accordingly, young CEOs have the incentive to take greater risks as a means of demonstrating their capabilities or competence in the labor market. Consistent with the view that younger CEOs prefer to take higher risks, Serfling (2014) indicates that compared with younger CEOs, older CEOs engage in less R&D investment, engage in more diversifying acquisitions, choose more diversified firm operations, and maintain lower operating leverage. In addition, older CEOs have a shorter career horizon; as such, they have a tendency to be less concerned about their careers and exhibit a higher likelihood of aspiring to enjoy a "quiet life." Consistent with such career concerns, Li et al. (2017) reveal that young CEOs tend to venture into new business areas, pursue bolder expansions and divestments, and increase firm size through inorganic investment plans such as mergers and acquisitions (M&As). Compared with CEOs who are men, CEOs who are women tend to exhibit greater levels of risk aversion; hence, the risk aversion mechanism may alleviate the risk-taking tendency of young CEOs. Accordingly, we posit that the correlation of CEO gender with firms' debt structure is stronger for companies with younger CEOs.

The CEOs in our sample are noted to have an average age of 55 years; this is in line with the average age reported by Antia et al. (2010) and Andreou et al. (2017). Our study establishes a variable termed *Young*, which is equal to 1 if a CEO is younger than 55 years and is equal to 0 otherwise. We present in Table 8 the impact exerted by CEO age on the correlation between CEO gender and corporate debt structure (Columns 1 and 2). We note negative and significant $Female_{t-1} \times Young_{t-1}$ and $Female_{t-1}$ coefficients, confirming our prediction that career concerns related to CEO age magnify the discrepancies in the risk-taking tendencies of female and male CEOs.

5.1.2. Litigation risk

We focus on corporate litigation risk's effect on the empirical relationship of CEO gender with firm capital structure. Under the assumption that CEOs maximize their expected utility, we expect that CEOs weigh the expected pecuniary gain of risk-taking against the expected costs of risk-taking. Previous studies suggest that women outperform men in terms of following regulations on financial markets, complying with tax regulations, upholding business ethics, providing professional finance-related advice, and adhering to guidelines for compiling financial reports (see Baldry, 1987; Barnett et al., 1994; Bernardi & Arnold, 1997; Brooks et al., 2019; Fallan, 1999; Ittonen et al., 2013). Because CEOs who are women are more sensitive to litigation risk compared with their male counterparts, we conjecture that high ex-ante litigation risk would heighten the effect of CEO gender on corporate debt structure.

In accordance with the procedures described by Venkataraman et al. (2008) and Goh and Li (2011), the present study adopts the following primary SIC codes to find industries with a heighten litigation risk: codes 2833–2836, 3570–3577, 3600–3674, 5200–5961, and 7370–7374, which relate to biotechnology, computer equipment, electronics, retailing, and computer services, respectively. *Hrisk* is 1 so long as a company is in one of these industries; otherwise, it is 0. We list in Table 8 the impact exerted by litigation risk on the relationship of CEO gender with corporate leverage (Columns 3 and 4). The $Female_{t-1}$ and $Female_{t-1} \times Hrisk_{t-1}$ (interaction term) coefficients are negative and hold statistical significance (level: 1% for $Female_{t-1}$).

These findings confirm that potential future litigation risk magnifies the effect of the risk aversion channel, leading to firms with female CEOs issuing less debt.

5.1.3. Product market competition

This research also probes whether the relationship of CEO gender with corporate capital structure varies across companies in noncompetitive and competitive industries. Froot et al. (1993) indicate that firms facing stronger market competition have a higher default probability. Bushman et al. (2010) demonstrate that the probability of CEO turnover is positively correlated withmarket competition. Therefore, CEOs of firms in highly competitive industries are unlikely to enjoy a "quiet life" and a stable career (Akdo˘gu and MacKay, 2012). Given that market competition may increase CEOs' propensity to partake in risky activities, we anticipate CEO gender to exert a relatively large impact on corporate debt structure for companies in highly competitive industries.

For companies categorized under the same SIC codes (Boubaker et al., 2018), we apply the Herfindahl–Hirschman index (HHI) related to total assets as a proxy for product market competition. We derive *Hcompetition* and employ it to assess the level of product market competition according to the annual median HHI. If an industry has a large HHI, it has a low level of market competition. *Hcompetition* is 1 for companies in a highly competitive industry; otherwise, it is 0. We note that the estimated $Female_{t-1}$ and $Female_{t-1} \times HCompetition_{t-1}$ coefficients are all negative and hold statistical significance Table 8 (Columns 5 and 6). This result signifies that market competition increases risk aversion differences between female CEOs and male CEOs, resulting in a more pronounced relationship between CEO gender and firm debt structure for firms in highly competitive industries.

5.2. CEO gender and specific debt structure

We demonstrate that because women have greater risk aversion when compared with men, companies whose CEOs are women have a lower leverage ratio than do those whose CEOs are men. Accordingly, we perform further analysis to demonstrate that CEO gender is related to not only capital structure in general but also specific debt structure decisions, such as debt capacity and debt maturities.

5.2.1. Debt capacity

Denis and Sibilkov (2009), Harford et al. (2009), and Faulkender et al. (2012) reveal that actual company leverage usually fluctuates around a predicted target level, and the discrepancy between actual and target leverage ratios influences a company's future financing capability. Firms exhibiting above-target leverage tend to increase the leverage adjustment rate toward their target leverage ratio, and those exhibiting below-target leverage tend to decrease their leverage adjustment rate toward their target ratio (Lemmon and Zender, 2010). Because companies whose leverage is above the target have greater flexibility to borrow in external credit markets than do companies whose leverage is below the target, female CEOs are more likely to maintain below-target leverage according to the risk aversion channel.

To estimate a firm's target leverage, we adopt Byoun's (2008) empirical model:

$$Debtstructure_{i,t} = \beta_0 + \gamma'\Theta_{i,t-1} + \theta_j + \mu_t + \varepsilon_{i,t} \qquad (6)$$

where *Debtstructure* denotes market or book leverage, Θ denotes a variable vector related to a company's capital structure, θj denotes industry-specific fixed effects (according to SIC codes), and μt denotes the year-specific fixed effects. Θ includes the following firm and industry characteristics (Byoun, 2008; Flannery & Rangan, 2006): *Size* (representing the natural logarithm of total assets), *Profit* (representing the proportion of earnings prior to taxes, depreciation, interest, and amortization to total assets), *Fixed assets* (derived as fixed assets/total assets), *Median debt ratio* (representing the median industry debt ratio), *Tax* (representing the proportion of income tax to total sales), *Div* (representing the proportion of common stock dividends to total assets), *Depreciation* (representing the proportion of depreciation and amortization to total assets), *R&D* (representing the proportion of R&D expenditure to total assets), *R&D indicator* (a dummy variable, which is 1 if *R&D* is positive; otherwise, it is 0), and *AZ* (representing the Altman Z-score with modifications) (MacKie-Mason, 1990).

The residual estimated from Equation (6) represents the discrepancy between the real leverage and the target leverage that our model predicts. The indicator variable *BDebtCap* (*MDebtCap*) is equal to 1 if book (market) leverage falls below the predicted book (market) leverage and equal to 0 otherwise. We substitute the dependent variable that is expressed in Equation (3)—our baseline regression equation—with one of these two debt capacity indicator variables. As presented in Table 9, we note that $Female_{t-1}$ exerts a marginal effect on the debt capacity indicator variables estimated through probit regression analyses (Columns 1 and 2). The $Female_{t-1}$ coefficients are positive, and they hold statistical significance. Compared with firms who have male CEOs, those with female CEOs have a 8.4% (12.1%) higher probability of maintaining actual book (market) leverage below the predicted book (market) leverage. Given that the mean values of *BDebtCap* and *MDebtCap* are 60.0% and 57.7% respectively, the influence exerted by CEO gender on debt capacity has major financial implications. Our observation of a positive female CEO gender–debt capacity relationship verifies that risk aversion elucidates the gender difference in corporate debt structure. Our findings are in agreement with those reported by Byoun (2008) and Lemmon and Zender (2010); these researchers indicate that more risk averse companies are more likely to exhibit a positive debt capacity; their aim is to ensure that external borrowing is acceptable in the future.

5.2.2. Debt maturities

When refinancing debt with new borrowings, firms are aware that alterations in market conditions or imperfections in capital markets could induce increased external borrowing costs (Froot et al., 1993). A crucial component of corporate debt structure is debt maturity; a shorter debt maturity period heightens the expenses associated with refinancing risk (Harford et al., 2014). Companies with more short-term debt must engage in frequent renegotiations with their lenders, which exposes these companies to increased refinancing risk (Diamond and Verrecchia, 1991). Rajan and Winton (1995) reveal that a CEO is subject to scrutiny from lenders when their company frequently borrows from the external credit market. However, long-term debt puts firms in a scenario where refinancing is less frequent, which results in a lower refinancing risk (Johnson, 2003; Huang and Kisgen, 2013). Thus, CEOs exhibiting greater risk aversion levels have a stronger inclination to borrow more long-term debt instead of borrowing short-term debt (Dang and Phan, 2016). We expect companies whose CEOs are women would have longer debt maturity than do those whose CEOs are men.

To study the influence exerted by CEO gender on debt maturity, we substitute the dependent variable expressed in Equation (3)—our baseline regression equation—with one of two debt maturity proxy variables: $LDebt_t$ (representing the long-term debt–to–total debt ratio) and $DLDebt_t$ (equal to 1 if the $LDebt_t$ value is above its industry median; otherwise, it is equal to 0). As listed in Table 9, the estimated coefficients of $Female_{t-1}$ are positive and hold statistical significance (Columns 3 and 4). Column 3 suggests that the long-term debt–to–total debt ratios derived for companies whose CEOs are women are higher than those derived for companies whose CEOs are men by 0.9%, on average. Column 4 indicates that companies whose CEOs are women have an 11.1% higher probability of maintaining an above-industry-median long-term debt ratio. Our empirical results corroborate the idea that female CEOs prefer long-term debt to short-term debt and prefer to have a lower refinancing risk; we note that this is in agreement with the risk-averse channel.

5.3. CEO gender and corporate governance

Studies on agency theory suggest that managers tend to take greater risks when firms lack effective governance monitoring mechanisms. If firms that have good corporate governance tend to hire female CEOs, then corporate debt levels may be affected by corporate governance rather than by CEO gender. It is unclear whether CEO gender is influential if a firm's board of directors have a preferred capital structure. To investigate the potential confounding bias associated with corporate governance, we include CEO gender–corporate governance interaction terms in our baseline regression model: $Female_{t-1} \times EIndex_{t-1}$. As presented in Table 10, we determine that after corporate governance is controlled for directly, the $Female_{t-1}$ coefficients are still negative, and they still have statistical significance. However, the $Female_{t-1} \times EIndex_{t-1}$ coefficients are not statistically significant, suggesting that CEO gender's effect on debt levels is not primarily governed by corporate governance.

5.4. CEO gender versus CFO gender

Previous studies suggest that CEOs and CFOs may play different roles in corporate activities. Usually, CEOs take responsibility for major firm decisions, manage the whole firm's operations, allocate a firm's internal resources, and report firm operations to corporate boards; CFOs usually manage a firm's financial activities. Top executives could also have an equally crucial, or more crucial, function in firm decision-making and outcomes. Notably, the literature reveals that compared with those for CEOs, equity incentives for CFOs exert a larger effect on accrual management and earnings (Jiang et al., 2010). Furthermore, the literature indicates female CFO gender to negatively influence the risk of a stock price crash, although the influence is nonsignificant (Li & Zeng, 2019). We further examine the contribution of CEOs and CFOs to capital structure decision-making.

As indicated in Table 11, companies whose CFOs are women have lower corporate debt levels when compared with those whose CFOs are men (Columns 1 and 4).[5] Firms whose CFOs are women have, on average, a 1.5% lower book value of leverage and a 0.7% lower market value of leverage when compared with those whose CFOs are men. Nonetheless, the effect of female CFO gender on firm leverage is less financially important than the effect of CEOs, as documented in Section 4.1. Furthermore, we add CFO and CEO gender to our baseline regression model (Columns 2 and 5). The CEO and CFO gender coefficients are negative and hold statistical significance. When we include CEO gender–CFO gender interaction terms in our regression model, the interaction term coefficients do not hold statistical significance (Columns 3 and 6). Our results reveal that while both female CFOs and female CEOs and have a tendency to take less leverage than do their male counterparts, female CEOs are critical decision-makers regarding a company's capital structure. For a firm whose CEO is a woman, appointing a female CFO does not significantly reduce its debt level.

5.5. Additional controls

We seek to determine if our primary findings remain robust after we control for several factors related to firms' financing decisions. Chang et al. (2006) show that analyst coverage affects the patterns of security issuance decisions. In addition, institutional ownership is reported to significantly affect a company's capital structure (Chaganti & Damanpour, 1991). Coles et al. (2006) empirically demonstrate that the structure of managerial compensation affects a company's debt policy. Furthermore, Berger et al. (1997) suggest that entrenched CEOs have a higher likelihood of avoiding debt financing. Female and male CEOs may also differ in their managerial ability.

[5] Study period for CFO gender: 2006–2017 ("CFOANN" data are available only from 2006 onward.

Accordingly, we augment our baseline regression model with the following control variables: financial analyst coverage (*Analyst*), institutional ownership (*Ownership*), CEO fixed compensation (*CEOFixed*), CEO tenure (*CEOTenure*), firm efficiency (*Efficiency*), and managerial ability (*Mascore*). As indicated in Table 12, after we control for these factors, the $Female_{t-1}$ coefficients are still negative and still hold statistical significance.

5.6. Subsample periods

Studies suggest that economic conditions and market regulations influence firms' capital structure (see Baum et al., 2010; Wang et al., 2019). During our study's sample period (1993–2021), the financial market had experienced the bursting of the dotcom bubble (2000–2002), the global financial crisis (2007–2008), and the COVID-19 pandemic (2020–2021). Additionally, some important financial market regulations were implemented during this period. Consequently, to increase the accuracy of corporate disclosures and ensure shareholders' interests are not affected by accounting fraud, the Unites States Congress implemented the Sarbanes–Oxley Act (SOX) of 2002. In 2006, the Financial Accounting Standards Board (FASB) introduced FAS 123R, after which companies were required to deduct an amount for equity-based compensation on an annual basis; this has consequently engendered a substantial decrease in the utilization of options as a means of compensating CEOs.

In this study section, we restrict our sample to different subsample periods and determine whether our main findings are robust. As listed in Table 13, we divide our sample into noncrisis and crisis (2000–2002, 2007–2008, and 2020–2021) periods (Columns 1–4), pre-SOX (1993–2002) and post-SOX periods (Columns 5–8), and pre–FAS 123R (1993–2006) and post–FAS 123R periods (Columns 9–12). Table 13 reveals that the $F\ emalet-1$ coefficients are negative and hold statistical significance for every subsample period. Our results thus indicate that the relation of CEO gender with corporate debt levels is robust to the financial market turbulence and financial market regulation changes during our sample period.

6. Conclusions

This study investigates CEO gender's influence on companies' decision-making regarding financial matters in the context of debt structure. Our findings demonstrate that companies whose CEOs are women issue less debt than do those whose CEOs are men. We employ four identification methods to alleviate potential endogeneity problems: a PSM approach, Heckman's two-step method, a DID framework, and a high-dimensional fixed effects model. We observe that after the application of these methods, our main findings still remain robust. We find a negative relationship of female CEO gender with leverage, and the primary reason for this finding is that CEOs who are women exhibit greater risk aversion levels than do their male counterparts; the finding is not due to female CEOs exhibiting lower levels of overconfidence than do male CEOs. Furthermore, the influence of CEO gender on the debt structure of a company is more pronounced or only exists when the company's CEO is young, the level of market competition is relatively high, and the risk of litigation is relatively high; these findings support risk aversion as the channel or mechanism through which CEO gender affects corporate external borrowing. Consistent with the risk aversion mechanism, the study results suggest that female CEOs prefer to maintain positive debt capacity, which offers financial slack in the future, and that female CEOs exhibit a propensity to have more long-term debt, which reduces the risk of refinancing. Our supplementary tests indicate that our primary findings maintain their robustness when subsample periods and additional control variables are introduced. The relationship of CEO gender with corporate debt levels may not be fully explained by corporate governance. Although both female CEOs and female CFOs are shown to reduce the debt levels of firms, our derived findings signify that CEO gender has a greater influence on firm leverage than does CFO gender.

In general, our study's contribution to the relevant literature lies in its provision of evidence on the financial influence of female CEOs on firm activities. We also provide insight into the consequences CEOs' risk preferences have for capital structure. Because of data availability limitations, we cannot observe the detailed terms of firms' financing deals. Future studies could investigate how executive gender affects financing deal negotiation and the terms of financing deals, such as bank borrowing and equity issuance.

Appendix A

Table A1. Definitions of variables

Herein, we present our data sources and definitions of variables. CRSP = Center for Research in Security Prices. ExecuComp = Standard and Poor's Executive Compensation database; ISS = Institutional Shareholder Services. I/B/E/S = Institutional Brokers' Estimate System. 13F = Thomson Reuters 13F Database. PD = Peter Demerjian's website.

Variables	Definition	Source
Dependent variables		
BLev	Book leverage, the sum of current liabilities (*item 34*) and long-term debt (*item 9*) normalized by the book value of assets (*item 6*) (Cronqvist et al., 2012; Lin et al., 2018).	Compustat
MLev	Market leverage, the sum of current liabilities (*item 34*) and long-term debt (*item 9*) normalized by the market value of assets. The market value of assets is the book value of assets (*item 6*) minus the book value of equity (*item 60*) plus the market value of equity (*item 25* × *item 24*) (Berger et al., 1997).	Compustat
BDebtCap	The book value of debt capacity, an indicator variable equal to one if the book value of debt capacity is positive and zero otherwise (Byoun, 2008; Lemmon and Zender, 2010).	Compustat
MDebtCap	The market value of debt capacity, an indicator variable equal to one if the market value of debt capacity is positive and zero otherwise (Byoun, 2008; Lemmon and Zender, 2010).	Compustat
LDebt	Long-term debt, long-term debt (*item 9*) minus debt maturing in one year (*item 44*) normalized by the book value of total debt (*item 34* + *item 9*) (Huang et al., 2016).	Compustat
DLDebt	Above the mean of long-term debt, an indicator variable equal to one if a firm's *LDebt* is above the industry mean based on three-digit SIC codes and zero otherwise.	Compustat
Independent variables of interest		
Female	Female CEOs, an indicator variable equal to one if a firm has a female CEO and zero otherwise	ExecuComp
CFOGender	Female CFOs, an indicator variable equal to one if a firm has a female CFO and zero otherwise.	ExecuComp
Channel variables		
Delta	The value increase in a CEO's option portfolio for a 1% increase in the underlying stock price (Core and Guay, 2002).	ExecuComp

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Variables	Definition	Source
Vega	The value increase in a CEO's option portfolio for a 1% increase in the underlying stock return volatility (Core and Guay, 2002).	ExecuComp
Option	An indicator variable equal to one if a firm's CEO is classified as an overconfident CEO and zero otherwise. A CEO is classified as an overconfident CEO if she, at least once during our sample period, holds an option at least 67% in-the-money until the option's expiration year (Malmendier and Tate, 2005; Hirshleifer et al., 2012).	ExecuComp
Forecast	An indicator variable equal to one if a firm issues a management earnings forecast and zero otherwise (Libby and Rennekamp, 2012; Hribar and Yang, 2016).	I/B/E/S
Control variables		
Size	Firm size, the natural logarithm of the book value of assets (*item 6*).	Compustat
MTB	Market to book ratio, the ratio of the market value of assets (*item 6−item 60+item 25×item 24*) to the book value of assets (*item 6*).	Compustat
Profitability	Firm profitability, the ratio of income before extraordinary items (*item 18*) to the book value of assets (*item 6*).	Compustat
FAsset	Fixed assets, the ratio of property, plant and equipment (*item 8*) to the book value of assets (*item 6*).	Compustat
Rating	Debt rating, an indicator variable equal to one if a firm has a long-term debt rating from Standard & Poor's and zero otherwise (Huang et al., 2016).	Capital IQ
FirmAge	Firm age, the natural logarithm of one plus the number of years since a firm's stock is covered in CRSP.	CRSP
CEOComp	CEO total compensation, the natural logarithm of a CEO's total compensation (salary + bonuses + options + restricted stocks + other compensation).	ExecuComp
CEOPower	CEO pay slice, the ratio of a CEO's total compensation to the sum of top five executives' total compensation	ExecuComp
CEOAge	CEO age, the natural logarithm of one plus a CEO's age.	ExecuComp
EIndex	CEO entrenchment index, an entrenchment index composed of the six most important provisions in the *G-index* (Bebchuk et al., 2009).	ISS
DirGenRatio	Female director ratio, the ratio of the number of female directors to the total number of directors.	ISS
Director	Director number, the natural logarithm of one plus the number of a firm's board of directors.	ISS

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Table A1 (continued from the previous page)

Variables	Definition	Source
Analyst	Financial analysts coverage, the maximum number of financial analysts making annual earnings forecasts in any month over a twelve-month period (Chang et al., 2006).	I/B/E/S
Ownership	Institutional ownership, the shares held by institutional investors normalized by total shares outstanding.	13F
CEOFixed	CEO fixed compensation, the amount of fixed compensation (salary + bonus) normalized by total annual compensation (Berger et al., 1997).	ExecuComp
CEOTenure	CEO tenure, the number of years a CEO has held the CEO position (Berger et al., 1997).	ExecuComp
Efficiency	Firm efficiency score, computed by data envelopment analysis which includes an output (total sales) and a vector of inputs including firm characteristics (Demerjian et al., 2012).	PD
Mascore	Managerial ability score, computed by the residual from a regression between firm efficiency and firm characteristics (Demerjian et al., 2012).	PD

Appendix B. Summary of identification test results

	OLS		PSM		Heckman two-stage		High-dimensional	
	BLev$_t$	***MLev***$_t$	***BLev***$_t$	***MLev***$_t$	***BLev***$_t$	***MLev***$_t$	***BLev***$_t$	***MLev***$_t$
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Female$_{t-1}$	-0.027**	-0.029**	-0.052***	-0.049***	-0.019**	-0.022***	-0.022***	-0.027***
	(-2.000)	(-2.575)	(-2.728)	(-3.004)	(-2.209)	(-2.661)	(-3.411)	(-3.856)
Intercept	0.218**	0.288***	0.245	0.320	0.288***	0.338***	0.283***	0.245***
	(2.078)	(2.967)	(0.621)	(0.941)	(5.822)	(7.174)	(6.155)	(5.150)
Observations	28,389	28,389	1,288	1,288	17,047	17,047	28,389	26,973
Adjusted-R^2	0.097	0.120	0.225	0.245	0.057	0.098	0.169	0.223
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Firm fixed effect	No	No	No	No	No	No	Yes	Yes
Industry×Year fixed effects	No	No	No	No	No	No	Yes	Yes

Herein, we present the regression results for the baseline estimates conducted using four estimation methods. Columns 1 and 2 outline the results of our OLS regression. Columns 3 and 4 show the PSM regression results. Columns 5 and 6 report the results from Heckman's (1979) two-step method with panel data (xtheckman). Columns 7 and 8 report the regression results for high-dimensional fixed effects. Our sample comprises FYOs for every variable (no missing data) for the 1993–2021 period. Our dependent variables are proxies of firm leverage: *BLev* and *MLev*. Appendix A provides a definition for every variable. The parenthetically reported t-values are in accordance with double-clustered standard errors for year and firm (Petersen, 2009). *, **, and *** = statistically significant at the levels of 10%, 5%, and 1%, respectively.

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Table 1. Summary statistics

Panel A. Entire sample. This panel shows the descriptive statistics for every variable applied in the empirical analyses. Our main sample includes 28,389 FYOs in ExecuComp for 1993–2021. For every variable, we report the observations (expressed as a number), mean, SD, 25th percentile, 50th percentile, and 75th percentile from left to right in sequence. We define every variable in Appendix A.

Variables	Observations	Mean	S.D.	P25	P50	P75
Dependent variables						
BLev	28,389	0.242	0.211	0.061	0.206	0.372
MLev	28,389	0.202	0.207	0.044	0.144	0.294
BDebtCap	28,047	0.600	0.490	0.000	1.000	1.000
MDebtCap	28,047	0.577	0.494	0.000	1.000	1.000
LDebt	28,389	0.915	0.144	0.916	0.981	0.998
DLDebt	28,389	0.712	0.453	0.000	1.000	1.000
Independent variable of interest						
Female	28,389	0.025	0.156	0.000	0.000	0.000
CFOGender	16,795	0.104	0.306	0.000	0.000	0.000
Channel variables						
Delta	18,590	5.411	1.610	4.447	5.422	6.406
Vega	18,590	3.529	1.978	2.373	3.849	4.985
Option	16,099	0.206	0.404	0.000	0.000	0.000
Forecast	21,212	0.934	0.249	1.000	1.000	1.000
Control variables						
Size	28,389	3.711	1.965	2.612	3.201	3.946
MTB	28,389	1.601	1.322	0.910	1.192	1.841
Profitability	28,389	0.809	1.846	0.012	0.073	0.434
FAsset	28,389	0.429	0.341	0.075	0.370	0.809
Rating	28,389	0.369	0.482	0.000	0.000	1.000
FirmAge	28,389	6.933	13.170	2.485	3.219	3.784
CEOComp	28,389	8.043	1.283	7.305	8.116	8.841
CEOPower	28,389	0.380	0.150	0.289	0.373	0.461
CEOAge	28,389	4.022	0.139	3.951	4.043	4.111
EIndex	28,389	2.953	1.633	2.000	3.000	4.000
DirGenRatio	28,389	0.143	0.102	0.091	0.125	0.200
Director	28,389	2.301	0.252	2.197	2.303	2.485

Panel B. Univariate tests. This panel presents results from a univariate comparison of the debt structure in companies with female and male CEOs. We report the median and mean of debt structure proxies. The final two columns show the discrepancies between median and mean values. We define all variables in Appendix A. We report the t-test mean differences and Wilcoxon test median differences parenthetically. *, **, and *** = statistically significant at the levels of 10%, 5%, and 1%, respectively.

	Female CEOs		Male CEOs		Differences	
	Mean	Median	Mean	Median	t-test	Wilcoxon test
BLev	0.228	0.194	0.243	0.207	-0.015*	-0.013*
					(-1.892)	(-1.836)
MLev	0.182	0.134	0.203	0.144	-0.021***	-0.010***
					(-2.713)	(-2.139)
BDebtCap	0.646	1.000	0.606	1.000	0.040*	0.000*
					(1.903)	(1.903)
MDebtCap	0.681	1.000	0.632	1.000	0.049**	0.000**
					(2.276)	(2.276)
LDebt	0.970	0.989	0.955	0.987	0.015***	0.002***
					(4.033)	(3.120)
DLDebt	0.748	1.000	0.711	1.000	0.037***	0.000***
					(2.131)	(2.132)

Table 2. Female CEOs and corporate debt structure

Herein, we show the panel regression results for the relationship of female CEO gender with corporate debt structure. Our sample comprises FYOs without missing data on any variable for the 1993–2021 period. Our dependent variables are proxies of firm leverage: $BLev_t$ and $MLev_t$. Our independent variable, $Female_{t-1}$, is 1 when a company has a female CEO; it is 0 otherwise. The coefficients for the fixed effects of SIC code and year fixed effects are omitted for conciseness. Appendix A provides definitions of all the variables. The t-values (in parentheses) are derived from double-clustered standard errors by year and firm (Petersen, 2009). *, **, and *** = statistically significant at the levels of 10%, 5%, and 1%, respectively.

	$BLev_t$		$MLev_t$	
	(1)	(2)	(3)	(4)
$Female_{t-1}$	-0.027**	-0.027**	-0.030**	-0.029**
	(-1.997)	(-2.000)	(-2.433)	(-2.575)
$Size_{t-1}$		0.010***		0.006*
		(3.013)		(1.890)
MTB_{t-1}		-0.023***		-0.040***
		(-10.639)		(-24.991)
$Profitability_{t-1}$		-0.011***		-0.010***
		(-5.121)		(-6.271)
$FAsset_{t-1}$		-0.047***		-0.039***
		(-3.752)		(-3.258)
$Rating_{t-1}$		0.006		0.010
		(0.812)		(1.285)
$FirmAge_{t-1}$		0.000		0.000
		(0.799)		(0.912)
$CEOComp_{t-1}$		0.004*		0.002
		(1.764)		(0.709)
$CEOPower_{t-1}$		0.018		0.007
		(1.201)		(0.481)
$CEOAge_{t-1}$		0.010		-0.002
		(0.425)		(-0.099)
$EIndex_{t-1}$		-0.004		-0.003
		(-1.503)		(-1.439)
$DirGenRatio_{t-1}$		0.048		0.061*
		(1.324)		(1.954)
$Director_{t-1}$		-0.007		0.000
		(-0.479)		(0.015)
Intercept	0.248***	0.218**	0.240***	0.288***
	(5.888)	(2.078)	(5.953)	(2.967)
Observations	28,389	28,389	28,389	28,389
Adjusted-R^2	0.050	0.097	0.031	0.120
Industry fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes

Table 3. Female CEO gender and corporate debt structure: PSM

Panel A. PSM regression and postmatch regression. This panel details the estimated coefficients of propensity scores in accordance with a probit model. The sample has FYOs without missing data for every variable for the 1993–2021 period. Our dependent variable is $Female_{t-1}$, which is 1 when a company has a female CEO; otherwise, it is 0. The independent variables are firm and CEO characteristics (also reported in Table 2). We use a nearest-neighbor 1-to-1 matching with a caliper width of 1%. Column 1 presents the results of a propensity score regression before matching is applied. Column 2 shows the results of the postmatch diagnostic regression. Detailed definitions of all variables are provided in Appendix A. The z-values, which we report parenthetically, are based on double-clustered standard errors (by firm and year; Petersen, 2009). *, **, and *** = statistically significant at the levels of 10%, 5%, and 1%, respectively.

	Pre-match $Female_t$	Post-match $Female_t$
	(1)	(2)
$Size_{t-1}$	-0.010	-0.003
	(-0.716)	(-0.124)
MTB_{t-1}	0.038***	0.002
	(2.77)	(0.09)
$Profitability_{t-1}$	-0.010	-0.026
	(-0.870)	(-1.223)
$FAsset_{t-1}$	0.249***	0.025
	(4.04)	(0.20)
$Rating_{t-1}$	-0.097**	-0.077
	(-2.473)	(-0.873)
$FirmAge_{t-1}$	0.006***	-0.001
	(3.14)	(-0.228)
$CEOComp_{t-1}$	0.025	0.009
	(1.50)	(0.28)
$CEOPower_{t-1}$	0.176	-0.255
	(1.44)	(-0.973)
$CEOAge_{t-1}$	-0.934***	0.322
	(-8.723)	(1.15)
$EIndex_{t-1}$	0.022*	0.015
	(1.70)	(0.58)
$DirGenRatio_{t-1}$	4.725***	0.151
	(28.87)	(0.48)
$Director_{t-1}$	-0.228***	0.240
	(-3.872)	(1.459)
Intercept	0.893**	-1.836
	(2.13)	(-1.597)
Observations	28,389	1,288
Pseudo R^2	0.176	0.004

Panel B. Disparity between company and CEO characteristics. The present panel compares the characteristics (at the company and CEO level) of companies managed by female CEOs and those managed by male CEOs, matched through PSM. Columns 1 and 2 and Columns 5 and 6 present the mean values of CEO and firm characteristics of the treatment (women) and control (men) groups. Columns 3 and 7 compare the treatment and control groups. Columns 4 and 8 show the t-test results, expressed as mean values, on the differences between the two groups. Appendix A provides a definition for every variable. *, **, and *** = statistically significant at the levels of 10%, 5%, and 1%, respectively.

	Pre-match				Post-match			
	Female (N=706)	Male (N=27,683)	Difference	T-statistics	Female (N=644)	Male (N=644)	Difference	T-statistics
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Size	4.663	3.686	0.977***	13.084	4.582	4.528	0.054	0.357
MTB	1.581	1.601	-0.020	-0.392	1.624	1.651	-0.027	-0.324
Profitability	0.794	0.809	-0.015	-0.203	0.856	0.947	-0.091	-0.825
FAsset	0.459	0.428	0.031**	2.374	0.455	0.454	0.001	0.053
Rating	0.343	0.370	-0.027	-1.454	0.346	0.354	-0.008	-0.291
FirmAge	14.415	6.742	7.673***	15.351	14.062	13.783	0.279	0.240
CEOComp	8.373	8.035	0.338***	6.940	8.350	8.319	0.031	0.398
CEOPower	0.398	0.379	0.019***	3.260	0.399	0.404	-0.005	-0.636
CEOAge	4.004	4.022	-0.018***	-3.353	3.999	3.990	0.009	1.196
EIndex	3.332	2.943	0.389***	6.256	3.296	3.210	0.086	1.064
DirGenRatio	0.281	0.140	0.141***	37.302	0.265	0.260	0.005	0.703
Director	2.293	2.301	-0.008	-0.919	2.297	2.280	0.017	1.024

Panel C. PSM estimator. The present panel outlines the average treatment effects of female CEOs on corporate debt structure, as measured by *BLev* and *MLev*. Columns 1 and 2 detail the *BLev* and *MLev* values, expressed as means, for the treatment and control groups. Column 3 describes between-group differences. In Column 4, we report the t-test results, expressed as mean values, for between-group differences. Appendix A provides a definition for every variable. *, **, and *** = statistically significant at the levels of 10%, 5%, and 1%, respectively.

Table 4. Female CEOs and corporate debt structure: Heckman's two-step method with panel data (xtheckman)

This table presents the results of Heckman's (1979) two-step method with panel data (xtheckman) for the relationship of female CEO gender with corporate debt structure. Our sample comprises FYOs without missing data for the 1993–2021 period. Column 1 reports the results of our stage 1 selection equation, with probit regression estimation; $Female_{t-1}$is the dependent variable. In the stage 1 regression, $Gender\_equity_{t-1}$ is included as an explanatory variable. In Columns 2 and 3, we outline the stage 2 regression results; $BLev_t$ *and* $MLev_t$ are the dependent variables. We conduct *Inverse Mills Ratio* estimation using our stage 1 regression and include it in stage 2equation to adjust for potential selection bias. For conciseness, we omit the coefficients for the fixed effects of SIC code and year. Appendix A provides a definition of every variable. The parenthetically reported z- and t-values are in accordance with the double-clustered standard errors for firm and year (Petersen, 2009). *, **, and *** = statistically significant at the levels of 10%, 5%, and 1%, respectively.

	Selection	Outcome	
	***Female*$_{t-1}$**	***BLev*$_{t-1}$**	***MLev*$_{t-1}$**
	(1)	**(2)**	**(3)**
Female$_{t-1}$	.	-0.019**	-0.022***
		(-2.209)	(-2.661)
Gen_Equity$_{t-1}$	0.007**		
	(2.123)		
Size$_{t-1}$	0.017	0.007***	0.001
	(0.535)	(4.486)	(0.893)
MTB$_{t-1}$	0.049***	-0.024***	-0.041***
	(3.058)	(-18.829)	(-33.261)
Profitability$_{t-1}$	-0.012	-0.009***	-0.009***
	(-1.034)	(-9.023)	(-9.660)
FAsset$_{t-1}$	0.014	-0.040***	-0.028***
	(0.168)	(-6.998)	(-5.117)
Rating$_{t-1}$	-0.161**	0.017***	0.019***
	(-2.352)	-4.166	-4.909
FirmAge$_{t-1}$	0.240***	-0.001***	0.000
	(6.039)	(-2.859)	(-1.199)
CEOComp$_{t-1}$	0.008	0.003**	0.000
	(0.363)	(2.068)	(-0.062)
CEOPower$_{t-1}$	0.289	0.008	-0.006
	(1.487)	(0.705)	(-0.575)
CEOAge$_{t-1}$	-2.071***	0.013	-0.001
	(-12.191)	-1.077	(-0.071)
EIndex$_{t-1}$	-0.063***	-0.005***	-0.003***
	(-3.190)	(-4.516)	(-3.564)
DirGenRatio$_{t-1}$	5.436***	-0.013	0.028
	-20.447	(-0.635)	-1.418
Director$_{t-1}$	-0.322***	-0.027***	-0.021***
	(-3.618)	(-3.786)	(-3.114)
Inverse Mills ratio		0.006**	0.005**
		(2.163)	(2.357)
Intercept	5.197***	0.288***	0.338***
	(7.228)	(5.822)	(7.174)

Observations	17,047	17,047	17,047
Pseudo/Adjusted-R^2	0.318	0.057	0.098
Industry fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes

Table 5. Female CEOs and corporate debt structure: DID

Here, we show the results of a DID regression for the relationship of female CEO gender and corporate debt structure. Our sample includes FYOs 3 years prior to and 3 years subsequent to a CEO changeover; the CEO transition year is excluded. The CEO change is either from a male CEO to another male CEO or from a male CEO to a female CEO. The sample period is 1993–2021. To be included in our sample, companies must have over 2 years of data (without any data missing) before a CEO changeover. Our dependent variables are $BLev_{t+1}$ and $MLev_{t+1}$. The indicator variable $FeTran$ is 1 if a CEO changeover is from a male to a female CEO; the value is 0 if the changeover is from a male CEO to another male CEO. The indicator variable $TranPost_t$ is 1 if a firm–year is after a CEO changeover; otherwise, the value is 0. For conciseness, we omit the fixed effects of SIC code and year. Appendix A provides a complete definition of each variable. The parenthetically reported t-values are in accordance with double-clustered standard errors by firm and year (Petersen, 2009). *, **, and *** = statistically significant at the levels of 10%, 5%, and 1%, respectively.

	$BLev_{t+1}$ (1)	$MLev_{t+1}$ (2)
$FeTran \times TranPost_t$	-0.026*	-0.027*
	(-1.794)	(-1.706)
$FeTran$	0.007	-0.028***
	(0.798)	(-4.231)
$TranPost_t$	-0.007*	-0.002
	(-1.864)	(-0.519)
$Size_t$	0.003	0.002
	(1.344)	(1.039)
MTB_t	-0.008	-0.017*
	(-0.795)	(-1.759)
$Profitability_t$	-0.035	-0.086***
	(-0.864)	(-3.217)
$FAsset_t$	0.002	-0.010
	(0.320)	(-1.012)
$Rating_t$	-0.014**	-0.019***
	(-2.785)	(-3.812)
$FirmAge_t$	0.001***	0.001***
	(5.423)	(4.710)
$CEOComp_t$	-0.003	-0.003
	(-1.587)	(-1.490)
$CEOPower_t$	0.026	0.035*
	(1.362)	(1.922)
$CEOAge_t$	-0.052**	-0.050***
	(-2.206)	(-2.701)
$EIndex_t$	-0.003	-0.007***
	(-1.586)	(-3.723)
$DirGenRatio_t$	0.102***	0.149***
	(4.043)	(6.165)
$Director_t$	-0.030***	-0.034***
	(-2.851)	(-3.262)
Intercept	0.491***	0.507***
	(5.104)	(6.098)
Observations	10,055	10,055
Adjusted-R^2	0.007	0.014
Industry fixed effects	Yes	Yes
Year fixed effects	Yes	Yes

Table 6. Female CEOs and corporate debt structure: High-dimensional fixed effects
Herein, we present the regression results for high-dimensional fixed effects. Our sample comprises FYOs for all variables without missing values for 1993–2021. Our dependent variables are the firm leverage measures $BLev_t$ and $MLev_t$. Our independent variable is $Female_{t-1}$, and it equals 1 if a company's CEO is a woman; it is 0 otherwise. In Columns 1 and 3, we control for the firm fixed effects and year fixed effects. As indicated in Columns 2 and 4, this study controls for the firm fixed effects and interacted fixed effects of industry–year. For conciseness, we omit the fixed-effects coefficients. Appendix A provides a definition for every variable. The parenthetically reported t-values are in accordance with double-clustered standard errors for firm and year (Petersen, 2009). *, **, and *** = statistically significant at the levels of 10%, 5%, and 1%, respectively.

	$BLev_t$		$MLev_t$	
	(1)	(2)	(3)	(4)
$Female_{t-1}$	-0.021***	-0.025***	-0.022***	-0.027***
	(-2.868)	(-3.216)	(-3.411)	(-3.856)
$Size_{t-1}$	0.009***	0.009***	0.006***	0.006***
	(6.525)	(5.871)	(4.482)	(4.147)
MTB_{t-1}	-0.023***	-0.023***	-0.039***	-0.037***
	(-23.400)	(-21.939)	(-52.114)	(-46.972)
$Profitability_{t-1}$	-0.011***	-0.011***	-0.009***	-0.009***
	(-13.886)	(-13.542)	(-14.477)	(-13.653)
$FAsset_{t-1}$	-0.038***	-0.052***	-0.034***	-0.047***
	(-8.171)	(-10.686)	(-7.445)	(-9.758)
$Rating_{t-1}$	0.005	0.007**	0.007**	0.009***
	(1.548)	(2.209)	(2.178)	(2.662)
$FirmAge_{t-1}$	0.000	0.000	0.000	0.000
	(1.016)	(0.869)	(1.254)	(0.975)
$CEOComp_{t-1}$	0.002**	0.001	0.000	-0.001
	(2.334)	(0.564)	(0.072)	(-0.894)
$CEOPower_{t-1}$	0.016*	0.010	0.009	0.001
	(1.848)	(1.119)	(1.084)	(0.099)
$CEOAge_{t-1}$	0.010	0.011	-0.001	-0.002
	(1.054)	(1.159)	(-0.096)	(-0.174)
$EIndex_{t-1}$	-0.005***	-0.006***	-0.004***	-0.004***
	(-5.512)	(-6.158)	(-4.243)	(-4.415)
$DirGenRatio_{t-1}$	0.031**	0.047***	0.038***	0.049***
	(2.225)	(3.196)	(2.769)	(3.362)
$Director_{t-1}$	-0.009	-0.016***	-0.001	-0.008
	(-1.522)	(-2.712)	(-0.111)	(-1.385)
Intercept	0.214***	0.191***	0.283***	0.245***
	(4.746)	(3.788)	(6.155)	(5.150)
Observations	28,389	26,973	28,389	26,973
Adjusted-R^2	0.152	0.212	0.169	0.223
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	No	Yes	No
Industry×Year fixed effects	No	Yes	No	Yes

Table 7. Channels: Risk aversion and overconfidence

Herein, we show the regression results of firm leverage on variations in CEO gender; we can explain these results based on CEO overconfidence or risk aversion. This sample comprises FYOs for every variable (no values are missing) for the 1993–2021 period. The dependent variables are the debt level measures $BLev_t$ *and* $MLev_t$. Our independent variables are $Female_{t-1} \times Proxy_{t-1}$. For conciseness, we omit the coefficients for the fixed effects of SIC code and year. Appendix A provides a definition for every variable. The parenthetically reported t-values are in accordance with double-clustered standard errors for firm and year (Petersen, 2009). *, **, and *** = statistically significant at the levels of 10%, 5%, and 1%, respectively.

	$BLev_t$	$MLev_t$	$BLev_t$	$MLev_t$	$BLev_t$	$MLev_t$	$BLev_t$	$MLev_t$
	Prozzy=Dela		*Prozzy=Vega*		*Prozzy=Option*		*Prozzy=Forecast*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Female_{t-1}$	0.066	0.027	0.009	-0.003	-0.046**	-0.051***	-0.032**	-0.054***
	(1.152)	(0.801)	(0.341)	(-0.168)	(-2.460)	(-2.663)	(-2.515)	(-4.290)
$Prozzy_{t-1}$	0.007***	0.006***	-0.001	-0.001	0.001	0.004	0.000	-0.018***
	(2.596)	(5.264)	(-0.605)	(-0.752)	(0.141)	(0.594)	(0.016)	(-6.459)
$Female_{t-1} \times Prozzy_{t-1}$	-0.020*	-0.012*	-0.014**	-0.010*	-0.024	0.008	0.014	0.028
	(-1.825)	(-1.822)	(-2.218)	(-1.915)	(-0.605)	(0.190)	(0.759)	(1.527)
$Size_{t-1}$	0.006	0.005**	0.007	0.006	0.005	0.000	0.007***	0.006***
	(1.284)	(2.563)	(1.368)	(1.187)	(1.354)	(0.067)	(3.840)	(3.031)
MTB_{t-1}	-0.022***	-0.038***	-0.022***	-0.038***	-0.023***	-0.041***	-0.022***	-0.041***
	(-9.505)	(-35.366)	(-9.583)	(-21.404)	(-11.687)	(-20.157)	(-20.899)	(-39.277)
$Profitability_{t-1}$	-0.013***	-0.011***	-0.012***	-0.010***	-0.012***	-0.012***	-0.011***	-0.010***
	(-6.843)	(-13.210)	(-6.306)	(-6.731)	(-8.052)	(-7.792)	(-14.190)	(-13.127)
$Fasset_{t-1}$	-0.029**	-0.036***	-0.028*	-0.035**	-0.068***	-0.057***	-0.043***	-0.048***
	(-1.996)	(-6.659)	(-1.893)	(-2.433)	(-7.065)	(-5.796)	(-8.515)	(-9.639)
$Rating_{t-1}$	0.001	-0.003	0.002	-0.002	-0.013*	-0.007	0.004	0.004
	(0.092)	(-0.642)	(0.206)	(-0.147)	(-1.753)	(-0.932)	(0.962)	(1.016)
$FirmAge_{t-1}$	0.006	0.009***	0.005	0.009	0.021***	0.018***	0.002	0.005**
	(0.882)	(3.808)	(0.809)	(1.438)	(4.146)	(3.512)	(1.009)	(2.297)
$CEOComp_{t-1}$	0.002	0.001	0.006*	0.005	0.006*	0.003	0.006***	0.005***
	(0.493)	(0.360)	(1.835)	(1.418)	(1.902)	(0.984)	(4.573)	(3.782)
$CEOPower_{t-1}$	0.008	0.006	0.008	0.006	0.031*	0.003	0.013	0.004

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	$BLev_t$	$MLev_t$	$BLev_t$	$MLev_t$	$BLev_t$	$MLev_t$	$BLev_t$	$MLev_t$
	$Proxxy$=$Dela$		$Proxxy$=$Vega$		$Proxxy$=$Option$		$Proxxy$=$Forecast$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	(0.508)	(0.562)	(0.492)	(0.415)	(1.692)	(0.141)	(1.320)	(0.386)
$CEOAge_{t-1}$	-0.007	-0.010	0.002	-0.003	0.003	-0.008	0.012	-0.021*
	(-0.254)	(-0.808)	(0.075)	(-0.140)	(0.166)	(-0.360)	(1.084)	(-1.952)
$Eindex_{t-1}$	-0.007***	-0.006***	-0.008***	-0.006***	-0.001	-0.004*	-0.005***	-0.004***
	(-2.973)	(-5.620)	(-3.090)	(-2.773)	(-0.424)	(-1.683)	(-4.604)	(-3.953)
$DirGenRatio_{t-1}$	0.031	0.051***	0.029	0.049	0.076**	0.106***	0.055***	0.082***
	(0.797)	(2.930)	(0.743)	(1.341)	(2.422)	(3.298)	(3.429)	(5.220)
$Director_{t-1}$	-0.008	-0.001	-0.007	0.000	0.004	0.004	0.001	0.005
	(-0.462)	(-0.103)	(-0.189)	(0.208)	(0.244)	(0.282)	(0.206)	(0.793)
Intercept	0.224*	0.237***	1.561	1.835*	0.215	0.441***	0.283***	0.330***
	(1.838)	(4.086)	(1.607)	(1.870)	(1.466)	(2.954)	(5.462)	(6.556)
Observations	18,590	18,590	18,590	18,590	16,099	16,099	21,212	21,212
Adjusted-R^2	0.145	0.188	0.144	0.187	0.121	0.161	0.071	0.126
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 8. Cross-sectional analysis

Herein, we provide the results of our cross-sectional analyses of the effect of CEO age, litigation risk, and market competition on the relation between CEO gender and corporate debt structure. Our sample covers firm–year observations with nonmissing values for all variables during 1993–2021. The dependent variables are two leverage ratios: $BLev_t$ *and* $MLev_t$. The independent variables of interest are $Female_{t-1} \times Proxy_{t-1}$. In Columns 1 and 2, *Young* is 1 if a CEO's age is below the median; otherwise, it is 0. In Columns 3 and 4, *Hrisk* equals 1 if a company is in an industry with a high risk of litigation; otherwise, it is 0. In Columns 5 and 6, *Hcompetition* equals 1 if a company is in an industry with a below-median Herfindahl Index based on total assets; otherwise, it equals 0. *Hcompetition* measures the product market competition. Our control variables are those applied in Equation (3). For conciseness, we omit the coefficients for the control variables as well as those for the fixed effects of SIC code and year. Appendix A provides a full definition of every variable. Our parenthetically reported t-values are in accordance with double-clustered standard errors for firm and year (Petersen, 2009). *, **, and *** = statistically significant at the levels of 10%, 5%, and 1%, respectively.

	$BLev_t$	$MLev_t$	$BLev_t$	$MLev_t$	$BLev_t$	$MLev_t$
	Proxy= Young		*Proxy=Hrisk*		*Proxy=Hcompetition*	
	(1)	(2)	(3)	(4)	(5)	(6)
$Female_{t-1}$	-0.025**	-0.025*	-0.028***	-0.030***	-0.017*	-0.014*
	(-2.645)	(-1.779)	(-4.733)	(-4.507)	(-1.710)	(-1.738)
$Proxy_{t-1}$	-0.003	-0.005	0.006*	0.010***	0.002	0.002
	(-0.802)	(-1.198)	(2.044)	(3.839)	(0.958)	(0.741)
$Female_{t-1} \times Proxy_{t-1}$	-0.026**	-0.032*	-0.034*	-0.030*	-0.019*	-0.029***
	(-2.102)	(-1.750)	(-1.887)	(-1.727)	(-1.871)	(-2.900)
$Size_{t-1}$	0.007***	0.005***	0.009***	0.007***	0.007	0.006***
	(3.832)	(2.812)	(4.935)	(3.816)	(1.249)	(2.874)
MTB_{t-1}	-0.022***	-0.041***	-0.023***	-0.042***	-0.023***	-0.040***
	(-21.045)	(-40.160)	(-28.893)	(-48.782)	(-24.916)	(-31.274)
$Profitability_{t-1}$	-0.011***	-0.010***	-0.011***	-0.010***	-0.011***	-0.010***
	(-20.595)	(-12.972)	(-22.185)	(-17.043)	(-20.506)	(-13.266)
$FAsset_{t-1}$	-0.044***	-0.045***	-0.036***	-0.040***	-0.031***	-0.039***
	(-17.043)	(-9.423)	(-14.980)	(-12.329)	(-7.128)	(-8.026)
$Rating_{t-1}$	0.005*	0.003	0.005**	0.003	0.012***	0.010***
	(1.869)	(0.921)	(2.440)	(1.261)	(5.481)	(4.060)
$FirmAge_{t-1}$	0.003*	0.006***	0.008***	0.009***	0.000	-0.000*
	(1.921)	(2.842)	(6.256)	(8.884)	(0.797)	(-1.724)
$CEOComp_{t-1}$	0.006***	0.005***	0.004**	0.003***	0.003**	0.002
	(4.376)	(3.720)	(2.760)	(2.822)	(2.178)	(0.968)
$CEOPower_{t-1}$	0.011	0.001	0.014	0.006	0.021**	0.007
	(0.947)	(0.131)	(1.420)	(0.794)	(2.327)	(0.952)
$CEOAge_{t-1}$	-0.020	-0.037**	0.000	-0.005	0.006	-0.002
	(-1.209)	(-2.219)	(0.007)	(-0.622)	(0.721)	(-0.226)
$EIndex_{t-1}$	-0.004***	-0.004***	-0.003***	-0.003***	-0.002***	-0.003***
	(-6.050)	(-3.889)	(-7.176)	(-6.474)	(-3.321)	(-7.059)
$DirGenRatio_{t-1}$	0.058***	0.088***	0.042***	0.059***	0.017	0.062***

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	$BLev_t$	$MLev_t$	$BLev_t$	$MLev_t$	$BLev_t$	$MLev_t$
	Proxy=Young		***Proxy=Hrisk***		***Proxy=Hcompetition***	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	(6.550)	(5.756)	(5.193)	(6.530)	(1.278)	(5.819)
$Director_{t-1}$	-0.004	0.002	-0.015***	-0.007	-0.005	0.000
	(-0.775)	(0.302)	(-3.038)	(-1.547)	(-0.887)	(0.046)
Intercept	0.324***	0.397***	-0.828***	-0.279	-0.586	0.288***
	(4.330)	(5.497)	(-3.134)	(-1.107)	(-1.575)	(8.501)
Observations	28,389	28,389	28,389	28,389	28,389	28,389
Adjusted-R^2	0.069	0.124	0.052	0.108	0.055	0.120
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 9. Effect of CEO gender on debt capacity and maturity

Herein, we outline the results from our regression of the relationship of female CEO gender with firm-specific debt structure. Our sample comprises FYOs for all variables (no missing values) for the 1993–2021 period. In Columns 1 and 2, our dependent variables relate to debt capacity: $BLevCap_t$ and $MLevCap_t$. In Columns 3 and 4, our dependent variables relate to debt maturity: $LDebt_t$ and $DLDebt_t$. $Female_{t-1}$ is our independent variable. The table provides the results from a probit regression (marginal effect shown) in Columns 1, 2, and 4, and the OLS regression results are presented in Column 3. The control variables are as in Equation (3). For conciseness, we omit the coefficients for the control variables as well as those for the fixed effects of SIC code and year. Appendix A provides a full definition of every variable. The parenthetically reported z- and t-values are in accordance with the double-clustered standard errors for firm and year (Petersen, 2009). *, **, and *** = statistically significant at the levels of 10%, 5%, and 1%, respectively.

	$BDebtCap_t$ (1)	$MDebtCap_t$ (2)	$LDebt_t$ (3)	$DLDebt_t$ (4)
$Female_{t-1}$	0.084**	0.121**	0.009*	0.111**
	(2.003)	(2.227)	(1.801)	(2.147)
Observations	28,047	28,047	28,389	28,389
Pseudo/Adjusted-R^2	0.019	0.091	0.492	0.0001
Control variables	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes

Table 10. CEO gender and corporate governance

Herein, we outline the regression results for the effect of corporate governance on the relationship of corporate debt structure with CEO gender. Our sample pertains to FYOs for every variable (without missing data) for the 1993–2021 period. Our dependent variables are two debt level measures, namely $BLev_t$ and $MLev_t$. Our independent variables are $Female_{t-1}$, $EIndex_{t-1}$, and $Female_{t-1} \times EIndex_{t-1}$. See Equation (3) for the control variables. For conciseness, we omit the coefficients for the control variables as well as those for the fixed effects of SIC code and year. Appendix A provides a full definition of every variable. The parenthetically reported t-values are in accordance with double-clustered standard errors for year and firm (Petersen, 2009). *, **, and *** = statistically significant at the levels of 10%, 5%, and 1%, respectively.

	$BLev_t$		$MLev_t$	
	(1)	(2)	(3)	(4)
$Female_{t-1}$	-0.038**	-0.040**	-0.046***	-0.045***
	(-2.328)	(-2.471)	(-3.103)	(-3.179)
$Eindex_{t-1}$	-0.003***	-0.004***	-0.002***	-0.003***
	(-3.205)	(-4.282)	(-2.689)	(-3.824)
$Female_{t-1} \times Eindex_{t-1}$	0.003	0.004	0.004	0.005
	(0.682)	(0.906)	(1.098)	(1.246)
Intercept	0.251***	0.219***	0.243***	0.289***
	(14.030)	(5.098)	(11.883)	(6.733)
Observations	28,389	28,389	28,389	28,389
Adjusted-R^2	0.051	0.097	0.031	0.120
Control variables	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes

Table 11. CEO gender versus CFO gender

Herein, we report the regression results for the relationship of corporate debt structure with CEO and CFO gender. Our sample pertains to FYOs for all variables (no data missing) for the 1993–2021 period. Our dependent variables are the firm leverage measures $BLev_t$ *and* $MLev_t$. Our independent variables are $CFOGender_{t-1}$, $Female_{t-1}$, and $CFOGender_{t-1} \times Female_{t-1}$. $CFOGender_{t-1}$ equals 1 if a company has a female CFO; it is 0 otherwise. $Female_{t-1}$ equals 1 if a company has a female CFO; it is 0 otherwise. See Equation (3) for the control variables. For conciseness, we omit the coefficients for the control variables as well as those for the fixed effects of SIC code and year. Appendix A provides a full definition of every variable. The parenthetically reported t-values are in accordance with double-clustered standard errors for year and firm (Petersen, 2009). *, **, and *** = statistically significant at the levels of 10%, 5%, and 1%, respectively.

	$BLev_t$			$MLev_t$		
	(1)	(2)	(3)	(4)	(5)	(6)
$CFOGender_{t-1}$	-0.015***	-0.015***	-0.013**	-0.007*	-0.019***	-0.020**
	(-2.639)	(-2.578)	(-2.258)	(-1.735)	(-3.097)	(-2.701)
$Female_{t-1}$		-0.018**	-0.015*		-0.008*	-0.014**
		(-2.494)	(-1.910)		(-1.995)	(-2.255)
$CFOGender_{t-1} \times Female_{t-1}$			-0.021			-0.018
			(-1.026)			(-0.817)
Intercept	-0.023	-0.016	-0.015	0.169**	0.148***	-0.027
	(-0.417)	(-0.298)	(-0.282)	(2.375)	(3.041)	(-0.544)
Observations	16,795	16,795	16,795	16,795	16,795	16,795
Adjusted-R^2	0.227	0.227	0.227	0.256	0.323	0.257
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 12. Additional control variables

Herein, we show the regression results for the relationship of female CEO gender with corporate debt structure, and additional variables are controlled. Our sample comprises FYOs for every variable (no missing data) for the 1993–2021 period. Our dependent variables are the firm leverage measures $BLev_t$ and $MLev_t$. Our independent variable is $Female_{t-1}$, which equals 1 if a company's CEO is a woman; it is 0 otherwise. In addition to the control variables in Equation (3), we control for financial analyst coverage (*Analyst*), institutional ownership (*Ownership*), CEO fixed compensation (*CEOFixed*), CEO tenure (*CEOTenure*), firm efficiency (*Efficiency*), and managerial ability (*Mascore*). See Equation (3) for the other control variables. For conciseness, we omit the coefficients for the other control variables as well as those for the fixed effects of SIC code and year. Appendix A provides the full definition of every variable. The parenthetically reported t-values are in accordance with double-clustered standard errors for year and firm (Petersen, 2009). *, **, and *** = statistically significant at the levels of 10%, 5%, and 1%, respectively.

	$BLev_t$ (1)	$MLev_t$ (2)
$Female_{t-1}$	-0.028***	-0.029***
	(-3.134)	(-3.328)
$Analyst_{t-1}$	0.001***	0.000
	(4.082)	(1.644)
$Ownership_{t-1}$	-0.024***	-0.017***
	(-4.173)	(-3.043)
$CEOFixed_{t-1}$	0.005	-0.001
	(0.754)	(-0.161)
$CEOTenure_{t-1}$	0.000	0.000
	(0.752)	(0.714)
$Efficiency_{t-1}$	-0.008	-0.015*
	(-0.960)	(-1.768)
$Mascore_{t-1}$	0.021	0.013
	(1.630)	(1.033)
Intercept	0.250***	0.321***
	(5.233)	(6.889)
Observations	24,117	24,117
Adjusted-R^2	0.163	0.176
Control variables	Yes	Yes
Industry fixed effects	Yes	Yes
Year fixed effects	Yes	Yes

Table 13. Subsample time periods

Herein, we show the regression results for the relationship of female CEO gender with corporate debt structure over different subsample time periods. Our sample data comprise FYOs for each variable (no missing data) for the 1993–2021 period. Our dependent variables are the firm leverage measures $BLev_t$ *and* $MLev_t$. Our independent variable, $Female_{t-1}$, equals 1 if a company's CEO is a woman; it is 0 otherwise. In Columns 1–4, we partition our sample into crisis (2000–2002, 2007–2008, and 2020–2021) and noncrisis periods. In Columns 5–8, we partition our sample into periods before (1993–2002) and after the SOX Act. In Columns 9–13, we partition our sample into the period before FAS 123R (1993–2006) and after FAS 123R. See Equation (3) for the control variables. For conciseness, we omit the coefficients for the control variables and those for the fixed effects of SIC code and year. Appendix A provides the full definition of every variable. The parenthetically reported t-values are in accordance with double-clustered standard errors for year and firm (Petersen, 2009). *, **, and *** = statistically significant at the levels of 10%, 5%, and 1%, respectively.

	Non-crisis period		Crisis period		Pre-SOX		Post-SOX		Pre-FAS 123R		Post-FAS 123R	
	$BLev_t$	$MLev_t$	$BLev_t$	$MLev_t$	$BLev_t$	$MLev_t$	$BLev_t$	$MLev_t$	$BLev_t$	$MLev_t$	$BLev_t$	$MLev_t$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$Female_{t-1}$	-0.022**	-0.020***	-0.035**	-0.043***	-0.041*	-0.037*	-0.018**	-0.019***	-0.061**	-0.054**	-0.018**	-0.021***
	(-2.545)	(-2.676)	(-2.096)	(-2.605)	(-1.668)	(-1.841)	(-2.256)	(-2.702)	(-2.053)	(-2.006)	(-2.155)	(-2.781)
Intercept	0.162***	0.239***	0.363***	0.349***	0.295***	0.242***	0.209***	0.314***	0.242**	0.494***	0.213***	0.334***
	(3.067)	(4.451)	(4.967)	(4.904)	(4.418)	(3.523)	(3.500)	(5.121)	(1.994)	(5.045)	(3.138)	(4.994)
Observations	21,566	21,566	6,823	6,823	8,965	8,965	19,424	19,424	11,230	11,230	17,159	17,159
Adjusted-R^2	0.163	0.174	0.016	0.021	0.073	0.200	0.177	0.179	0.072	0.189	0.130	0.126
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Figure 1. Average corporate debt ratios and the percentage of companies with female CEOs

Herein, we plot the time-series of average corporate debt ratios (*BLev*) and reveal the proportion (%) of companies with female CEOs in our sample, which comprises 28,389 nonfinancial FYOs in ExecuComp for the 1993–2021 period; the sample must not have missing data on CEO gender or corporate debt structure.