The Bond Market Responses to Female CEOs appointment

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Abstract:

In recent years, studies in corporate governance have focused on understanding the effect of CEO gender on firm performance, stock returns and related risks. However, little research been conducted to uncover the effect of CEO's gender on bond performance and debtholders return. Using 65 female CEO appointments and a matching sample of 65 male CEO appointments, we examine whether gender of the newly appointed CEOs affect debtholders' wealth. We conduct a bond event study using the abnormal bond returns measure as proposed by Bessembinder *et al.* (2009) and subsequently refined by Ederington *et al.* (2013). Our results suggested that debtholders' reaction differ significantly to the news of CEOs appointment based on gender. In fact, they react negatively to the appointment of a female CEO and positively to the appointment of male CEO. Our results are robust after controlling for firm, board, bond and CEO characteristics. We believe that the negative reaction to female CEOs appointment might be explained by the fact that such appointments are relatively new, therefore debtholders might have not yet incorporated the largely cited characteristic of female manager's higher inclination to risk aversion as an element of reduced risk.

Keywords: Female CEOs, event study, bond market reaction, bond returns, TRACE

JEL: G12, G14, G30

Section 1: Introduction

In United States, the corporate governance system is based on diffused ownership in which owners have limited control over the firm's operational activities. For instance, shareholders have limited liability over the firm while debtholders have limited holdings of firm stocks. To ensure the sustainability of firms, owners hire managers to control and supervise the operations of firms. However, these managers do not have any major stock ownership. Hence, they are more likely to work less and extract rents and perquisites from firms. As managers start extracting rents from firms, their incentives to maximize firms' value as well as shareholders' wealth fall. This results in agency problem as a conflict of interest appears between managers and shareholders. Such undesirable situation leads to higher monitoring costs, also called agency cost, borne by owners (Jensen & Meckling 1976).

According to the agency theory, the agency costs are costs that firm owners are willing to pay in order to monitor managers (CEO) and to ensure that the incentives of both parties are aligned (Jensen & Meckling 1976). Indeed, there are two types of agency costs, i) the agency costs of equity, which is borne by equity holders and ii) the agency costs of debt, which is borne by debtholders. The agency costs of equity represent the costs incurred by equity holders to ensure that CEOs are taking the necessary risk to maximize their wealth (Mitnick 1973). In contrast, the agency cost of debt is the cost incurred by debt-holder to curb the risk taking nature of managers. They are used to reduce the incentive of CEOs to invest in poor performing project, thus reducing the probability that firm will default. They are also used to reduce the incentives of CEOs to increase risk by reallocating firm wealth from debtholders to equity holders (Wei & Yermack 2011).

Since the "Enron scandal", researchers in finance have investigated different methods to reduce agency costs (Healy & Palepu 2003). Research has been conducted to understand the different possibilities to constrain CEOs' behaviors. For example, researchers studied the constraining effects of institutional investors (Chung *et al.* 2002) and female board presence on the CEOs extractive behaviors (Thiruvadi & Huang 2011). However, if the firms are not able to constrain these extractive behaviors, they might need to opt for an adverse decision i.e., changing the CEO altogether.

Following this stream of research, finance scholars studied the effects of the new appointment of CEOs on investors' wealth. Principally, they studied the responses of the stock market to the appointment of new CEOs and their characteristics. For example, academicians studied the effect of the appointment of CEOs (Lubatkin *et al.* 1989), appointment of outside CEO (Charitou *et al.* 2010) and forced CEOs turnovers (Murphy & Zimmerman 1993; Farrell & Whidbee 2002) on stock returns. The assumption of these studies is that new CEOs appointment conveys information about the future firm performance. Thus, based on the characteristics of the CEOs, shareholders can assess the likelihood of future success and failure of firms (Charitou *et al.* 2010). However, the question with respect to which CEOs characteristics owners use to assess future performance remain unanswered.

Martin *et al.* (2009) responds to this question by testing the effect of the risk taking characteristics of new CEOs on stock returns. Based on the study by Barber and Odean (2001) that states that men are more overconfident than woman, they tested the reaction of stock market to the appointment of female CEOs. They find that risk is significantly lower after the

appointment of female CEOs, supporting the view that the market considers female CEOs as more risk averse compared to their male counterparts. Furthermore, they also find evidence supporting that firms with higher risk are more likely to appoint female CEOs to reduce the element of risk. However, their analysis was only done on the stock market, thus understanding of bond market reaction towards the appointment of new CEOs based on their characteristics i.e. gender, age or education is quite limited.

This paper intend to fill this important gap under the strand of corporate governance literature and shed light on debtholders' reaction to CEOs risk taking abilities, based on gender. In fact, we investigate whether the risk taking characteristics of new CEOs measured by CEO gender has an impact on debtholders' wealth. Research finds that debtholders, like shareholders, are sensitive to changes that alter risk, both upwards or downwards (DeFusco *et al.* 1990; Wei & Yermack 2011). Since CEO gender plays an important role in reducing or increasing risk (Barber & Odean 2001), debtholders. Debtholders are also expected to be sensitive to the gender of newly appointed CEO. However, the direction in which CEO gender affects debtholders' wealth is still subject to empirical examination.

On the one hand, studies suggest that female CEOs might receive a positive reaction from debtholders because they are more risk averse and less overconfident (Martin *et al.* 2009). On the other hand, the token theory suggests that female CEOs might receive a negative reaction from debtholder because female CEOs appointment is still a new phenomenon (Lee & James 2007). We test these two assumptions by investigating the reaction of the bond market towards the appointment of female CEOs.

We conduct this test using the bond event study methodology proposed by Bessembinder *et al.* (2009) and subsequently improved by Ederington *et al.* (2013). This nascent and relatively new methodology permits the measure of abnormal bond returns around an event. Thus, allowing for a test of the bond market reactions towards the gender of the newly appointed CEO. The abnormal bond returns are calculated using data on bond trade from TRACE. The data on bond trade are matched with firms using Compustat and CRSP. The data on female appointment are collected from ExecuComp. The database provides researchers with the date when a new CEO was appointed, when he/she left or when he/she rejoined the firm. For the purpose of our study, we focus on the dates at which a new CEO was appointed. In this analysis, we also controlled for firm, board and CEOs characteristics that differentiate female and male CEOs. In addition to that we also accounted for bond ratings, maturity and other bond characteristics. We used daily data from July 2002 till March 2015 in our analysis.

This paper provides a novel idea because it is the first paper, as we know, to test the effect of female CEOs appointment announcements, specifically on bond market. In fact, the main contribution of this paper is that it directly tests the impact of CEOs risk taking characteristics on the debtholders. In support for the theoretical assumption, we expect to witness a significant reaction of the bond market to the appointment of female CEOs in either direction (positive or negative.

Our results indicate that debtholders react significantly to both male and female CEOs appointments. However, they react differently based on the gender of the new CEOs. We observe that debtholders react positively to male CEOs appointment and negatively to female CEOs appointment. A possible explanation for these results is that the negative reaction to

female CEOs appointment might be explained by the fact that appointment of female CEOs is a new phenomenon. Therefore, debtholders might have not yet incorporate the risk aversion characteristics of female as an element of reduced risk towards their fixed security component of investment portfolio. However, as the number of female CEOs appointment increase the negative reaction is expected to disappear.

The paper is organized as follows. The next section discusses the theory, framework used, and hypotheses development. The third section discusses about the methodology used to test the hypotheses and data collection. The fourth section presents the results from the analysis and fifth section concludes.

Section 2: Literature review and hypothesis development

Debt is an agreement by a creditor to provide funds to a firm under the promise of repayment by the firm according to stipulated criteria. It is an important instrument because it allows firms to raise capital to finance existing operations and new projects. It is a contract enforced through formal mechanism like the legal system, which allows for the compensation of creditors in an event of default.

Debt is also an important device to discipline and control managers' behaviors. First, through the promise of repayment, debt incentivizes managers to invest in profit maximizing projects. The perspectives of future coupon payment and the desire to obtain new debt will push managers to invest in projects that generate enough cash flow to repay debtholders (Wei & Yermack 2011). Second, debt reduces the possibility for managers to use cash flows to extract rent and perquisites. The payment of debt coupon reduces the free cash flows available to the managers, by forcing them to spend the surplus of cash (Jensen 1986). Third, debtholders can also control managers through stringent covenants and stricter enforcement of violation of covenant (Jha *et al.* 2015). They formulate covenants that restrain the risk taking characteristics of managers. They also define covenants that prevent from any reduction in firm value. In addition, in period of distress or after covenants violation, debtholders can indirectly take the control of the firm, since they can exercise their right to liquidate firm. On average, after the occurrence of a covenant violation, the value of firms increases as a result of correctives measures taken by debtholders (Nini *et al.* 2012).

However, while debt provides an important control mechanism, its efficiency is limited. In fact, both debtholders and shareholders have legal claim on firms, but they have different rights. Shareholders are the "residual claimants" of the firm; they hold a claim to the profit of the firm. On the other hand, debtholders have right to fixed payments and can only exercise their control in case of covenant violation or default. The conflicting interests that arise from this difference in rights is called the shareholders-debtholders conflict (Modigliani & Miller 1958; Jensen & Meckling 1976).

The shareholders-debtholders conflict states that the claimants in control might take actions that benefit them to the detriment of the other claimants (Jensen & Meckling 1976). In addition, the shareholders' value theory states that the main purpose of managers is to increase the value of the firm thus maximize the wealth of shareholders, which are the owners of the firms. Shareholders control managers through the board of directors (Danielson *et al.* 2008; Campbell *et al.* 2012). They can incite managers to invest in more risky project to increase their own

profits while extracting wealth from the debtholders who are the beneficiary of fixed periodic interest only. This action will increase the overall firm risk. In addition, the repercussions of any bad performance through reduced firms' cash flows will weigh heavily on debtholders. Since, firms might not be able to repay their debt. Thus to protect themselves against possible transfer of wealth to shareholders, debtholders will be sensitive to any change that may affect the overall risk of the firm (Campbell *et al.* 2012).

Based on the assumptions that executive stock option plans payoffs could incite managers to take additional risk, DeFusco et al. (1990) test the reaction of both the stock and bond market to the approval of an executive stock option plan. They find that bond reacted negatively to the approval, while stock market responded positively, showing support for the notion that debtholders are sensitive to regulatory change that affect risk and a conflict of interest exists between shareholders and debtholders. Following this line of research, Wei and Yermack (2011) test the reaction of debtholders and shareholders to change that leads to reduction of firm overall risk. In fact, the 2007 Securities and Exchange Commission (SEC) disclosure reform requires firms to report CEOs' inside debt holdings, which are CEOs' pensions and deferred compensation. Note, pensions and deferred compensation are important tools to reduce the agency cost of debt in firms. They incite CEOs to take less risk to ensure the payment of their pension and deferred compensation, thus reducing overall firm risk. Wei and Yermack (2011) use the first reports of CEO's inside debt after the 2007 disclosure (SEC) reform to test the debtholders and shareholders reaction to CEOs' inside holding positions. Contrary to DeFusco *et al.* (1990) , they find that debtholders react positively, while shareholders react negatively when the CEOs have large inside debt holdings. This evidence proves that debtholders react positively to any change that reduces risk. In sum, we can inferred from existing research that debtholders are sensitive to change that both reduces and increases risk

Research on stock market finds that new CEO appointment is a type of change that influences risk. As noted earlier, new CEOs appointment conveys information about the future firm performance. It is used as a mechanism to signal future success or failure to stakeholders (Charitou *et al.* 2010). In addition, new CEO appointment leads to change in overall firm risk. In fact, Beatty and Zajac (1987) argue that appointment of new CEO is followed by important shifts in firm's market risk. Delving deeper in this analysis, researchers analyzed different characteristics of the newly appointed CEO that might explain this shift in risk. For instance, academicians studied the effect of appointment of outside CEO(Charitou *et al.* 2010) and forced CEOs turnover. Other Scholars like Martin *et al.* (2009) looked at new CEOs' gender as an important characteristics in explaining the shift in risk. In fact, using gender as a proxy for CEOs risk taking characteristics, they tested the reaction of stock market to the appointment of female CEOs. Their analysis is based on the study by Barber and Odean (2001) that states that men are more overconfident than woman. Note that Barber and Odean (2001) discussed that men are more likely to prefer portfolio of small stocks with higher risk than women. They are also more likely to invest in riskier positions than women. Thus, women will be more risk averse than men. Using this assumption, Martin *et al.* (2009) examined if gender affected market measures of valuation and risk for CEO appointments. Concerning, the valuation results, they did not identify any major differences in the responses for male and female CEOs. However, for the risk measures, they find that risk is significantly lower after the appointment of female CEOs, supporting the view that female CEOs are more risk averse compared to male. Thus, in line with

the arguments above, we can state that gender of the new appointed CEO affect the overall risk of the firm.

Recall that debtholders react to any change that affects overall firm risk. Since, as the literature suggests that gender of newly appointed CEO may affect the overall risk of firm, we believe that debtholders will react significantly to the appointment of new CEOs based on their gender. Thus, we hypothesize the following:

Hypothesis 1(a): Debtholders react to appointment of female CEO

Hypothesis 1(b): Debtholders react to appointment of Male CEO

Hypothesis 1(c): Debtholders react differently based on CEO gender

Nonetheless, the direction of the reaction of debtholders to the female CEO appointment is not clear and subject to empirical questioning. One could argue, following Martin *et al.* (2009), that debtholders will react positively since woman are risk averse, less overconfident and associated with lower risk. However, missing from this assumption is the fact that female CEO appointment is a new phenomenon. Thus, debtholders may have not yet incorporate the appointment of female CEO as an element reducing overall risk. Therefore, they could wrongly interpret the appointment of a female CEO as an expectation of increase in overall risk. Based on the token theory proposed by Lee and James (2007), this wrong interpretation might lead debtholders to react negatively to female CEO appointment, but the negative reaction will be expected to wear off as the number of female CEO increase.

Since, the direction of the reaction of debtholders is undetermined, we develop two hypotheses that can test whether debtholders react positively or negatively to the appointment of female CEO.

Hypothesis 2(a): Debtholders react positively to appointment of female CEO

Hypothesis 2(b): Debtholders react negatively to appointment of female CEO

Section 3: Methodology and Data

Sample

For the analysis, we use the bond event study methodology proposed by Bessembinder et al. (2009) and subsequently improved by Ederington et al. (2013). This relatively nascent methodology permits to measure the abnormal bond returns around an event, thus allowing for a test of the bond market reactions. The abnormal bond returns are calculated using data on bond trade from TRACE. The data on bond trade have matched with their respective firms using Compustat database as we collect our control variables from it. The data on female appointment are collected from ExecuComp. The database provides researchers with the date when a new CEO was appointed, when he/she has left or when he/she has rejoined the firm. For the purpose of our study, we will focus on the dates at which a new CEO was appointed. We also collected data on bond characteristics like coupon payment, time to maturity and bond rating from Mergent FISD. The bond daily data are collected from July 1, 2002 to March 31, 2015 while the

CEOs appointment data are collected from 2002 to 2014. We collected bond dates through the year 2015 because some of the appointments took place in late December 2014. Thus, to calculate the abnormal bond returns and cumulative abnormal bond returns for these 2014 appointments, we needed bond data from the year 2015. We summarize the data sources and how each variable is measured in Table1.

Data collection

Measuring New CEO appointment

The data for new CEO appointment are collected from ExecuComp database. This data provide us the gender of CEOs and date of their respective appointments. It also provides information about the age of the CEOs. We collected data for 65 female CEOs announcements for the period starting from 2002 to 2014, which have data available for their firms on Compustat, CRSP[1] and matching male CEOs appointment. The matching process is explained later in this section. The sample distribution of the female CEOs appointment is reported in Table 2 Panel 'A' reports the distribution of female CEOs appointment by years. Panel 'B' reports the said distribution by industry groups using Fama-French industry classification. Panel 'A' shows that female CEOs appointment has decreased after 2002 all the way till 2009. This followed by a considerable increase in female CEOs appointments in 2010 and particularly in 2011 and 2012. However, the trend seems feeble as female CEOs appointments have again decreased in 2013 and 2014. Panel 'B' shows that female CEOs are most frequently appointed in firms belonging to "wholesale and retail" industry followed by firms in "business equipment" and "manufacturing" industries.

Using the female CEOs appointment data, we generated a matched sample of male CEOs appointments. We matched the firms using the industry classification, and firm's total asset for the last fiscal year prior to the appointment of the new CEOs with a tolerance level of plus/minus 40 percent. Then, we subsequently identified the closest match based on the total assets for each observation, thus obtaining only one matched male CEO appointment for each 65 female appointments.

Bond database description

We collected the bond transaction dataset for the period of July 1, 2002 to March 31, 2015 from TRACE. TRACE is a database in WRDS that report information concerning the individual bond trades. It was first introduced in July 1, 2002. It provides the bond identification information, date and time of the execution, and bond price and yield for each trade. It also provides intraday data which allows researchers to analyze bond for finer periods of time (Bessembinder *et al.* 2009). Following, Bessembinder et al. (2009) cleaning process, we drop the canceled, corrected and commission trades. We also remove the trades categorized as "when issued", "special price", "as of" trades i.e., any trade with special conditions. In addition, we remove all trades under $100,000. We also include bonds that trade at least 100 times from 2002 to 2015. After initial cleaning the resulting bond trade sample contains 27,603,476 trades for 26,305 bonds from 4,422 firms. Note that, as TRACE provides intraday data therefore to compute daily data, we calculated a trade weighted daily price, which is computed by weighing each trade by its trade

[1] Fifteen women CEO announcements were deleted due to lack of data from CRSP and Compustat and 32 women CEO appointments were deleted after matching it with male CEOs announcement.

size. Following this procedure, the total number of bond daily trades becomes equal to 7,583,284 trades.

To get bond characteristics such as coupon payments, time to maturity and bond ratings, we collected bond issues and rating data from Mergent FISD. We restrict the dataset to industrial, non-zero coupon, non-convertible, non-puttable, and US denominated bonds. We also restricted the sample to bonds with $1,000 par value and semi-annual coupon payment that mature between 1 to 50 years. Further, we include bonds which are rated by Moody's or S&P and have not defaulted and without outstanding tender offer.

After matching the Mergent FISD data with the TRACE daily data, the bond daily trade sample eventually contains 2,629,009 trades for 6329 bonds from 1701 firms. Finally, we merged the Mergent FISD/TRACE data with the data on Female and Male CEOs appointment. We obtain 96,638 bond daily trades for 130 firms (65 female and 65 male CEO firms). Table 3 panel 'B' provides a summary statistic of the bonds and issuers characteristics of 130 firms whose female and matching male CEOs are shortlisted through aforementioned procedure.

Measuring Abnormal Bond returns

The main purpose of this paper is to test if debtholders react to CEOs appointment based on gender. To implement this test, we measure the effects of female and male CEO appointment announcements on the firm's bond returns. We estimate the firm abnormal bond returns using the methodology proposed by Bessembinder et al (2009) and Ederington et al (2013). We set the event window and event estimation following Martin *et al.* (2009). However, since bonds do not trade much we increased the estimation window from 200 to 240 days estimation period, which ends in 21 days before the appointment. The daily abnormal bond returns and cumulative abnormal bond returns are calculated for three event windows, which are (-1, +1), (-1, 0), and (0, +1).

We opt for the two-day returns as proposed by Ederington et al (2013) because announcement can occur before, on or after the trading day and the study uses two and three day event windows. Hence, following Ederington et al (2013) we first calculated the bond returns for nth bond from day t-1 to t+1 as under:

$$bond\ return(t-1,t+1)_n = \frac{\left((P_{n,t+1} - P_{n,t-1}\right) + \Delta AI_n)}{(P_{n,t-1} + AI_{n,t-1})}$$

Where AI_n is the accrued interest, $P_{n,t-1}$ is the trade-weighted price of bond '*n*' at event date t-1 and $P_{n,t+1}$ is the trade-weighted price of bond 'n' at day prior to the event date t+1 date. ΔAI_n is the change in accrued interest from *t-1* to *t+1*. The data on accrued interest is calculated using day count basis multiplied by coupon and principal amount as provided by Mergent FISD.

Then we calculated the abnormal bond returns as the difference between the bond returns and the mean returns calculated on 24 rating/maturity benchmark portfolio. Formula for this calculation is hereunder:

$$ABR(t-1,t+1)_n = bond\ return(t-1,t+1)_n - benchmark\ return(t-1,t+1)_n$$

Where '*ABR*' stands for abnormal bond returns. The benchmark returns are calculated using the mean returns on maturity/ratings benchmark portfolios. Following, Ederington et al (2013), we created 24 maturity/ratings benchmark portfolios composed of six rating groups (Aaa and Aa, A Baa, Ba, B, and below B) by using Moody's and S&P ratings, and four maturity groups based on whether the time to maturity of bond is between 1 to 3 years, 3 to 5 years, 5 to 10 years and over 10 years.

Finally, since many firms have more than one traded bond we calculated the firm level abnormal return, for each firm, as the equally weighted average of the bonds' returns.

$$ABR_f = \sum_{i=1}^{b} ABR(t-1, t+1)_n \, w_n$$

Where '*b*' is the number of bonds per firm '*f*' and' *w*' is the price of bond 'n^{th}' divided by the total price of all the bonds for firm 'f'.

Measuring the control variables

To control for the differences between female and male CEOs, we collected data on the firms' board, and CEOs characteristics that differentiate female CEOs from matching male CEOs. In fact, to control for firm characteristics, we collected data on total assets, asset turnover, return on asset (ROA), leverage, book to market ratio and firm age for the last year prior to the CEO's appointment. To control for board characteristics, we collected data on board composition, and female board presence. Further, for controlling CEOs' characteristics, we collected the data on CEO duality and CEO age. The data on total assets, asset turnover, return on asset (ROA), leverage, book to market ratio and CEO's age is collected using Compustat. The data on board composition, CEO duality and female board presence are collected from Bloomberg. Female board presence is computed as a dummy variable that takes '1' if there is a woman on the board or '0' otherwise. CEO duality is also a dummy variable that take '1' if the CEO is also appointed as chairperson or '0' otherwise. The board composition is computed as the proportion of non-executive directors. We also controlled for bond characteristics using maturity, offering yield, offering amount and ratings of the bond owned by the male and female CEOs sample. Note that, the alphabetical ratings were converted into numerical ratings (see table1, panel 'A')

Methodology

We conduct both a univariate and a multivariate analysis. First, using the event study methodology proposed by Bessembinder et al. (2009), we estimate the abnormal bond returns and cumulative abnormal bond returns for the female CEOs appointments. We test the significant of these abnormal bond returns and cumulative abnormal returns using t-statistics and Wilcoxon signed rank test. It is necessary to use the signed rank test because as discussed by Bessembinder et al. (2009) and Ederington et al (2013), bond returns have high heteroscedasticity. In fact, each firm has many different bonds based on maturity, ratings, yield and other bond characteristics. Moreover, bond returns are highly volatile. Thus, parametric test like t statistics might lead in bias estimates. The use of a non-parametric test like the signed rank test permits to alleviate any bias. Then we compare the mean and median of abnormal bond returns and cumulative abnormal bonds returns generated upon the appointment of female CEO

with male CEO appointment using t-statistics and Wilcoxon sign rank tests. Afterward, for further analysis, we conduct a multivariate regression to control for firm, board, and CEO characteristics that might affect the reaction of debtholders to female or male CEOs appointments. The multivariate regression equation is as followed as

$$CAR_f = \alpha + \sum_{j=1}^{6} \beta_j \ (FC) + \sum_{k}^{2} \beta_k \ (BC) + \sum_{l}^{2} \beta_l \ (CEOC\ ) + \sum_{l}^{4} \beta_l \ (BoC) + \beta_g (Gender)$$

Where CAR_f represents the cumulative abnormal return for the entire sample of 130 firms where male and female CEOs are appointed. FC represents the different characteristics of the firm e.g., total assets, return on assets, leverage, and book to market ratio, asset turnover and firm age. BC represents the board characteristics like female board presence and board composition. *CEOC* represents the CEO characteristics i.e., CEO age and CEO duality. Finally, BoC represents the bond characteristics measured by offering yield, offering amount, maturity and ratings. Note that gender is a dummy variable that take 1 if the new CEO is a female and 0 otherwise.

Section 4: Results

Descriptive statistics

Table 3 panel 'A', presents some basic comparison of the firms' characteristics of two groups. We compared them using total assets, asset turnover, return on asset, leverage, book to market ratio, and firm's age. We report the p-values of mean and median difference of the two groups using t-statistics and Wilcoxon signed-rank test statistics, respectively. From the mean comparison, we observe that there is no significant difference between the firms that appoint female CEOs and male CEOs with the exception of total assets. This substantiate the successful matching of firms from two groups giving us reasons to believe that we are engaged in apple to apple comparisons which is key to our analysis and obtaining accurate results. We find that firms that appoint female CEOs tend to have higher total assets compared to the firms, which appoint male CEOs. From the median comparison, we observe that there is significant difference between total assets and leverage between the two groups. These median differences indicate that female appointing firms are larger and more levered than the firms, which appoint male CEOs.

Next in table 3 panel 'B', we compared two groups based on board and CEO characteristics. From this comparison, we observe that female CEOs, on average, are younger than male CEOs. Female CEOs on average are 3 years younger than the male CEOs [56 compared to 59]. We also compare the CEOs based on CEO duality, board composition and female board presence. Note that we collected the data on these variables from Bloomberg. Since they are missing for many observations, we provide the comparison only for the observation for which there is no missing data. For CEO duality, we find that female CEOs are more likely to be chosen as board chairperson. In fact, we find that on average 42 percent of the female CEOs in our sample are both CEO and chairperson compared to 34 percent for the male CEOs. For board composition, we find that they are no significant differences between the two groups. This evidence shows that the number of non-executive CEOs present on the board is not affected by the gender of the CEO. For female board presence, we find that firm with female on the board are more likely to hire a female CEOs than a male CEO. We find that on average 96 percent of the firm that

appointed a female CEOs also had a female in the board compared to 74 percent for the male sample (significant at 1%).

Finally in table 3 panel 'C' we observe that two groups differs significantly based on their bond characteristics. We find that firms that appoint female CEOs tend to offer bonds with longer maturity and higher yield than firms that appoint male CEOs. On average, firms that appoint female CEOs have an offering yield of 33 basis points higher than firms that appoint male CEOs. Their offering amount is 5% higher than the offering amount of firms which appoint male CEOs [(656,221-624,360)/624,360]. Their average bond maturity is also 3% higher than that of issued by the firms which appoint male CEOs.

To compare the ratings of the bond of female and male group, we convert the alphabetical ratings in numerical value. We assign the numbers to each rating following the process described in table 1 panel 'A'. We find that bond owned by firms that appoint female CEOs receive better ratings than bond owned by firms that appoint male CEOs. In fact, on average, bonds from firms appointing female receive a numerical value of 2.10, while bonds from firm appointing male CEOs receive a numerical value of 2.54. Translated in alphabetical letter (after rounding off), we can inferred the bond from the female CEOs sample receive approximately a rating of A, while the ones from the male CEOs receive approximately a rating of Baa. In sum, the comparison of firms that appoint female and male CEOs based on bond characteristics shows that firms appointing female CEOs provide better bonds, based on yield and other characteristics, than firms, which appoint male CEOs. This is quite in line with the argument that female managers might have lesser appetite for risk compare to their male counterparts. It is apparently clear from our analysis that risk averse firm, proxy by better bond characteristics in terms of high ratings etc., are more likely to appoint the managers who embrace their risk mitigation policy which in this case are female CEOs.

Event study

Table 4 presents the results from the event study. In panel 'A', we present the mean abnormal return for both groups for 10 days before and after the appointment of CEOs. In panel 'B', we present the cumulative abnormal returns for three event windows, (-1,+1), (-1,0) and (0,+1). For the mean abnormal return, we find mixed reactions in the days prior and after the appointment of both male and female CEOs.

For the female CEOs, we find positive and abnormal returns on the tenth day before the appointment (-10 under Day in table 4), followed with significantly negative abnormal returns in 9th day prior to the appointment. However, we do not find significant reaction on the day of appointment and mixed reaction the days after. We also observe the same mixed pattern with the daily abnormal returns for male CEOs. This mixed pattern makes it difficult to differentiate if the abnormal returns are due to the actual CEOs appointment. One of the reasons why we observe this pattern is that appointment of new CEOs mainly occurs when firms financial and business situation have already changed. Thus, debt-holders already sense an increase in firm risk and incorporate it in the bond returns prior to the appointment of the CEOs. In addition, the mixed results after the CEOs appointments are due to the supplementary information concerning the financial and business situation of the firms that are announced later (Martin *et al.* 2009). To get a better picture of the reaction of debt-holders to the appointment of new CEOs, we focus on the interpretations of the cumulative abnormal returns, reported in panel 'B' table 4.

Panel 'B' of table 4 shows that debt-holders on average react negatively to the appointment of female CEOs. The mean cumulative abnormal return for event window (-1,+1) for female CEOs is -2.56 percent and the median is -2.85 percent, both of which are significant at 1%. This evidence support hypothesis H1(a), which states that debt-holders react to female appointment. For the matched male CEOs, we find that debt-holders reacted positively to the appointment of a male CEO. The mean cumulative abnormal returns for male CEOs appointment is 8.29 percent and the median is 3.72 percent both significant at 1%. This evidence shows that debt-holders perceive the appointment of male CEOs quite favorable and positive. Thus, we find support for hypothesis H1(b), which states that debt-holders react to the appointment of male CEOs.

Thus these results suggest, as hypothesized, debt-holders react to the appointment of male and female CEOs. However, the issue central to our analysis is to test whether debt-holders react differently to new CEOs appointment base on gender. A brief look at the cumulative abnormal returns of female CEOs and male CEOs shows that debt-holders react quite differently to CEO appointments based on CEO's gender. In fact, we observe that the cumulative abnormal returns for the period leading to the appointment [event window (-1, 0)] are negative and significant at 1% level for both female and male CEOs. This might be due to the fact that investors are quite fearful and meticulous prior to the appointment of new CEO. However, after the appointment [event window (0,+1)], we again find a significant negative reaction for female CEOs group and positive for male ones. Consistence with hypothesis H1(c), we find these two groups show significant difference in term of debt-holders reactions. Thus, it is substantiated that debt-holders reactions to CEO appointments, is biased by gender.

Concerning the hypotheses on the direction of debt-holders reaction, results provide support for the view that debt-holders react negatively to female CEO appointment [H2(b)] and reject the view that debt-holders react positively to female CEO appointment [H2(a)]. In fact we find that though debt-holders react to both male and female appointment but their reactions significantly differ based on CEO gender. These results convey information about female CEOs appointment as an investors' expectation of increase in firm risk. This result is in line with the token status theory of female CEOs appointments proposed by Lee and James (2007), which states that negative reaction to female CEOs appointments is because female CEO appointment is a relatively new phenomenon. This might suggest that investors have relatively less confidence in leadership skills of female CEOs compared to their male counterparts in running the firm operations smoothly. However, we believe as the number of female CEOs will increase, the negative reaction might disappear. Therefore, we can assume that the negative reaction of debt-holders is due to the fact that, they do not yet know how to incorporate the risk aversion characteristics of female in future firm risk.

Multivariate analysis

Since the firm, bond, CEOs and board characteristics may have an important impact on debt-holders reactions. We conduct a multivariate analysis to control for the impact of these characteristics on the reaction of debt-holders, measured in term of cumulative abnormal return, to both female and male CEO appointment.

For the firm characteristics, we control for return on asset, leverage, book-to-market ratio, asset turnover and firm age. For the bond characteristics, we control for offering yield, offering amount, maturity and ratings. For CEO characteristics, we control for CEO age and CEO duality.

Finally, for board characteristics, we control for board composition and female on board. To measure the impact of the appointment of female CEO on debt-holders reaction, we include a dummy variable called gender that takes 1 when the CEO is a female and 0 otherwise. The analysis is done using the cumulative abnormal returns from the event window (-1, 1).

To implement our multivariate analysis, we use a regression with clustered standard errors to account for heteroscedasticity. In fact, as discussed by Ederington et al (2013) bond returns have high heteroscedasticity, the use of a parametric test e.g. OLS regression might lead to bias estimates. Therefore use of regression with clustered standard errors seems to be a mandatory choice for us.

The results from this multivariate analysis are reported in table 5. Model 1 represents the regression with the cumulative abnormal bond returns as dependent variable and gender as the only independent variable using the event window(-1,1). Model 2, 3, and 4 represent the regressions when we respectively include firm characteristics, bond characteristics and board characteristics as independent variables. Consistent, with the results from the event study, we find that the coefficient for gender is negative and significant for all the regressions even after adding the firm bond, board and CEO characteristics (significant at 1%). These results provide additional support for the reaction of debt-holders to appointment of CEOs. In fact, they show that gender plays an important role in determining the reaction of debt-holders to CEOs appointment, thus supporting H1(c). However, it again depicts that debt-holders do not react positively to female CEOs appointment, thus supporting H2 (b).

Section 5: Implications

This investigation has important implications for researchers and practitioners. First, it shows that debtholders might misinterpret the impact of the appointment of female CEOs on firm future performance. In fact, contrary to the well-developed literature that assert appointment female CEOs lower firm overall risk (Barber & Odean 2001; Martin *et al.* 2009), debtholders seems to believe that appointment of female CEOs will increase firm overall risk. This different interpretation of the impact of appointment female CEOs is probably because they might not trust in the leadership skills of female CEOs. This is a challenge for female CEOs as they have to establish a track record of superior leadership skills.

Second, the negative reaction of debtholders to female CEO appointment might also affect the future borrowing costs of firms. Fundamentally, reduction in bond prices around female CEOs appointment raises the borrowing costs of the firm by signaling poor future performance of these firms. Thus, to protect their investment against the increase probability of default of firms with female CEOs, debtholders will provide tighter debt contracts (Nini *et al.* 2012; Jha *et al.* 2015). They will increase interest rates, provide tighter covenants and are more likely to liquidate defaulting firms.

Our findings also have important implications on credit default swap's (CDS) risk premia traded on the bonds of firm that appoint female CEO. Theoretically, CDS spread and bond prices are inversely related which means that after the announcement of female CEO appointment CDS prices on their issued bonds should inflate. Because CDS market is quite efficient and liquid this

might result in generating abnormal profits for protection sellers of CDS referencing bonds of firm which has appointed female CEO. Opposite is true for male CEO appointed firms as higher prices of their bonds (lower CDS spread), around the event, might result in over insurance behavior of creditors which leads to empty creditor problem (Hu & Black 2008) and detriments social welfare by strengthening creditors incentives to enforce bankruptcy on referenced entities.

Section 6: Conclusion, Limitations and Future research

This paper investigates the reaction of debt-holders to new CEOs appointment. Especially, it tests if debt-holders' reaction to new CEOs appointment is based on the gender of the newly appointed CEO. Note that there is little to no empirical research has been conducted to test the impact of newly appointed CEOs gender on debt-holders reactions. This study use insights from agency theory to empirically and theoretically test the impact of CEOs gender on debtholders' reactions. We contribute to the existing literature on debt-holders reactions and new CEOs appointment by, first, determining the reaction of debt-holders using the novel bond event study methodology proposed by Bessembinder *et al.* (2009). Second, we perform a multivariate regression after controlling for firm, bond, board and CEOs characteristics that might effectively result in debt-holders reaction to new CEOs appointment, thus affording sufficient evidence in favor of the reliability of these results.

We analyze the bond data from July 1, 2002 to March 31, 2015 for 65 female CEOs appointment and 65 matched male CEOs appointment. Our results indicate that debt-holders react to both male and female CEOs appointment. However, they react differently based on the gender of the new CEOs. We observe that debt-holders react positively to male CEOs appointment and negatively to female CEOs appointment. A possible explanation for these results is that the negative reaction to female CEOs appointment might be explained by the fact that appointment of female CEOs is a new phenomenon. Debt-holders have not, yet, incorporated the risk aversion characteristics of female as an element to reduced risk. Another probable explanation is that market participants might not be confident about leadership skill set of female manager yet. However, as the number of female CEOs increase the negative reaction will tend to disappear.

Since, our study is a novel attempt to understand the reaction of debt-holders to the appointment of female CEOs, a number of limitations need to be considered when interpreting the results. First, two main limitations of this study are the heteroscedasticity in bond returns data and the infrequent trading of bonds. In fact, bonds differ within firms based on maturity, rating, yield and other variables and they are more volatile. Thus, omission to control for heteroscedasticity will likely to lead to mis-specified parametric tests. Moreover, as bonds trade less frequently –since returns calculation need price for at least two days returns– it is quite difficult to compute the returns for all available firms. To resolve these issues, Ederington et al. (2013) proposed to compute the bond returns as two days returns standardized by standard deviation of returns. They also propose to broaden the event window returns using price and give more weight to the observations near the event date. Future studies can retest the impact of newly appointed CEOs gender on debt-holders' reaction using the improved methodology proposed by Ederington et al. (2013).

Second limitation pertains to the limited availability of data on CEOs and board characteristics. In fact, since the analysis collected the CEOs appointment data using secondary source, we are not able to get more information on CEOs characteristics like whether it was an outside appointment or forced appointment. In addition, we used Bloomberg to collect the board characteristics data. While Bloomberg provides data for board characteristics, however there are many missing observations. The non-availability of data for some of the observations may foster measurement error or misspecification of the model. Further research should hand collect the data on CEOs and board characteristics from firms' annual reports to avoid any possible mis-measurement.

This study also provides future research opportunities since it raises question concerning the impact of gender of newly appointed CEOs on the overall firms' risk. In fact, our theoretical argument was based on the assumption the gender of newly appointed CEOs affect firm overall risk. In fact, since female CEOs are perceive as risk averse, they might lead to reduction in firm overall risk. Therefore, debt-holders should react positively to their appointment. However, our analysis showed that debt-holders react negatively to their appointment, meaning they view the appointment of a female CEO as an expectation of increased firm's future risk. A better method to properly understand the link between firm risk, CEO gender and debt-holders' reaction must incorporate the control for market risk and firm's idiosyncratic risk. Future research should estimate and control market risk and firm idiosyncratic risk to test that how risk affects the relationship between CEOs gender and debtholders reactions.

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Table1: Description of Variables		
Variables	Sources	Definition
Panel A: Bond Price and Bond Characteristics		
Bond price	TRACE	The reported bond price for each bond trade transaction
Maturity	Mergent FISD	Date that the issue' s principal is due for repayment
Bond ratings	Mergent FISD	Moody's and S&P ratings: the ratings were converted into numerical ratings using the following values 1 for Aaa and Aa ratings 2 for A ratings 3 for Baa ratings 4 for Ba ratings 5 for B ratings 6 for below B ratings
Offering yield	Mergent FISD	Yield to maturity at the time of issuance
Offering amount	Mergent FISD	The par value of debt initially issued
Panel B: Firm Characteristics		
Total Assets	Compustat	Number of assets in a firm reported in millions of dollars
Asset Turnover	Compustat	Sales divided by total assets.
Return on Asset	Compustat	EBITDA divided by total assets.
Leverage	Compustat	Long term debt divided by total assets
Book to Market ratio	Compustat	Market price divided by book value per share.
Panel C: Event date and CEO characteristics		
CEO appointment date	ExecuComp	Number of years a stock has been in the CRSP database.
CEO Duality	Bloomberg	Equal 1 if CEO is also appointed as chairperson
CEO age	ExecuComp	CEO’s age at the time of appointment.
Panel D: Board characteristics		
Board Composition	Bloomberg	Proportion of non-executive directors
Female Board presence	Bloomberg	Equal 1 if there is a female on the board and 0 otherwise

Table 2 Sample Distributions

Panel A: Sample Distributions by Fiscal Year

Fiscal Year	Number of Appointments	Percent of Appointments
2002	7	10.61
2003	4	6.06
2004	2	3.03
2005	4	6.06
2006	5	7.58
2007	5	7.58
2008	3	4.55
2009	4	6.06
2010	7	10.77
2011	10	15.15
2012	8	12.12
2013	4	6.06
2014	2	3.03
Total	65	100

Panel B: Sample Distributions by Fama-French Industry classification

Industry Description	Number of Appointments	Percent of Appointments
Consumer Nondurable	5	7.58
Consumer Durable	2	3.03
Manufacturing	9	13.64
Oil, Gas and Coal Extraction and products	0	0
Chemicals and Allied Products	1	1.52
Business equipment	12	18.18
Telecommunications	1	1.52
Utilities	6	9.09
Wholesale and retail and some services	20	30.3
Finance	4	6.06
Other	5	9.09
Total	65	100

Table 3 - Descriptive statistics						
	Female Sample		Male sample		P value of Difference	
	Mean	Median	Mean	Median	Mean	Median
Panel A: Firm characteristics						
Total Assets ($million)	11,184.91	1,571.094	10,002.04	1,137.118	0.0093***	0.000***
Return on Assets	0.129	0.130	0.136	0.117	0.670	0.332
Leverage	0.166	0.146	0.218	0.178	0.120	0.003**
Book to Market Ratio	0.570	0.558	0.621	0.602	0.653	0.572
Asset turnover	1.25	1.088	1.177	1.054	0.428	0.490
Firm Age	35	24	32	30	0.365	0.712
Panel B: Board and CEO Characteristics						
Female Board	0.961	.	0.749	.	0.00***	.
Board composition	0.865	0.888	0.855	0.875	0.10	0.735
CEO duality	0.425	.	0.343	.	0.06**	.
CEO age	56	56	59	60	0.01***	0.006***
Panel C: Bond Characteristics						
Yield	5.40%	5.16%	5.07%	5.55%	0.000***	0.000***
Amount	656,221	550,000	624,360	500,000	0.000***	0.000***
Maturity	7.004	6	6.831	5	0.000***	0.000***
Ratings	2.10	2	2.54	3	0.000***	0.000***

*** significant at the 1% level
** significant at the 5%level
* significant at the 10% level

Table 4: Impact of CEO Appointment on Firm abnormal bond returns

Panel A: Daily Abnormal Returns (in percent)

	Female sample		Male sample	
Day	Mean	Median	Mean	Median
-10	0.891***	1.703***	1.152***	0.114
-9	-0.772***	-0.766***	-0.817***	-0.911**
-8	-0.483***	-0.354***	-0.991***	-1.148***
-7	-0.643***	-0.725***	-0.631***	-0.771**
-6	-0.995***	-0.853***	-0.257	-0.598*
-5	-0.222***	-0.305***	-0.479***	-1.079**
-4	-0.800***	-1.176***	0.476	-0.422
-3	-0.868***	-1.029***	0.161***	-0.807***
-2	-0.468***	-0.502***	0.119***	-0.421**
-1	-0.857***	-0.866***	0.132	-0.285
0	-0.269	0.469	-0.711***	-0.769***
1	0.502	-0.764	-0.857***	-0.795***
2	1.300***	0*	-0.718***	-0.647***
3	-0.293***	-0.371***	0.768***	-0.601***
4	-0.471***	-0.449***	-0.361	-0.758*
5	1.419***	-0.391	-0.836***	-0.718***
6	-0.352**	-0.424	0.378	-0.386
7	-0.828**	-0.841***	-0.803***	-0.935***
8	-0.554***	-0.906**	-0.870***	-0.884***
9	1.392***	0.635**	-0.677***	-0.896**
10	-1.488***	-1.647***	-0.491	-0.850**

Panel B: Cumulative Abnormal Returns (in percent)

	Female sample		Male sample		P-values differences	
Event windows	Mean	Median	Mean	Median	Mean	median
CAR (-1, +1)	-2.56***	-2.85***	8.29***	3.72***	0.000	0.000
CAR (-1, 0)	-1.52***	-1.87***	-1.15***	-0.51***	0.000	0.000
CAR (0, +1)	-1.53***	-1.87***	8.29***	3.72***	0.000	0.000

*** significant at 1%

** significant at 5%

* significant at 10%

Table 5: Multivariate regressions				
Variables	Gender only	Firm characteristics	Firm and bond characteristics	Firm, bond & board characteristics
Log of asset		2.92076	3.04343	3.33790
		(2.015)	(1.471)	(2.036)
Return on asset		86.23731**	81.54938	13.85528
		(3.065)	(2.105)	(0.452)
Leverage		17.43965*	22.99121	29.49068**
		(2.923)	(1.566)	(3.639)
Book to Market Ratio		15.89547***	15.77398***	16.58140***
		(5.258)	(6.782)	(4.812)
Asset Turnover		13.38223***	17.08745***	15.56667**
		(5.120)	(5.629)	(4.069)
Firm age		0.15538*	0.19740*	0.16150**
		(2.931)	(2.990)	(3.144)
Gender	-10.85929	-11.25986***	-11.73146***	-10.26931**
	(-1.810)	(-5.430)	(-4.331)	(-3.548)
Yield			0.12665	0.02229
			(0.205)	(0.911)
Amount			-0.00000	0.00000
			(-0.002)	(1.118)
Maturity			0.05502	-0.00011
			(1.564)	(-0.875)
Ratings			-0.09430	0.00031
			(-0.078)	(0.033)
CEO Duality				-3.64264
				(-1.375)
Board composition				0.33555
				(1.761)
Female board presence				0.19334*
				(2.879)
Log of CEO age			-22.19895	0.80929
			(-1.137)	(0.142)
Constant	8.29754	-68.77320**	11.43751	-104.99909*
	(1.421)	(-3.534)	(0.114)	(-2.975)
Observations	96,638	96,638	86,610	32,887
R-squared	0.290	0.886	0.910	1.000
Adj. R-squared	0.290	0.886	0.910	1.000
F stat	3.276	18.85	267.7	.

Robust t-statistics in parentheses

*** p<0.001, ** p<0.01, * p<0.05