Gender Diversity in Corporate Leadership: Implications for Risk and Market Behavior

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Declaration

I confirm that this is my own work and the use of all material from other sources has been properly and fully acknowledged.

Loua Deeb

In loving memory of my mother, Golshine

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Abstract

This thesis contributes to the growing literature on gender diversity in corporate leadership by examining its implications for risk and market behavior. Across its three main chapters, the thesis explores different dimensions of gender diversity within executive and boardroom settings. First, I investigate the relationship between board gender diversity and stock price crash risk, using a panel dataset of publicly listed UK firms. The findings reveal that board gender diversity does not have a statistically significant effect on crash risk. Furthermore, I examine the Davies Report as a policy intervention intended to promote female board representation. The results show that the increase in female directors following the report did not lead to a significant change in the association between board gender diversity and stock price crash risk.

Next, I investigate the impact of female CFOs on stock price crash risk using a sample of UK-listed public firms. The analysis reveals a negative and statistically significant association between the presence of female CFOs and crash risk, suggesting that firms led by female CFOs are less likely to experience extreme negative returns. Additionally, I show that this effect is more pronounced in firms characterized by less CEO power, higher levels of information opacity, or greater exposure to risk; conditions under which the role of the CFO in shaping financial transparency and risk management is especially critical.

Finally, I explore how financial markets respond to the appointment of female executives. The results indicate that, on average, neither the bond market nor the stock market exhibit a statistically significant reaction to such appointments. However, further analysis reveals that the bond market responds positively to female outside appointments, suggesting that bondholders may interpret external female hires as a signal of positive organizational change or improved governance.

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CHAPTER 1 Introduction

1.1 Motivation for the Thesis

Traditionally, leadership positions such as Chief Executive Officer (CEO), Chief Financial Officer (CFO), and seats on corporate boards have largely been occupied by men. Over the past few decades, there have been significant efforts, through both voluntary initiatives and regulatory actions, to enhance the presence of women in these roles. For example, among Fortune 500 companies, only one woman held a CEO position in 1998 (Li and Zeng, 2019). As of 2024, women occupy 11.8% of C-suite roles in publicly traded U.S. firms (Chiang et al., 2024), reflecting a steady yet slow progression toward greater inclusion at the highest levels of corporate leadership.

As the number of women in top executive roles has increased, an important question emerges: does this shift in gender representation influence corporate outcomes? A growing body of research has explored whether female executives differ from their male counterparts in terms of risk behavior, decision-making styles, and the extent to which executive gender affects firm performance. While many studies suggest that female leadership is associated with positive firm outcomes, the empirical evidence remains mixed. For instance, some studies link female executives and board members to lower leverage ratios (Faccio et al., 2016; Schopohl et al., 2021), more informative stock prices (Abad et al., 2020; Gul et al., 2011), reduced earnings management (Peni and Vähämaa, 2010), more conservative financial reporting (Francis et al., 2015), and a lower likelihood of engaging in corporate fraud (Cumming et al., 2015; Wahid, 2019). On the contrary, other studies find no significant gender-based differences in risk preferences (Adams and

Funk, 2012; Adams and Ragunathan, 2015) and report no effect of board gender diversity on firm risk (García Lara et al., 2017; Sila et al., 2016).

This thesis builds upon the literature that links executive characteristics to firm outcomes and examines whether gender diversity in corporate leadership has measurable implications for firm risk and market behavior. While prior literature has investigated the impact of gender diversity on firm performance, decision-making processes, and managerial risk preferences, limited research has addressed its effect on extreme downside risk or the capital market response, particularly in the bond market, to changes in executive gender composition.

1.2 Intended Contributions

This thesis contributes to the expanding literature on gender diversity in corporate finance by examining the intersection of gender diversity, financial risk, and market responses. Specifically, it addresses three core research questions across its main empirical chapters:

1. Does board gender diversity, alongside the implementation of the Davies Report, affect stock price crash risk in UK-listed firms?
2. Are firms led by female CFOs associated with lower stock price crash risk in the UK?
3. How does the U.S. bond market respond to the appointment of female CEOs and CFOs, and does this response differ from that of the stock market?

This thesis is structured around three empirical chapters, each focusing on a distinct topic and addressing specific research questions within the relevant literature. Collectively, these chapters provide a comprehensive analysis of critical issues related to gender diversity in corporate finance, with particular emphasis on its implications for financial risk and investor behavior. This thesis makes several significant theoretical and practical contributions to the existing literature. Chapter 2 is the first to examine the relationship between board gender diversity and stock price crash risk within the UK context. The UK offers a particularly valuable case study due to its voluntary governance reforms, most notably the Davies Report, which serve as a quasi-experimental setting for analysis. As firms responded to the report's recommendations by increasing female representation on their boards, this variation allows for an empirical investigation into whether such changes were associated with differences in the likelihood of stock price crashes compared to firms that did not adopt similar reforms. A key contribution of this chapter lies in its main finding: board gender diversity does not have a statistically significant impact on crash risk, even among firms that increased female board representation following the Davies Report. This result invites further investigation, particularly into the extent to which newly appointed female directors are practically engaged in corporate governance and decision-making processes.

Chapter 3 adds to the small but expanding literature on the impact of female CFOs on corporate outcomes. Despite the main role CFOs play in financial reporting and risk management, most studies on gender diversity in corporate leadership tend to focus on the impact of CEOs and board directors, rather than CFOs (Schopohl et al., 2021). This chapter adds to the literature by investigating the role of CFO gender, recognizing the pivotal influence CFOs exert over financial disclosures, earnings management, and corporate transparency (Barua et al., 2010; Francis et al., 2015; Peni and Vähämaa, 2010). These factors are closely associated with stock price crash risk, which often arises from the accumulation and sudden release of previously hidden information. This chapter also contributes to the literature on stock price crash risk and corporate risk-taking by demonstrating that the association between female CFOs and reduced crash risk is context-dependent, and shaped by the broader governance and informational environment. Specifically, this chapter shows that the negative relationship is more pronounced in firms characterized by less CEO power, higher levels of information opacity, or greater exposure to risk. Most notably, this chapter carries important managerial and policy implications, highlighting that merely increasing the number of female executives or appointing women to leadership roles is not sufficient. It highlights the need to create an inclusive organizational environment that enables female executives to exert meaningful influence on firm outcomes through their strategic decision-making and managerial roles.

Chapter 4 contributes to the existing literature on the role of gender-related factors in shaping investor behavior by providing the first empirical evidence on the bond market reaction to announcements of female executive appointments. Utilizing a unique dataset that captures detailed appointment characteristics, this chapter offers practical insights for both investors and firms, highlighting how the gender and nature of executive appointments can shape market perceptions. The findings suggest a positive and statistically significant bond market reaction to female outside appointments. Moreover, the chapter studies whether the bond market response differs from that of the stock market, thereby shedding light on how various segments of financial markets interpret gender-related executive changes.

1.3 Outline of the Thesis

Chapters 2, 3, and 4 constitute the main body of this thesis. Each chapter presents an independent study addressing a distinct yet interrelated aspect of gender diversity in corporate finance, offering novel empirical evidence and contributing original insights to the respective strands of literature.

Chapter 2 investigates the impact of board gender diversity on future stock price crash risk. I begin by outlining the motivation for the study, followed by a comprehensive review of the related literature examining the relationship between board gender diversity and stock price crash risk. I then describe the research design, detailing the data sources, sample construction, and empirical methodology employed. The primary data for this analysis are drawn from BoardEx and Thomson Reuters Datastream databases, yielding a sample of 16,141 firm-year observations spanning the period 1999–2021.

The empirical methodology section outlines the proxies used for the key variables. Stock price crash risk is measured using: the negative coefficient of skewness (NCSKEW) and down-to-up volatility (DUVOL) of firm-specific weekly returns. Board gender diversity is proxied through three measures: (1) the percentage of women on the board, (2) an indicator variable equal to one if there is at least one female director on the board (and zero otherwise), and (3) an indicator variable equal to one if there are three or more female directors on the board (and zero otherwise), capturing the presence of a female group dynamic.

To account for time-invariant unobservable firm characteristics, I employ a firm fixed effects model. I then present descriptive statistics and summarize the main empirical findings. To test the robustness of the results and address potential issues of non-random selection due to confounding variables, I apply a propensity score matching (PSM) procedure and re-estimate the model using a matched sample. Furthermore, I exploit the introduction of the Davies Report (2011) as a quasi-natural experiment by employing a difference-in-differences (DiD) approach, comparing changes in crash risk among treated firms before and after the intervention relative to a control group of unaffected firms.

Additionally, I explore whether executive-level gender diversity, specifically the presence of female CFOs or CEOs, influences the relationship between board gender diversity and crash risk. Finally, to assess the potential immediate effects of gender diversity on board decisions, I estimate a model in which crash risk and gender diversity measures are aligned within the same period.

Chapter 3 examines the impact of female CFOs on stock price crash risk. After a brief discussion of the study's motivation, the chapter reviews prior literature on the relationship between female CFOs and stock price crash risk, identifying key gaps and areas of interest. Based on this foundation, I derive the main research questions and formulate testable hypotheses.

The data section details the construction of the sample, which is drawn from two primary databases: BoardEx and Thomson Reuters Datastream. By combining these sources, I build a final sample comprising 11,347 firm-year observations from publicly listed firms on the London Stock Exchange, covering the years 2000 to 2021. The difference in the time periods covered in Chapters 2 and 3 is due to data availability.

The chapter then introduces the econometric model and methodology employed, outlining the dependent and independent variables as well as the control variables included in the analysis. Following this, I present the summary statistics and report the main empirical findings.

To deepen the analysis, the chapter investigates whether specific conditions or environments moderate the relationship between female CFOs and crash risk. In particular, I examine the moderating effects of CEO power, information opacity, and firm risk, assessing whether these factors strengthen or reduce the CFO's influence on crash risk.

To assess the robustness of the main results, I conduct several additional analyses. To address concerns about potential selection bias, I implement a propensity score matching (PSM) approach, re-estimating the model on a matched sample of firms with female CFOs and comparable firms with male CFOs based on observable firm-level characteristics. Furthermore, to mitigate concerns about time-varying heterogeneity across industries or firm-specific unobservable factors, I employ a high-dimensional fixed effects model, incorporating both firm fixed effects and interacted industry-year fixed effects to enhance the validity of the estimated results.

Chapter 4 serves as the final empirical chapter of this thesis and employs an event study framework to examine the bond market's reaction to the announcement of female executive appointments. The chapter begins by introducing the motivation behind the study and identifying a clear gap in the existing literature, namely the limited understanding of how bondholders react to gender-specific executive appointments. It then offers a focused review of prior research, covering both the bond market's and the stock market's responses to female executive announcements.

Next, the chapter details the sample construction, which relies on a unique hand-collected dataset. The data collection process involved gathering the precise announcement dates of female executive appointments along with detailed appointment characteristics. This includes identifying the gender of the outgoing CEO or CFO to create gender transition groups and collecting data on whether the appointment involved an internal or external hire, as well as whether it was designated as interim or non-interim. To ensure comparability, the female executive sample is matched to a male executive sample. The main data sources used are Dow Jones Newswires, ExecuComp, TRACE, and Thomson Reuters Datastream.

The chapter then explains the bond trades data cleaning process. The final bond sample consists of 271 appointments (83 female, 188 male) covering 53,257 bond trades and 1,277 bonds within an 11-day event window (–5, +5 days) around the announcement date, and 227 appointments (70 female, 157 male) within a narrower (–3, +3 days) window. For cross-market consistency, the equity sample includes 418 executive appointment announcements (128 female, 290 male), but an equity subsample analysis is also conducted using the same 227 events as the bond sample over the (–3, +3) window.

Following this, the chapter describes the methodology used to compute abnormal bond returns, including the steps taken to correct for heteroskedasticity. It also outlines the methodology for calculating abnormal stock returns. Descriptive statistics are then presented, covering the appointment sample, appointment characteristics, and the bond characteristics included in the analysis.

The chapter proceeds to present the main findings, starting with univariate analyses that detects abnormal returns in both bonds and stocks around the announcement date. Results are reported both for the overall sample and for subsamples classified by gender transition groups and appointment characteristics. While the univariate analyses provide valuable preliminary insights, they are limited by their inability to control for confounding factors that may influence investors' reactions. To address this, the chapter concludes with a multivariate analysis, allowing for a more rigorous examination of the determinants of abnormal returns in response to female executive appointments.

Although at the conclusion of each chapter, I summarize the pertinent empirical findings and their key contributions, in Chapter 5, I offer a more comprehensive overview by integrating the results and conclusions from all chapters. The thesis closes with a discussion of its limitations and suggests potential directions for future research that could expand upon the findings presented in this work.

CHAPTER 2 Board Gender Diversity and Stock Price Crash Risk: Evidence from the UK

2.1 Introduction

For a considerable period, women have been underrepresented on corporate boards (Singh and Vinnicombe, 2004). To address this issue, various initiatives have been implemented to increase the number of female directors on corporate boards and promote gender diversity in leadership positions. For instance, many countries have introduced quotas or targets for female representation on boards. These range from hard quota regulations in countries like Belgium and France, where non-compliance can result in penalties and other restrictions, to softer quotas in Germany and Spain, where laws carry weak penalties or no sanctions at all (Fernández-Méndez and Pathan, 2023). Other initiatives are in the form of voluntary recommendations, such as those in the UK. These efforts have shown some success in increasing female representation on corporate boards and have also introduced a greater diversity of perspectives and skills into decision-making processes, impacting firms' outcomes in various ways.

Initiatives aimed at increasing female representation on boards have led to a substantial body of research on the distinctive characteristics of female directors compared to their male counterparts (Adams and Funk, 2012; Sila et al., 2016) and its potential impact on firms. Some believe that these interventions are designed to break the glass ceiling, allowing skilled females to reach leadership positions. Others argue that corporate boards are initially formed to maximize firm outcomes, and introducing such initiatives could result in the appointment of less qualified women, thereby reducing the effectiveness of the boards (Demsetz and Lehn, 1985). These varying perspectives and inconclusive empirical findings indicate the need for further research to better understand the underlying mechanisms between board gender diversity and economic outcomes for firms.

In this study, I examine the effect of board gender diversity on stock price crash risk. Stock price crash risk refers to a sudden sharp decrease in a firm's stock price, often caused by managers withholding negative information from shareholders and the public, a practice known as managerial bad-news hoarding (Jin and Myers, 2006). Introducing female directors on corporate boards can potentially reduce this risk by enhancing corporate governance and improving management practices. Female directors bring diverse perspectives, which can lead to more effective risk management (Chen and Gavious, 2016; Khaw et al., 2016; Shin et al., 2020), as well as enhanced transparency and reduced information asymmetry (Abad et al., 2020; Pucheta-Martínez et al., 2016). In this study, I further exploit the introduction of the Davies Report (2011), which aimed to increase the percentage of females on FTSE350 boards and examine its potential effect on stock price crash risk. Using a sample of 16,141 firm-year observations that cover UK listed non-financial companies over the period 1999-2021, I find no statistically significant association between board gender diversity and stock price crash risk. This result is robust across several methods, including propensity score matching (PSM), difference-in-differences (DID) analysis for a subsample of FTSE350 firms, and when examining settings where women hold CFO or CEO positions.

This essay offers several significant contributions to the existing literature, both theoretically and practically. First, it adds to the emerging body of research on board gender diversity and stock price crash risk (Jebran et al., 2020; Qayyum et al., 2021; Wattanatorn and Padungsaksawasdi, 2022), by being the first to explore this relationship within the UK context. Unlike earlier studies that primarily focused on other regions, such as China and the United States, this study investigates the unique characteristics of the UK market, where distinct regulatory frameworks and corporate governance practices are in place. In addition to this, a notable contribution of this essay lies in its empirical findings, which suggests that the impact of board directors on stock price crash risk does not vary based on gender. This finding aligns with the work of Adams and Ferreira (2009), who argue that gender-based differences commonly observed in broader social contexts may not manifest in the same way within the highest levels of corporate governance. My findings suggest that inherent gender differences may not play a pivotal role in the strategic decision-making process, particularly when managing significant corporate risks like stock price crashes.

The remainder of the chapter is structured as follows. Section 2.2 reviews the literature on board gender diversity and stock price crash risk. Section 2.3 describes the dataset and explains the baseline methodology. Section 2.4 provides descriptive statistics and main empirical findings. Section 2.5 tests the robustness of my results. Section 2.6 provides some concluding remarks.

2.2 Literature Review

2.2.1 Board Gender Diversity

A substantial and expanding body of literature indicates that the presence of female directors can significantly impact organizational outcomes (e.g., Adams and Ferreira, 2009; Brahma et al., 2021; Lenard et al., 2014; Jizi and Nehme, 2017). Various theories have been proposed to explain the influence of board gender diversity on firm outcomes, with agency theory being particularly relevant to this research. In fact, gender-diverse boards can mitigate agency costs that arise from conflicts of interest between management and shareholders by enhancing the board's monitoring function and effectiveness (Adams and Ferreira, 2009; Carter et al., 2003; Terjesen et al., 2016).

Prior research documents that female directors take more active roles on the board (Virtanen, 2012); have better attendance records than male directors (Adams and Ferreira, 2009); and improve the informativeness of stock prices (Gul et al., 2011).

The quality of financial reports is another important aspect from the agency theory perspective. Financial statements disclosed by companies must be clear, reliable, relevant, and transparent (Jonas and Blanchet, 2000) to minimize asymmetric information between stakeholders (Qayyum et al., 2021). Research indicates that gender diverse boards can enhance financial reporting quality and firm transparency. For instance, Wahid (2019) finds that female board members are associated with fewer financial reporting errors and a lower likelihood of engaging in fraudulent activities. Kyaw et al. (2015) shows that females directors reduce earnings management in European countries where gender equality is high. Similarly, Orazalin, (2020) uses a sample of top public companies in Kazakhstan and finds that firms with gender diverse boards are more effective in curbing earnings management practices. Also Harakeh et al. (2019) document a negative association between the presence of female directors on FTSE350 corporate boards in the UK and earnings management. Additionally, using 320 firms from the S&P Small Cap 600, Thiruvadi and Huang (2011) show that the inclusion of female directors on the audit committee restricts earnings management.

Furthermore, the impact of board gender diversity on firms' outcomes is well documented in prior literature. For example, Liu et al. (2014) and Sabatier (2015) show that female directors have a positive impact on firms' economic performance. Lenard et al. (2014), and Jizi and Nehme (2017) also find that female directors contribute to lower variability of firms' stock return. Nielsen and Huse (2010) show that board gender diversity is positively associated with board strategic control.

Research suggests that women directors may bring diverse perspectives to the boardroom, potentially impacting risk-related decisions. However, Adams and Funk (2012) challenge this view, finding that female directors may share similar risk preferences with male counterparts. Earlier research by Eagly and Johnson (1990) supports this, suggesting that individuals in similar organizational roles tend to behave similarly, irrespective of gender. In line with these findings, Sila et al. (2016) report no effect of board gender diversity on firm risk. Likewise, Bugeja et al. (2012) find no significant differences in CEO compensation across genders. They further suggest that women who break through the "glass ceiling" to attain CEO positions receive similar compensation to male CEOs, as they display similar levels of risk aversion and willingness to accept performance-based pay. Adams and Ragunathan (2015) reinforce these conclusions, showing that women in leadership during the financial crisis were not more risk-averse than men, thereby challenging gender-based stereotypes around risk behavior. The varying perspectives and inconclusive empirical results regarding the potential impact of female directors on firm risk outcomes highlight the need for further research to investigate the role of female directors in influencing stock price crash risk.

2.2.2 Stock Price Crash Risk

Recent academic studies in accounting and finance have paid significant attention to the issue of stock price crash risk and its consequences on firms' outcomes. According to Chen et al. (2001), stock price crash risk is defined as the conditional skewness of return distribution, which captures asymmetry in risk. The theoretical framework proposed by Jin and Myers (2006) posits that stock price crash risk is rooted in the agency conflict that arises when managers deliberately conceal unfavorable information for their own benefit. This conflict can result in a heightened risk of a stock price crash when the concealed information is eventually disclosed to the market.

Several studies have provided evidence that information asymmetry, “bad news” hoarding, and the quality of financial reports have a significant impact on the likelihood of stock price crashes. For example, Kim and Zhang (2016) show that firms with more conservative accounting policies have a lower stock price crash risk. Also, Hutton et al. (2009) find that firms that engage in accruals management and conceal information from the public tend to have poor earnings quality and are consequently associated with a higher likelihood of stock price crashes. Additionally, Francis et al. (2016), show that companies that engage in real earnings management are at a heightened risk of experiencing a crash, particularly in the post-Sarbanes-Oxley era.

A growing body of literature has also documented evidence of how corporate governance and board characteristics can influence stock price crash risk. For example, Andreou et al. (2016) have analyzed a diverse range of 21 corporate governance factors, demonstrating that certain elements, such as CEO stock option incentives, transient institutional ownership, and directors holding equity, contribute to an increase in crash risk, while others, including insider ownership, board size, accounting conservatism, and governance policy, lead to a decrease in crash risk. Also, Wattanatorn and Padungsaksawasdi (2022) developed a board effectiveness index, which takes into account several key attributes such as the number of board meetings, the number of board attendances, the expertise of the directors, the size of the board and the number of independent directors. Their findings indicate that an increase in the board effectiveness index is associated with a reduction in firm-specific crash risk. Additionally, their study demonstrates that the inclusion of female directors positively impacts the overall effectiveness of the board. In addition to this, Hu et al. (2020), examine a sample of firms from 41 economies that implemented significant board reforms between the years 1990 and 2012 and show that these reforms lead to a significant decrease in crash risk. They also show that the impact of reforms on crash risk is more pronounced among firms with greater ex ante agency problems. Their analysis also shows that board reforms enhance financial transparency and investment efficiency, which ultimately reduces crash risk. These findings align with the idea that board reforms improve board oversight and address agency problems.

2.2.3 Board Gender Diversity and Stock Price Crash Risk

Previous research has highlighted several pathways through which gender diversity on corporate boards can impact information asymmetry. This is primarily explained by agency theory, where corporate boards play a crucial role in monitoring and resolving conflicts of interest between principals and agents (Fama and Jensen, 1983; Jensen and Meckling, 1976). Prior research indicates that gender diverse boards are associated with more informative stock prices (Abad et al., 2020; Gul et al., 2011), less corporate opacity (Upadhyay and Zeng, 2014), higher earnings quality (Srinidhi et al., 2011), more effective monitoring (Nguyen, 2020), and less fraud (Cumming et al., 2015; Wahid, 2019). Therefore, firms with gender-diverse boards are more likely to disseminate information effectively, reducing information asymmetry and agency costs. This, in turn, can influence the firm's stock price crash risk.

The literature on crash risk is extensive, but few studies investigate the impact of board gender diversity on crash risk. For instance, Qayyum et al. (2021) investigate the impact of board gender diversity on stock price crash risk in twelve Asia-Pacific Markets. Their findings reveal that board gender diversity can reduce the risk of stock price crashes for firms. Moreover, they observe that this relationship is stronger for firms with three or more female directors on their board compared to those with fewer than three female directors. Utilizing a sample of Chinese listed firms spanning from 2003 to 2015, Jebran et al. (2020), categorize board diversity into relation-oriented diversity (gender and age) and task-oriented diversity (tenure and education), and find that more diverse boards can reduce firms' stock price crash risk. They further show that this relationship is more pronounced for firms with high information opacity and low institutional ownership. Also, Li and Zeng (2019) examine the influence of top executive gender on crash risk and show that female CFOs mitigate stock price crash risk by reducing bad news hoarding activities. However, they did not find a statistically significant result for the influence of female CEOs on this aspect. Furthermore, Kao et al. (2020) show that co-opted directors, who are appointed after the CEO joins the office, have a significantly positive impact on crash risk, with this effect being stronger for male directors than for female directors. Non-co-opted independent directors, on the other hand, reduce crash risk, but this negative relationship between gender and crash risk is stronger for female directors. They also show that the impact of gender on crash risk is more pronounced at firms with high earnings management and financial leverage. These findings imply that gender diversity on the board may play an important role in shaping crash risk behaviors.

While several studies have suggested a potential link between increased female representation on corporate boards and reduced stock price crash risk, it is important to acknowledge that these results are still not conclusive. First, most of the current research on this topic concentrates on the United States and China, with a limited focus on the UK market. My study aims to address this gap by specifically examining the relationship between board gender diversity and stock price crash risk within the context of the UK. Initiatives like the Hampton-Alexander Review and the Davies Report have set targets for female representation on the UK corporate boards. However, the effectiveness of these efforts in mitigating crash risk may depend on factors such as the regulatory environment, corporate governance practices, and investor behavior. Research also suggests that the endogenous nature of board composition presents a significant challenge in establishing links between the directors' characteristics, including their gender, to firm outcomes (Adams et al., 2010; Johnson et al., 1996). The corporate governance framework in the UK, shaped by initiatives like the UK Stewardship Code, distinguishes it from other countries and hence offers a unique setting to study. Therefore, it is important to investigate the UK market to provide insights and contribute to a more comprehensive understanding of the relationship between gender diversity and crash risk in the UK.

In regard to risk taking and how it might vary based on gender, a substantial amount of research has shown that women generally exhibit lower levels of risk-taking and display more transparency and conservatism in financial reporting compared to men. However, Adams and Funk (2012) present an exception to this trend within corporate boardrooms. Using a Swedish sample, Adams and Funk (2012) discovered that the risk aversion exhibited by female directors seems to disappear once they reach leadership positions by adopting typically male characteristics. They concluded that female directors were, in fact, more risk-loving than their male counterparts.

With respect to earnings management, the effects of gender appear to be inconsistent. Some studies indicate that female directors have no significant effect, while others propose that gender diversity on boards can reduce earnings management under firm specific circumstances. For example, the research by Zalata et al. (2022) did not find a significant association between the presence of female directors and the practice of earnings management. This indicates that having female directors on the board might not be enough to influence earnings management and financial reporting practices significantly. On the other hand, Lara et al. (2017) examined a more specific aspect of this relationship. Their UK-based study suggested that board gender diversity mitigates earnings management particularly in companies that practice gender discrimination. This mitigating effect was not observed in firms without such discriminatory practices, highlighting that the impact of board diversity on earnings management is context dependent. The mixed results in how board gender diversity might influence firm outcomes highlight the complexity of the relationship and suggest that the influence of board gender diversity on stock price crash risk remains an empirical question. Hence to investigate this effect specifically in the UK context, where regulatory, cultural, and market dynamics may influence the relationship differently, I formulate the following hypotheses:

Hypothesis 1: *Greater board gender diversity is associated with a lower likelihood of stock price crash risk.*

2.3 Research Design

2.3.1 Sample and Data Collection

My sample consists of UK publicly listed firms on the London Stock Exchange from 1999-2021. This UK context serves as an ideal setting for my research, given the substantial shifts in corporate governance practices throughout the period examined. The selected timeframe, which spans more than two decades, captures both pre- and post-regulatory changes regarding gender diversity quotas in UK boardrooms. One of the key regulatory developments during this period was the introduction of the Davies Report, which set voluntary targets for female board representation. I will discuss the implications of the Davies Report in more detail in section 2.5.2 of the study.

Data on the gender of the board of directors and other board characteristics is obtained from the BoardEx database. Whereas firm characteristics and financial data are obtained from Thomson

Reuters Datastream. Following prior literature (Hutton et al., 2009; Kim et al., 2011b), I exclude observations with (i) non-positive book values and total assets, (ii) fiscal year-end prices of less than $1, (iii) fewer than 26 weeks of stock return data, (iv) missing values. Furthermore, I exclude all finance and utility firms as they differ in their financial characteristics and winsorize all continuous variables at the 1st and 99th percentile to eliminate potential outlier effects. The final sample consists of 16,141 firm-year observations and 1,883 unique firms listed on the London Stock Exchange over the period 1999-2021.

2.3.2 Econometric Model and Variables Description

To empirically investigate the effect of female directors on stock price crash risk, I employ the following regression model:

$$Crash\ Risk_{j,t+1} = \beta_0 + \beta_1\ Board\ Gender\ Diversity_{j,t} + \sum \beta_i\ Control\ Variables_{j,t} + \varepsilon_{j,t} \qquad (1)$$

The variable $Crash\ Risk_{j,t+1}$ represents the crash risk of company j in year $t+1$, measured using either $NCSKEW_{(t+1)}$ or $DUVOL_{(t+1)}$; $Board\ Gender\ Diversity_{j,t}$ includes three measures representing the gender composition of the board for each firm j in year t; $Control\ Variables_{j,t}$ comprise a range of firm-level and board-level factors for each firm j in year t. Additionally, the analysis incorporates firm fixed effects, year fixed effects, and standard errors clustered at the firm level. Sections (2.3.2.1), (2.3.2.2), and (2.3.2.3) provide a detailed explanation of variable definitions and computation.

2.3.2.1 Dependent Variable: Stock Price Crash Risk

I follow Chen et al. (2001) and use two measures of stock price crash risk: (1) *NCSKEW:* The negative coefficient of skewness of firm-specific weekly returns over the fiscal year; (2) $DUVOL$: the down-to-up volatility of firm-specific weekly returns over the fiscal year[1]; These measures reflect the firm-specific weekly returns driven by factors unique to each firm rather than broader market movements.

First, I measure the firm-specific weekly returns by estimating the following expanded market model regression:

$$r_{j,t} = \alpha_j + \beta_{1,j} r_{m,t-2} + \beta_{2,j} r_{m,t-1} + \beta_{3,j} r_{m,t} + \beta_{4,j} r_{m,t+1} + \beta_{5,j} r_{m,t+2} + \varepsilon_{j,t} \qquad (2)$$

Where $r_{j,t}$ is the return on stock j in week t and $r_{m,t}$ is the return on the FTSE All-Share Index in week t. Consistent with Dimson (1979), lead and lag variables are included in the market model to correct for non-synchronous trading. The firm-specific weekly return for firm j in week t ($W_{j,t}$) is calculated following the formula expressed in Eq. (3) as the natural logarithm of one plus the residual return from Eq. (2). The natural log transformation decreases the positive skewness observed in the distribution of stock returns, and thus enhances symmetry (Chen et al., 2001).

$$W_{j,t} = Ln(1 + \varepsilon_{j,t}) \qquad (3)$$

The first measure of stock price crash risk is the negative coefficient of skewness of the firm-specific weekly returns, $NCSKEW$, calculated by taking the negative of the third moment of firm-specific weekly returns for each sample year and dividing it by the standard deviation of firm-

[1] These two measures have been used as a proxy for stock price crash risk in related articles (e.g., Jebran et al., 2020; Kao et al., 2020; Qayyum et al., 2021; Shahab et al., 2020).

specific weekly returns raised to the third power. $NCSKEW$ for firm j in year t is calculated as follows:

$$NCSKEW_{j,t} = -\left[n(n-1)^{3/2} \sum W_{j,t}^3\right] / \left[(n-1)(n-2)\left(\sum W_{j,t}^2\right)^{3/2}\right] \qquad (4)$$

Where n is the number of firm-specific weekly returns during the fiscal year t.[2] The negative sign is used at the beginning of the $NCSKEW$ equation so that a higher value of $NCSKEW$ indicates that the stock is more "crash-prone" and vice versa (Chen et al., 2001; Kim et al., 2014).

The second measure of crash risk is the down-to-up volatility ($DUVOL$). For each firm j in year t, I separate the firm-specific weekly returns into two categories: "the down weeks", which are all the weeks with firm-specific weekly returns below the annual mean and "the up weeks", which are firm-specific returns above the annual mean. After that, I calculate the standard deviation of firm-specific weekly returns for each group mentioned above. $DUVOL$ is then computed by the natural logarithm of the ratio of the standard deviation of the down weeks to the standard deviation of the up weeks:

$$DUVOL_{j,t} = \log\left\{\left[(n_u - 1) \sum_{DOWN} W_{j,t}^2\right] / \left[(n_d - 1) \sum_{UP} W_{j,t}^2\right]\right\} \qquad (5)$$

Where n_u and n_d are the number of up and down weeks, respectively. A higher value of $DUVOL$ indicates that the stock is more "crash prone" and vice versa (Kim et al., 2014). The $DUVOL$ measure does not involve the third moment; therefore, it is less likely to be excessively affected by a small number of extreme returns (Chen et al., 2001).

[2] The denominator is a normalization factor (Greene, 1993, as cited in Callen and Fang, 2013 and Chen et al., 2001)

I forward these two measures by one year so that my dependent variables $NCSKEW_{(t+1)}$ and $DUVOL_{(t+1)}$ refer to one year ahead in the future.

2.3.2.2 Independent Variable: Board Gender Diversity

Following previous research (e.g., Jizi and Nehme, 2017; Qayyum et al., 2021), I use three measures to proxy for board gender diversity: (1) the percentage of women on the board, (2) an indicator variable that is equal to one if there is at least one female director on the board and zero otherwise, (3) an indicator variable to proxy for the existence of a group of female directors that takes the value of 1 if three or more female directors are on the board and zero otherwise. The third measure is based on the "Critical Mass Theory" which suggests that having at least three women on the board is necessary for them to significantly impact firm outcomes (Joecks et al., 2013; Torchia et al., 2011).

2.3.2.3 Control Variables

I control for a set of firm and board characteristics that may potentially influence stock price crash risk. Chen et al., (2001) find that firms with higher intensity of investor disagreement tend to have higher stock price crash risk. Accordingly, I control for the detrended stock trading volume as a proxy to the heterogeneity of investor opinions ($Dturn_{(t)}$). $Dturn_{(t)}$ is measured as the difference between the mean monthly stock turnover in year t and the mean monthly stock turnover in year $t-1$, where the monthly stock turnover is calculated as the monthly trading volume divided by the total number of shares outstanding during the month (Kim et al., 2011a). Chen et al. (2001) suggest that crash risk is higher for firms with higher past return skewness, higher past stock volatility, and higher past returns. Therefore, I control for: $NCSKEW_{(t)}$ the stock price crash risk for fiscal year t ; $Sigma_{(t)}$ the volatility of firm specific weekly returns for fiscal year t; and $Return_{(t)}$ the mean of firm specific weekly returns for fiscal year t, respectively. Furthermore, I control for firm size ($Ln(total\ assets)_{(t)}$) and market-to-book ratio ($Mtb_{(t)}$) as literature documents their positive effect on stock price crash risk (Chen et al., 2001; Hutton et al., 2009). In addition to this, Hutton et al. (2009) document a negative effect between stock price crash risk and leverage. Thus, I control for $Leverage_{(t)}$ which is computed as the ratio of total debt to total assets at the end of fiscal year t.

Regarding board characteristics, a study by Chen et al. (2015) shows that CEO duality is positively associated with stock price crash risk. So, I control for the variable $Duality_{(t)}$ which is identified as a dummy variable that equals one if the CEO is also the Chairman, and zero otherwise. Research also documents a negative association between board attributes (i.e. board size and number of independent directors) and stock price crash risk. Accordingly, I control for $Board\ size_{(t)}$ estimated as the natural logarithm of the number of directors on the board and $Board\ independence_{(t)}$ calculated as the percentage of independent directors over total directors at the end of fiscal year t. I also control for $Board\ age_{(t)}$ the natural logarithm of the standard deviation of the age of directors of the board and the percentage of non-British directors on the board (% $non-British\ directors_{(t)}$) at the end of the fiscal year t. I also apply year fixed effects to control for variation in stock price crash risk across years. Table A.2.1 in the Appendix of Chapter 2 summarizes the variable definitions and data sources used in this study.

2.4 Descriptive Statistics and Empirical Results

2.4.1 Descriptive Statistics

Table 2.1 provides the descriptive statistics of the main variables in my sample. The mean values of the main stock price crash risk measures $NCSKEW_{(t+1)}$ and $DUVOL_{(t+1)}$ are 0.177 and 0.020, respectively. This is consistent with other studies that investigate stock price crash risk within the UK context (e.g., Albert et al., 2025) . The percentage of female directors on the board is as low as 8.6% with 40.5% of the firm-years observations having at least one woman on the board and only 5.6% having three or more female directors on the board. Figure 2.1 illustrates the percentage of female directors across all sampled firms, as well as those specifically within the FTSE 350 index, from 1999 to 2021. Over this period, the percentage of female directors has significantly increased, from only 3.1% in 1999 to nearly 20% in 2021. Specifically, the data highlights a high rise in female representation starting around 2011. This shift aligns with the introduction of the Davies Report in that year, which urged FTSE 350 companies to increase gender diversity on their boards. This is clearly reflected in the figure, which shows that the percentage of FTSE 350 firms increased from 10.8% in 2011 to almost 37% in 2021, reflecting the impact of the Davies Report. In section 2.5.2, I will further exploit the effect of this "exogenous" increase in female board representation to provide further evidence on the impact of board gender diversity on stock price crash risk.

Table 2.1 also shows that 19.2% of the directors are non-British, 55.1 % of the directors on board are independent directors, and 5.4% of the CEOs are also the chair of the board. The statistics of other variables are consistent with prior UK studies (e.g., Schopohl et al., 2021).

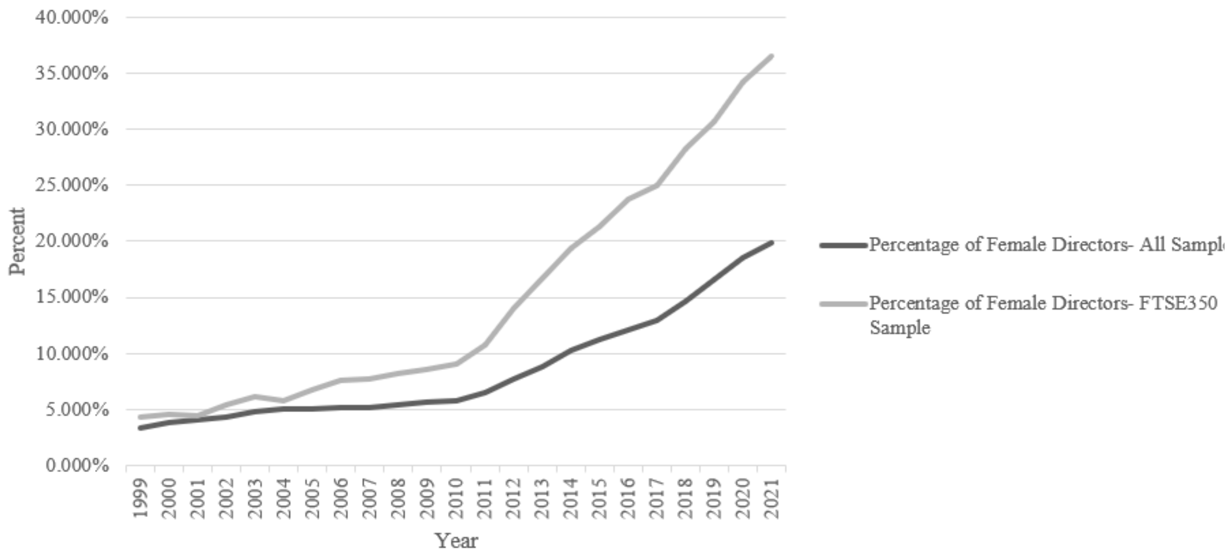

Figure 2.1 The distribution of the percentage of female directors across the years

This figure presents the percentage of female directors among the boards of UK publicly listed firms over the sample period 1999–2021, divided into two categories: all sample firms and those specifically within the FTSE 350 index.

Table 2.1 Summary Statistics

This table reports the descriptive statistics for crash risk measures, board gender diversity, board characteristics, and firm characteristics. The sample consists of all firms listed on the London Stock Exchange over the period 1999-2021. All variables are defined in Appendix (A).

VARIABLES	N	Mean	SD	Min	Max	P25	P50	P75
Crash Risk Measures								
$NCSKEW_{(t+1)}$	16,141	0.177	1.288	-6.553	8.487	-0.495	0.036	0.629
$DUVOL_{(t+1)}$	16,141	0.020	0.538	-2.977	3.326	-0.315	-0.021	0.287
Board Gender Diversity								
$\%\ female\ direcrtors_{(t)}$	16,141	0.086	0.121	0.000	0.667	0.000	0.000	0.167
$Female\ dummy\ (at\ least\ one)_{(t)}$	16,141	0.405	0.491	0.000	1.000	0.000	0.000	1.000
$Female\ dummy\ (three\ or\ more)_{(t)}$	16,141	0.056	0.231	0.000	1.000	0.000	0.000	0.000
Board Characteristics								
$\%\ non-British\ directors_{(t)}$	16,141	0.192	0.237	0.000	0.900	0.000	0.000	0.400
$Ln(SD\ of\ board\ age)_{(t)}$	16,141	2.118	0.318	0.000	3.178	1.946	2.140	2.332
$Ln(number\ of\ directors)_{(t)}$	16,141	1.840	0.339	0.693	3.135	1.609	1.792	2.079
$Board\ independance_{(t)}$	16,141	0.551	0.181	0.000	1.000	0.429	0.571	0.667
$CEO\ duality_{(t)}$	16,141	0.054	0.226	0.000	1.000	0.000	0.000	0.000
Firm Characteristics								
$NCSKEW_{(t)}$	16,141	0.165	1.226	-6.428	8.487	-0.487	0.024	0.599
$Dturn_{(t)}$	16,141	0.000	0.052	-0.456	0.569	-0.010	0.000	0.010
$Sigma_{(t)}$	16,141	0.058	0.038	0.001	0.710	0.033	0.048	0.071
$Return_{(t)}$	16,141	-0.002	0.004	-0.087	0.098	-0.002	-0.001	-0.001
$Ln(total\ assets)_{(t)}$	16,141	11.400	2.247	6.114	17.940	9.761	11.210	12.880
$Leverage_{(t)}$	16,141	0.152	0.159	0.000	2.554	0.004	0.112	0.254
$Mtb_{(t)}$	16,141	3.530	7.966	0.030	142.40	1.060	1.840	3.370

2.4.2 Correlation Matrix

Table 2.2 presents the pairwise correlation of all the variables used in this study. The two proxies of stock price crash risk, namely $NCSKEW_{(t+1)}$ and $DUVOL_{(t+1)}$, are highly positively correlated at 0.959. This suggests that both effectively capture the most common aspects of stock price crashes. The correlation between the crash measures and board gender diversity variables is generally a weak (close to zero) positive significant correlation. The correlations of crash risk measures with control variables are generally in line with previous literature. Most of the correlation coefficients are under 0.50, indicating that multicollinearity is not a serious concern in my study.

2.4.3 Main Results

In this section, I examine the impact of board gender diversity on stock price crash risk. Table 2.3 reports the baseline results from estimating Equation (1) using the two measures of stock price crash risk: $NCSKEW_{(t+1)}$ and $DUVOL_{(t+1)}$. Columns (1) to (6) show the results based on the three measures of board gender diversity: the percentage of female directors, a dummy variable that equals 1 if there is at least one woman on the board and zero otherwise and a dummy variable that equals 1 if there are three or more women on the board and zero otherwise. I apply the firm fixed effect model to control for any time-invariant unobservable characteristics during the period of study. The results show that the coefficients for board gender diversity are insignificant in predicting $NCSKEW_{(t+1)}$ and $DUVOL_{(t+1)}$. This indicates that board gender diversity may not necessarily prevent managers from withholding negative news and may not reduce stock price crash risk. To assess the potential immediate impact of gender diversity on board decisions, I also estimated a contemporaneous model where crash risk and gender variables are dated the same. The results remain qualitatively unchanged, yielding similar insignificant findings. A detailed table presenting these results is included as table A.2.2 in the Appendix to this chapter.

Table 2.2 Correlation Matrix

This table reports the pairwise correlation of the variables over the period 1999-2021. All continuous variables are winsorized at the 1% and 99% percentiles before the correlation analysis. All variables are defined in table A.2.1 ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$NCSKEW_{(T+1)}$ (1)	1							
$DUVOL_{(T+1)}$ (2)	0.959***	1						
$\%\ female\ direcrtors_{(t)}$(3)	0.023**	0.039***	1					
$Female\ dummy\ (at\ least\ one)_{(t)}$(4)	0.019*	0.034***	0.860***	1				
$Female\ dummy\ (three\ or\ more)_{(t)}$(5)	0.013	0.031***	0.559***	0.296***	1			
$NCSKEW_{(t)}$(6)	0.050***	0.049***	0.031***	0.028***	0.025**	1		
$Dturn_{(t)}$(7)	-0.007	-0.011	-0.013	-0.018*	-0.014	0.014	1	
$Sigma_{(t)}$(8)	0.023**	-0.004	-0.148***	-0.164***	-0.116***	0.322***	0.064	1
$Return_{(t)}$(9)	-0.011	0.006	0.096***	0.106***	0.074***	-0.276***	-0.061	-0.837***
$Ln(total\ assets)_{(t)}$(10)	-0.000	0.029***	0.331***	0.376***	0.353***	0.034***	-0.039	-0.370***
$Leverage_{(t)}$ (11)	0.002	0.017*	0.128***	0.141***	0.135***	0.009	0.001	-0.118***
$Mtb_{(t)}$(12)	0.014	0.010	0.035***	0.018*	0.043***	0.014	-0.005	0.053***
$Ln(number\ of\ directors)_{(t)}$(13)	-0.003	0.018*	0.233***	0.338***	0.290***	0.027***	-0.026	-0.282***
$\%\ non-British\ directors_{(t)}$(14)	0.020**	0.025**	0.077***	0.080***	0.178***	0.027***	-0.009	0.036***
$Ln(SD\ of\ board\ age)_{(t)}$(15)	-0.002	-0.004	-0.083***	-0.050***	-0.075***	-0.015	-0.002	0.035***
$CEO\ duality_{(t)}$(16)	0.008	0.003	-0.019*	-0.030***	-0.045***	-0.004	0.007	0.032***
$Board\ independance_{(t)}$(17)	0.011	0.021**	0.209***	0.195***	0.206***	0.024**	-0.022	-0.060***

Table 2.2 Correlation Matrix- Cont'd

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
$Return_{(t)}$(9)	1								
$Ln(total\ assets)_{(t)}$(10)	0.251***	1							
$Leverage_{(t)}$ (11)	0.081***	0.408***	1						
$Mtb_{(t)}$(12)	-0.043***	-0.090***	0.001	1					
$Ln(number\ of\ directors)_{(t)}$(13)	0.195***	0.678***	0.259	-0.006	1				
$\%\ non-British\ directors_{(t)}$(14)	-0.042***	0.261***	0.075***	0.018*	0.237***	1			
$Ln(SD\ of\ board\ age)_{(t)}$(15)	-0.023**	-0.112***	-0.025***	-0.000	0.081***	0.000	1		
$CEO\ duality_{(t)}$(16)	-0.028***	-0.097***	-0.065***	-0.012	-0.106***	-0.031***	-0.033***	1	
$Board\ independance_{(t)}$(17)	0.031***	0.309***	0.117***	0.036***	0.200***	0.274***	-0.014	-0.145***	1

Table 2.3 Regression of Board Gender Diversity on Stock Price Crash Risk

This table reports the results of firm fixed effects models for the impact of board gender diversity on future stock price crash risk. The sample covers 16,141 firm-year observations with non-missing values for all variables during the period 1999-2021. The dependent variables are the two measures of stock price crash risk: $NCSKEW_{(t+1)}$ and $DUVOL_{(t+1)}$. Columns (1) and (2) show the results for the independent variable percentage of female directors; columns (3) and (4) show the results for the independent variable Female dummy (at least one); and columns (5) and (6) show the results for the independent variable Female dummy (three or more). I control for firm and year fixed effects and present the results based on standard errors clustered by firm level. Continuous variables are winsorized at the 1% and 99% levels. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Fixed Effects Model- All Sample					
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	$NCSKEW_{(t+1)}$	$DUVOL_{(t+1)}$	$NCSKEW_{(t+1)}$	$DUVOL_{(t+1)}$	$NCSKEW_{(t+1)}$	$DUVOL_{(t+1)}$
$\% \ female\ direcrtors_{(t)}$	0.090	0.061				
	(0.555)	(0.907)				
$Female\ dummy\ (at\ least\ one)_{(t)}$			0.023	0.011		
			(0.648)	(0.736)		
$Female\ dummy\ (three\ or\ more)_{(t)}$					-0.005	0.010
					(-0.109)	(0.471)
$NCSKEW_{(t)}$	-0.050***	-0.019***	-0.050***	-0.019***	-0.050***	-0.019***
	(-4.505)	(-4.059)	(-4.492)	(-4.042)	(-4.486)	(-4.039)
$Dturn_{(t)}$	-0.399**	-0.172**	-0.399**	-0.172**	-0.399**	-0.172**
	(-2.207)	(-2.292)	(-2.206)	(-2.292)	(-2.208)	(-2.292)
$Sigma_{(t)}$	-1.199*	-0.659**	-1.202*	-0.662**	-1.203*	-0.662**
	(-1.775)	(-2.448)	(-1.781)	(-2.457)	(-1.781)	(-2.456)
$Return_{(t)}$	2.733	0.302	2.719	0.290	2.700	0.288
	(0.494)	(0.151)	(0.492)	(0.145)	(0.488)	(0.144)
$Ln(total\ assets)_{(t)}$	0.135***	0.061***	0.135***	0.061***	0.136***	0.062***
	(5.527)	(6.191)	(5.531)	(6.203)	(5.558)	(6.236)
$Leverage_{(t)}$	-0.201	-0.087*	-0.199	-0.086	-0.199	-0.086*
	(-1.532)	(-1.665)	(-1.522)	(-1.645)	(-1.518)	(-1.646)
$Mtb_{(t)}$	0.005**	0.002**	0.005**	0.002**	0.005**	0.002**
	(2.380)	(2.252)	(2.386)	(2.262)	(2.385)	(2.255)
$Ln(number\ of\ directors)_{(t)}$	0.037	0.018	0.032	0.016	0.040	0.018
	(0.533)	(0.606)	(0.464)	(0.549)	(0.582)	(0.633)
$\% \ non-British\ directors_{(t)}$	0.063	0.009	0.064	0.010	0.065	0.010
	(0.655)	(0.237)	(0.667)	(0.259)	(0.678)	(0.254)
$Ln(SD\ of\ board\ age)_{(t)}$	-0.001	0.002	-0.001	0.001	-0.002	0.001
	(-0.020)	(0.073)	(-0.024)	(0.061)	(-0.038)	(0.060)
$CEO\ duality_{(t)}$	-0.020	-0.007	-0.020	-0.007	-0.020	-0.007
	(-0.296)	(-0.251)	(-0.297)	(-0.251)	(-0.292)	(-0.256)
$Board\ independance_{(t)}$	-0.001	-0.000	-0.001	-0.000	-0.001	-0.000
	(-0.938)	(-0.937)	(-0.936)	(-0.918)	(-0.907)	(-0.897)
Intercept	-1.115***	-0.570***	-1.107***	-0.569***	-1.128***	-0.576***
	(-4.052)	(-5.096)	(-4.019)	(-5.079)	(-4.129)	(-5.173)
Observations	16,141	16,141	16,141	16,141	16,141	16,141
Adjusted R-squared	0.022	0.026	0.022	0.026	0.022	0.026
Firm Fes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fes	Yes	Yes	Yes	Yes	Yes	Yes

2.5 Robustness checks

Female executives and board members are not randomly assigned to firms. As per Huang and Kisgen (2013), hiring boards may engage in gender-based discrimination when selecting new board members, and women might self-select into specific types of firms. Accordingly, research that explores the influence of female directors on organizational outcomes might suffer from potential endogeneity. To address these endogeneity issues, first, I employ a propensity score matching (PSM) procedure; then, I apply the difference-in-difference framework for a subsample of FTSE 350 firms, and finally, I examine settings where women hold CFO or CEO positions.

2.5.1 Propensity Score Matching

The results of the impact of board gender diversity on stock price crash risk in Table 2.3 may suffer from the issue of non-random selection due to potential confounding variables. To address this, I employ the propensity score matching procedure (Rosenbaum and Rubin, 1983). This procedure enables me to identify a control group of firms with all-male boards, which exhibit no observable differences in characteristics compared to a treatment group of firms that have at least one female board member. When I compare the control and treatment groups, each pair of matched firms is nearly identical, with the exception of board gender diversity. This matching technique helps minimize, although not entirely eliminate, concerns associated with non-random selection.

First, I run a probit model with "Female dummy (at least one)" as the dependent variable, using all the control variables from Equation 1 as regressors. Then, I calculate the propensity scores and perform one-to-one nearest neighbor matching without replacement, ensuring that the absolute difference in propensity scores between a treated firm-year (with at least one female board member) and its matched control does not exceed 0.1%.

To validate the requirement that the firms in the treatment and control groups have similar observable characteristics, I first re-estimate the probit model for the post-match sample. Column (1) of Panel (A) in Table 2.4 indicates that firms with at least one female board member have more directors, fewer foreign board members, younger board members, greater CEO duality, higher board independence, and larger size. Column (2) of Panel (A) in Table 2.4 presents the probit model estimates for the matched sample. All the estimated coefficients are statistically insignificant, suggesting that there are no notable differences in firm characteristics between the treatment and control groups.

Then, to validate that the matched samples are comparable, I test the balancing property of the covariates after matching. Panel (B) in table 2.4 reports the quality of the matching performed and shows a Rubin's B of 5.9 (should be <25) and a Rubin's R of 0.78 (should be between 0.5 and 2) with insignificant differences in the variables between the treatment and control groups. This suggests that the results generated for both groups are only due to the board gender diversity difference.

Finally, I re-estimate Equation (1) using the matched sample. Table 2.5 shows that my primary findings are unaltered. Board gender diversity has an insignificant effect on $NCSKEW_{(t+1)}$ and $DUVOL_{(t+1)}$.

Table 2.4 Pre-match propensity score regressions and post-match diagnostic regressions

Panel (A)

Panel (A) presents the coefficients from the probit model used to estimate the propensity scores. The dependent variable is "Female dummy (at least one)". Column (1) reports the pre-match propensity score regression whereas columns (2) report the post-match diagnostic regression. The model controls for year and Fama-French 48 industry (Fama and French, 1997) industry fixed effects. The z-values, shown in parentheses, are based on standard errors clustered by firm and year (Petersen, 2009). Statistical significance is indicated by ***, **, and * for the 1%, 5%, and 10% levels, respectively.

Variables	(1) pre-match	(2) post-match
$NCSKEW_{(t)}$	0.011	0.011
	(1.009)	(0.845)
$Dturn_{(t)}$	-0.180	-0.156
	(-0.828)	(-0.547)
$Sigma_{(t)}$	-0.571	-1.277
	(-0.867)	(-1.496)
$Return_{(t)}$	-9.764	-8.111
	(-1.631)	(-1.019)
$Ln(total\ assets)t$	0.139***	-0.001
	(15.501)	(-0.073)
$Leverage_{(t)}$	-0.164*	0.066
	(-1.917)	(0.614)
$Mtb_{(t)}$	0.001	-0.000
	(0.955)	(-0.066)
$Ln(number\ of\ directors)_{(t)}$	1.120***	-0.005
	(21.222)	(-0.070)
$\%\ non-British\ directors_{(t)}$	-0.138**	-0.012
	(-2.409)	(-0.159)
$Ln(SD\ of\ board\ age)_{(t)}$	-0.145***	-0.077
	(-3.729)	(-1.505)
$CEO\ duality_{(t)}$	0.306***	-0.001
	(5.676)	(-0.021)
$Board\ independance_{(t)}$	0.004***	-0.000
	(5.513)	(-0.238)
Intercept	-5.057***	0.336
	(-24.029)	(1.219)
Observations	16,139	7,610
Pseudo R-squared	0.2565	0.0023
Industry dummy	Yes	Yes
Year dummy	Yes	Yes

Table 2.4 Cont'd

Panel (B)				
Panel (B) reports the univariate comparisons of firm characteristics between treatment and control groups. In columns (1) and (2) I report the mean value of firm characteristics. In column (3), I report the differences between treatment and control groups. In column (4), I report the t-statistics of the univariate comparisons. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.				
	(1)	(2)	(3)	(4)
	Treated	Control	Difference	T-stat
$NCSKEW_{(t)}$	0.172	0.159	0.013	0.450
$Dturn_{(t)}$	-0.000	0.000	0.000	-0.700
$Sigma_{(t)}$	0.055	0.056	-0.001	-1.230
$Return_{(t)}$	-0.002	-0.002	0.000	0.600
$Ln(total\ assets)_{(t)}$	11.426	11.394	0.032	0.720
$Leverage_{(t)}$	0.150	0.148	0.002	0.510
$Mtb_{(t)}$	3.337	3.380	-0.043	-0.250
$Ln(number\ of\ directors)_{(t)}$	1.871	1.868	0.003	0.400
$\%\ non-British\ directors_{(t)}$	0.176	0.177	-0.001	-0.240
$Ln(SD\ of\ board\ age)_{(t)}$	2.129	2.140	-0.011	-1.700
$CEO\ duality_{(t)}$	0.056	0.055	0.001	0.100
$Board\ independance_{(t)}$	54.730	54.774	-0.044	-0.120

Table 2.5 Re-estimation of the model using the matched sample

This table compares the results between the unmatched and matched samples. Columns (1) and (2) show results for the unmatched sample. Columns (3) and (4) present results for the PSM sample. Panel (A), (B), and (C) show results for the three board gender diversity measures: percentage of females on boards, at least one female on board, and three or more females on board, respectively. All control variables are included in all regressions but not reported for brevity. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively

	Unmatched Sample		**Matched Sample**	
	(1)	(2)	(3)	(4)
Panel (A)	$NCSKEW_{(t+1)}$	$DUVOL_{(t+1)}$	$NCSKEW_{(t+1)}$	$DUVOL_{(t+1)}$
$\%\,female\ direcrtors_{(t)}$	0.090	0.061	0.012	0.024
	(0.555)	(0.907)	(0.047)	(0.233)
Year Fixed Effects	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Adjusted R-squared	0.022	0.026	0.029	0.023
No. of Observations	16,141	16,141	7,676	7,676

	(1)	(2)	(3)	(4)
Panel (B)	$NCSKEW_{(t+1)}$	$DUVOL_{(t+1)}$	$NCSKEW_{(t+1)}$	$DUVOL_{(t+1)}$
$Female\ dummy\ (at\ least\ one)_{(t)}$	0.023	0.011	-0.011	-0.009
	(0.648)	(0.736)	(-0.222)	(-0.424)
Year Fixed Effects	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Adjusted R-squared	0.022	0.026	0.029	0.033
No. of Observations	16,141	16,141	7,676	7,676

	(1)	(2)	(3)	(4)
Panel (C)	$NCSKEW_{(t+1)}$	$DUVOL_{(t+1)}$	$NCSKEW_{(t+1)}$	$DUVOL_{(t+1)}$
$Female\ dummy\ (three\ or\ more)_{(t)}$	-0.005	0.010	-0.085	-0.001
	(-0.109)	(0.471)	(-0.609)	(-0.020)
Year Fixed Effects	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Adjusted R-squared	0.022	0.026	0.029	0.033
No. of Observations	16,141	16,141	7,676	7,676

2.5.2 Difference-in-Differences (Post-Davies)

The UK has witnessed a significant shift towards gender equality and inclusive leadership in terms of board gender diversity in recent years. This change has been driven by various factors, including voluntary targets and growing societal recognition of gender diversity and inclusion. One of the most important initiatives in this regard was the Davies report, which was launched in 2011 by Lord Davies of Abersoch and aims to address the low representation of women on corporate boards in the UK. The Davies Report encouraged FTSE 350 companies to increase female representation on their boards and set a target of 25% for FTSE 100 by 2015. The voluntary framework was successful in increasing the percentage of women on British boards, as reported by the Davies Report (2015), which states:

> There are more women on FTSE 350 boards than ever before, with representation of women more than doubling since 2011 - now at 26.1% on FTSE 100 boards and 19.6% on FTSE 250 boards.
>
> We have also seen a dramatic reduction in the number of all-male boards. There were 152 in 2011. Today there are no all-male boards in the FTSE 100 and only 15 in the FTSE 250. (p. 2)

Following the successes reported in the Davies report in 2015, a new objective of reaching 33% female representation on the boards of FTSE350 companies by 2020 was established (Hampton-Alexander Review, 2016). At the time the UK adopted a voluntary "comply or explain" approach to tackle the gender disparity on boards, other countries such as Norway, Spain, France, and Germany, implemented legally binding gender quotas. These mandatory quotas serve as an exogenous shock that helps mitigate the reverse causality issue of linking board gender diversity to firm outcomes (Schopohl et al., 2021). Although the UK did not enforce legally binding quotas, the Davies report can still act as an exogenous shock in this context as it had a substantial impact on increasing the number of women on UK corporate boards, as illustrated in figure 2.1 (Harakeh et al., 2019; Schopohl et al., 2021). For this, I use the difference-in-differences approach (Roberts and Whited, 2013) where I compare firm stock price crash risk before and after the intervention of the Davies Report to a control sample that did not undergo this treatment. I develop the following difference-in-differences regression model to capture the effect of the increased board diversity on stock price crash risk post-Davies:

$$Crash\ Risk_{j,t+1} = \beta_0 + \beta_1\ FTSE350\ +\ \beta_2\ Davies2011\ +\ \beta_3\ FTSE350 * Davies2011 + \sum \beta_i\ Control\ Variables_{j,t}\ + \varepsilon_{j,t} \qquad (6)$$

Where $Crash\ Risk_{j,t+1}$ is either $NCSKEW_{(t+1)}$or $DUVOL_{(t+1)}$. Since the Davies Report applies to FTSE350 companies, my treatment sample consists of all FTSE350 firms, while my control group comprises the rest of the publicly listed companies in the British economy within my sample. To distinguish between these groups, I use the dummy variable $FTSE350$, which takes value 1 if the company belongs to the FTSE350 index and 0 otherwise. To identify the post-treatment period, following a similar approach to Harakeh et al. (2019), I use the dummy variable $Davies2011$, which equals 1 for the year 2011 and later, and 0 otherwise. The interaction term $FTSE350 * Davies2011$ captures the differential effect of the Davies Report on FTSE350 firms relative to non-FTSE350 firms. I exclude the main effect of $Davies2011$ from the regression equation, as the inclusion of year fixed effects absorbs all time-specific variation, including that associated with the post-treatment period (Al-Shaer and Harakeh, 2020).

Table 2.6 presents the results of the difference-in-differences analysis. Columns (1) and (2) show that the coefficients for $FTSE350 * Davies2011$ are insignificant across both crash risk measures, indicating that female directors do not significantly affect stock price crash risk in FTSE350 companies more than in non-FTSE350 companies following the Davies Report. While the Davies Report explicitly targets FTSE350 firms, the results suggest that its introduction did not lead to a differential change in crash risk for FTSE350 firms compared to non-FTSE350 firms. Additionally, the significant coefficient on the $FTSE350$ dummy suggests that FTSE350 firms exhibit higher crash risk across the entire sample period.[3]

[3] To address potential endogeneity concerns associated with including a lagged dependent variable (LDV) in the control set, which may bias coefficient estimates (Nickell, 1981), I re-estimated the regressions presented in Tables (2.3) and (2.6) without the LDV. The results remained consistent, suggesting that the inclusion of the LDV does not drive the findings.

Table 2.6 Difference-in-differences regressions: Post-Davies Report (2011)

This table presents the results for difference-in-differences regression results for the effect of board gender diversity on stock price crash risk. The dependent variables are the two measures of stock price crash risk: $NCSKEW_{(t+1)}$ and $DUVOL_{(t+1)}$. FTSE350 is a dummy variable that takes the value 1 if the company belongs to the FTSE350 index, and zero otherwise. Davies2011*FTSE350 is the interaction term that captures the difference-in-differences effects. I control for firm and year fixed effects and present the results based on standard errors clustered by firm level. Continuous variables are winsorized at the 1% and 99% levels. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

VARIABLES	(1) $NCSKEW_{(t+1)}$	(2) $DUVOL_{(t+1)}$
FTSE350	0.270***	0.115***
	(4.132)	(4.330)
FTSE350*Davies2011	0.002	0.014
	(0.044)	(0.629)
$NCSKEW_{(t)}$	-0.051***	-0.019***
	(-4.550)	(-4.108)
$Dturn_{(t)}$	-0.416**	-0.180**
	(-2.305)	(-2.412)
$Sigma_{(t)}$	-1.152*	-0.638**
	(-1.704)	(-2.375)
$Return_{(t)}$	3.008	0.431
	(0.544)	(0.217)
$Ln(total\ assets)_{(t)}$	0.121***	0.055***
	(4.970)	(5.579)
$Leverage_{(t)}$	-0.176	-0.075
	(-1.342)	(-1.436)
$Mtb_{(t)}$	0.005**	0.002**
	(2.248)	(2.112)
$Ln(number\ of\ directors)_{(t)}$	0.028	0.014
	(0.402)	(0.483)
$\%\ non-British\ directors_{(t)}$	0.056	0.006
	(0.591)	(0.148)
$Ln(SD\ of\ board\ age)_{(t)}$	0.002	0.003
	(0.041)	(0.158)
$CEO\ duality_{(t)}$	-0.024	-0.009
	(-0.356)	(-0.334)
$Board\ independance_{(t)}$	-0.001	-0.000
	(-0.942)	(-0.969)
Intercept	-1.021***	-0.528***
	(-3.753)	(-4.767)
Observations	16,141	16,141
Adjusted R-squared	0.024	0.028
Firm dummy	Yes	Yes
Year dummy	Yes	Yes

2.5.3 Additional Analysis: Examining settings where women hold CFO or CEO positions

Corporate governance encompasses various interrelated elements that influence firm performance and decision-making. By examining the interaction between top executive traits and board structure, I offer a more comprehensive understanding of governance mechanisms, which is important for effective organizational outcomes. One critical dimension of this interaction is the role of gender. The gender of top executives can significantly interact with board gender diversity, shaping firm outcomes by enhancing leadership qualities and top management decisions. For instance, female top executives often employ leadership styles that emphasize inclusiveness and communication (Terjesen et al., 2009). These traits can harmonize effectively with a gender-diverse board, fostering better decision-making, improved firm performance, and a more supportive and efficient work environment.

The impact of executive gender on firm outcomes is further highlighted in the work of Li and Zeng (2019). Their study investigates the influence of top executive gender on stock price crash risk, revealing that female CFOs reduce the likelihood of stock price crashes by reducing the hoarding of negative news. However, they did not find a statistically significant relationship for the influence of CEOs in this regard. Their research suggests that CFOs play a crucial role in mitigating financial risks that could lead to stock price crashes.

Building on this body of research, the interaction between top executive gender and board gender diversity continues to gain significant attention for its implications on various firm outcomes[4].
To contribute to this growing field, I conduct additional tests to examine whether the impact of board gender diversity on stock price crash risk varies with the gender of top executives. This

[4] For example, Davis and Garcia-Cestona (2023) find that female directors are more successful in reducing the likelihood of financial restatements when the company's CFO is also female.

approach aims to provide deeper insights into the governance dynamics that promote sustainable and effective decision-making. Accordingly, I obtained data on the gender of the CFO and CEO from Boardex. The sample with CFO gender data consists of 13,641 firm-year observations whereas the sample with CEO gender data consists of 12,582 firm-year observations with non-missing values for all variables during the period 1999-2021. The variables "Female_CFO" and "Female_CEO" are dummy variables that equal one if the executive is a female and zero otherwise. In Tables 2.7 and 2.8 I include the interaction terms of "Female_CFO" and "Female_CEO" with board gender diversity. This allows me to investigate the impact of board gender diversity on stock price crash risk when the CFO/CEO is also a woman. Consistent with my earlier results, Tables 2.7 and 2.8 show no statistically significant effect for board gender diversity on stock price crash risk even when the CFO/CEO is female.

Table 2.7 The impact of board gender diversity on stock price crash risk when CFO is female

This table reports the results of firm fixed effects model for the impact of board gender diversity on future stock price crash risk when CFO is a female. The dependent variables are the two measures of stock price crash risk: $NCSKEW_{(t+1)}$ and $DUVOL_{(t+1)}$. Columns (1) and (2) show the results for the interaction variable (Female_CFO*% female directors); columns (3) and (4) show the results for the interaction variable (Female_CFO*Female dummy (at least one)); and columns (5) and (6) show the results for the interaction variable (Female_CFO*Female dummy (three or more)). The sample covers 13,641 firm-year observations with non-missing values for all variables during the period 1999-2021. I control for firm and year fixed effects and present the results based on standard errors clustered by firm level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Variables	(1) $NCSKEW_{(t+1)}$	(2) $DUVOL_{(t+1)}$	(3) $NCSKEW_{(t+1)}$	(4) $DUVOL_{(t+1)}$	(5) $NCSKEW_{(t+1)}$	(6) $DUVOL_{(t+1)}$
$\% \ female \ direcrtors_{(t)}$	0.191	0.113				
	(0.978)	(1.410)				
$Female \ dummy \ (at \ least \ one)_{(t)}$			0.045	0.022		
			(1.134)	(1.331)		
$Female \ dummy \ (three \ or \ more)_{(t)}$					0.039	0.028
					(0.684)	(1.143)
Female_CFO	-0.059	-0.050	-0.005	-0.013	-0.069	-0.035
	(-0.570)	(-1.151)	(-0.034)	(-0.203)	(-1.022)	(-1.303)
Female_CFO*% female directors	-0.213	-0.009				
	(-0.548)	(-0.052)				
Female_CFO*Female dummy (at least one)			-0.112	-0.039		
			(-0.692)	(-0.580)		
Female_CFO*Female dummy (three or more)					-0.106	-0.033
					(-0.857)	(-0.601)
$NCSKEW_{(t)}$	-0.060***	-0.024***	-0.060***	-0.024***	-0.060***	-0.024***
	(-4.929)	(-4.713)	(-4.904)	(-4.675)	(-4.893)	(-4.669)
$Dturn_{(t)}$	-0.323	-0.144*	-0.321	-0.143*	-0.320	-0.143*
	(-1.590)	(-1.710)	(-1.584)	(-1.700)	(-1.577)	(-1.694)
$Sigma_{(t)}$	-1.034	-0.643	-1.039	-0.645	-1.049	-0.647
	(-1.000)	(-1.558)	(-1.004)	(-1.562)	(-1.013)	(-1.565)
$Return_{(t)}$	9.895	2.399	9.865	2.399	9.812	2.398
	(1.067)	(0.672)	(1.064)	(0.671)	(1.057)	(0.670)
$Ln(total \ assets)_{(t)}$	0.169***	0.075***	0.168***	0.074***	0.170***	0.075***
	(5.697)	(6.253)	(5.705)	(6.263)	(5.777)	(6.359)
$Leverage_{(t)}$	-0.165	-0.082	-0.163	-0.081	-0.163	-0.081
	(-1.130)	(-1.454)	(-1.118)	(-1.433)	(-1.121)	(-1.437)
$Mtb_{(t)}$	0.008***	0.003***	0.008***	0.003***	0.008***	0.003***
	(2.817)	(2.777)	(2.824)	(2.797)	(2.832)	(2.797)
$Ln(number \ of \ directors)_{(t)}$	0.058	0.039	0.052	0.036	0.061	0.039
	(0.718)	(1.175)	(0.641)	(1.077)	(0.768)	(1.184)
$\% \ non-British \ directors_{(t)}$	0.000	-0.028	0.000	-0.027	0.002	-0.027
	(0.000)	(-0.595)	(0.002)	(-0.577)	(0.021)	(-0.578)
$Ln(SD \ of \ board \ age)_{(t)}$	-0.011	-0.003	-0.011	-0.003	-0.014	-0.004
	(-0.185)	(-0.108)	(-0.197)	(-0.130)	(-0.238)	(-0.154)
$CEO \ duality_{(t)}$	-0.004	-0.002	-0.004	-0.002	-0.003	-0.002
	(-0.052)	(-0.054)	(-0.043)	(-0.047)	(-0.042)	(-0.057)
$Board \ independance_{(t)}$	-0.002	-0.001	-0.002	-0.001	-0.002	-0.001
	(-1.429)	(-1.566)	(-1.449)	(-1.577)	(-1.379)	(-1.508)
Intercept	-1.481***	-0.738***	-1.467***	-0.733***	-1.502***	-0.748***
	(-4.327)	(-5.342)	(-4.295)	(-5.306)	(-4.439)	(-5.461)
Observations	13,641	13,641	13,641	13,641	13,641	13,641
Adjusted R-squared	0.028	0.032	0.028	0.032	0.028	0.032
Firm FEs	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes

Table 2.8 The impact of board gender diversity on stock price crash risk when CEO is female

This table reports the results of firm fixed effects model for the impact of board gender diversity on future stock price crash risk when CEO is a female. The dependent variables are the two measures of stock price crash risk: $NCSKEW_{(t+1)}$ and $DUVOL_{(t+1)}$. Columns (1) and (2) show the results for the interaction variable (Female_CEO*% female directors); columns (3) and (4) show the results for the interaction variable (Female_CEO*Female dummy (at least one)); and columns (5) and (6) show the results for the interaction variable (Female_CEO*Female dummy (three or more)). The sample covers 12,582 firm-year observations with non-missing values for all variables during the period 1999-2021. I control for firm and year fixed effects and present the results based on standard errors clustered by firm level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Variables	(1) $NCSKEW_{(t+1)}$	(2) $DUVOL_{(t+1)}$	(3) $NCSKEW_{(t+1)}$	(4) $DUVOL_{(t+1)}$	(5) $NCSKEW_{(t+1)}$	(6) $DUVOL_{(t+1)}$
$\% \ female \ direcrtors_{(t)}$	-0.022	0.026				
	(-0.121)	(0.348)				
$Female \ dummy \ (at \ least \ one)_{(t)}$			0.015	0.010		
			(0.375)	(0.578)		
$Female \ dummy \ (three \ or \ more)_{(t)}$					-0.059	-0.012
					(-1.029)	(-0.498)
Female_CEO	-0.070	0.012	0.110	0.180	0.167	0.076
	(-0.358)	(0.138)	(0.377)	(1.263)	(1.223)	(1.382)
Female_CEO*% female directors	0.822	0.207				
	(1.259)	(0.733)				
Female_CEO*Female dummy (at least one)			0.047	-0.113		
			(0.152)	(-0.768)		
Female_CEO*Female dummy (three or more)					-0.004	-0.006
					(-0.026)	(-0.093)
$NCSKEW_{(t)}$	-0.075***	-0.029***	-0.075***	-0.029***	-0.075***	-0.029***
	(-6.204)	(-5.764)	(-6.151)	(-5.728)	(-6.162)	(-5.730)
$Dturn_{(t)}$	-0.333	-0.130	-0.335	-0.130	-0.336	-0.131
	(-1.524)	(-1.442)	(-1.528)	(-1.435)	(-1.536)	(-1.450)
$Sigma_{(t)}$	-0.659	-0.558	-0.645	-0.555	-0.639	-0.553
	(-0.694)	(-1.510)	(-0.678)	(-1.501)	(-0.671)	(-1.493)
$Return_{(t)}$	7.253	1.169	7.382	1.210	7.388	1.205
	(0.875)	(0.381)	(0.892)	(0.395)	(0.890)	(0.392)
$Ln(total \ assets)_{(t)}$	0.147***	0.066***	0.146***	0.066***	0.146***	0.066***
	(5.250)	(5.730)	(5.201)	(5.695)	(5.234)	(5.744)
$Leverage_{(t)}$	-0.261*	-0.099	-0.262*	-0.099	-0.262*	-0.098
	(-1.646)	(-1.577)	(-1.653)	(-1.586)	(-1.651)	(-1.573)
$Mtb_{(t)}$	0.005**	0.002**	0.005**	0.002**	0.005**	0.002**
	(2.233)	(2.078)	(2.244)	(2.088)	(2.255)	(2.097)
$Ln(number \ of \ directors)_{(t)}$	0.008	0.007	0.001	0.005	0.013	0.009
	(0.107)	(0.216)	(0.008)	(0.139)	(0.165)	(0.276)
$\% \ non-British \ directors_{(t)}$	0.080	0.012	0.079	0.013	0.084	0.014
	(0.714)	(0.254)	(0.701)	(0.265)	(0.747)	(0.289)
$Ln(SD \ of \ board \ age)_{(t)}$	-0.038	-0.023	-0.038	-0.023	-0.040	-0.024
	(-0.660)	(-0.922)	(-0.667)	(-0.938)	(-0.704)	(-0.963)
$CEO \ duality_{(t)}$	-0.020	-0.011	-0.018	-0.011	-0.016	-0.010
	(-0.254)	(-0.358)	(-0.237)	(-0.335)	(-0.204)	(-0.320)
$Board \ independance_{(t)}$	-0.001	-0.000	-0.001	-0.000	-0.001	-0.000
	(-0.528)	(-0.640)	(-0.567)	(-0.649)	(-0.521)	(-0.613)
Intercept	-1.150***	-0.567***	-1.122***	-0.559***	-1.152***	-0.572***
	(-3.449)	(-4.079)	(-3.341)	(-3.995)	(-3.478)	(-4.131)
Observations	12,582	12,582	12,582	12,582	12,582	12,582
Adjusted R-squared	0.025	0.028	0.024	0.028	0.025	0.028
Firm FEs	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes

2.6 Summary

This study explores the relationship between board gender diversity and stock price crash risk in the UK context. It investigates whether the presence of female directors (measured by the percentage of females on board, a dummy variable that is equal to one if there is at least one female director on the board, and a dummy variable that is equal to one if there are three or more female directors on the board) is associated with lower stock price crash risk. Using a sample of UK Firms, I find that board gender diversity has no significant effect on stock price crash risk. The results of influence of board gender diversity on crash risk remain insignificant for several robustness checks such as when employing propensity score matching and the difference-in-difference approach for the post-Davies period. The results remain consistent even when women hold positions in top executive management roles. This research has several contributions. My findings add to the growing body of literature that highlights no significant differences in firm outcomes when considering the gender diversity of the board of directors. It also explores the implications of the Davies Report on stock price crash risk. Thus, my study provides insights to policy makers and regulators. Although this research finds an insignificant relationship between board gender diversity and stock price crash risk, it is crucial to recognize the broader importance of initiatives aimed at increasing representation on board of directors for diversity and inclusion purposes.

Appendix to Chapter 2

Table A. 2.1 Variables Definitions and Data Sources

Variable	Definition	Source
$NCSKEW_{(t+1)}$	The negative coefficient of skewness of firm specific weekly returns over the fiscal year (Chen et al., 2001).	Datastream
$DUVOL_{(t+1)}$	The natural logarithm of the ratio of the standard deviation of firm specific weekly returns for the “down-week" sample to the standard deviation of firm specific weekly returns for the “up week" sample over the fiscal year (Chen et al., 2001).	Datastream
$\%\ female\ direcrtors_{(t)}$	The percentage of female directors on the board at the end of the fiscal year.	Boardex
$Female\ dummy\ (at\ least\ one)_{(t)}$	An indicator variable that is equal to one if there is at least one female director on the board and zero otherwise.	Boardex
$Female\ dummy\ (three\ or\ more)_{(t)}$	An indicator variable that is equal to 1 if three or more female directors are on the board and zero otherwise.	Boardex
$\%\ non-British\ directors_{(t)}$	The percentage of non-British directors on the board at the end of the fiscal year.	Boardex
$Ln(SD\ of\ board\ age)_{(t)}$	The natural logarithm of the standard deviation of the age of directors of the board at the end of the fiscal year.	Boardex
$Ln(number\ of\ directors)_{(t)}$	The natural logarithm of the number of directors on the board.	Boardex
$Board\ independance_{(t)}$	The percentage of independent directors over total directors at the end of fiscal year.	Boardex
$CEO\ duality_{(t)}$	A dummy variable equal to one if the Chief Executive Officer is also the Chairman, zero otherwise.	Boardex
$NCSKEW_{(t)}$	The negative coefficient of skewness of firm specific weekly returns at the end of fiscal year.	Datastream
$Dturn_{(t)}$	The detrended stock trading volume at the end of fiscal year.	Datastream

$Sigma_{(t)}$	The volatility of firm specific weekly stock returns at the end of fiscal year.	Datastream
$Return_{(t)}$	The mean of firm-specific weekly stock returns at the end of fiscal year.	Datastream
$Ln(total\ assets)_{(t)}$	The natural logarithm of total assets at the end of fiscal year.	Datastream
$Leverage_{(t)}$	The ratio of total debt to total assets at the end of fiscal year.	Datastream
$Mtb_{(t)}$	The Market-to-Book value of equity at the end of fiscal year.	Datastream
Female_CFO	A dummy variable that equals one if the CFO is a female, zero otherwise.	Boardex
Female_CEO	A dummy variable that equals one if the CEO is a female, zero otherwise.	Boardex

Table A. 2.2 Contemporaneous Model Results

Table A.2.2 (on the next page), reports the results of firm fixed effects models for the impact of board gender diversity on stock price crash risk when crash risk and gender variables are dated the same. The sample covers 14,346 firm-year observations with non-missing values for all variables during the period 1999–2021. The dependent variables are the two measures of stock price crash risk: $NCSKEW_{(t)}$ and $DUVOL_{(t)}$. Columns (1) and (2) show the results for the independent variable percentage of female directors; columns (3) and (4) show the results for the independent variable Female dummy (at least one); and columns (5) and (6) show the results for the independent variable Female dummy (three or more). I control for firm and year fixed effects and present the results based on standard errors clustered by firm level. The Results remain qualitatively unchanged when using contemporaneous crash risk and gender variables, with similar insignificant findings as in the main analysis.

Table A. 2.2 Contemporaneous Model Results- Fixed Effects Model

Variables	(1) $NCSKEW_{(t)}$	(2) $DUVOL_{(t)}$	(3) $NCSKEW_{(t)}$	(4) $DUVOL_{(t)}$	(5) $NCSKEW_{(t)}$	(6) $DUVOL_{(t)}$
$\%\ female\ direcrtors_{(t)}$	0.179	0.092				
	(1.072)	(1.273)				
$Female\ dummy\ (at\ least\ one)_{(t)}$			0.007	0.006		
			(0.205)	(0.370)		
$Female\ dummy\ (three\ or\ more)_{(t)}$					0.005	0.010
					(0.113)	(0.497)
$NCSKEW_{(t-1)}$	-0.094***	-0.036***	-0.094***	-0.036***	-0.094***	-0.036***
	(-8.980)	(-8.099)	(-8.934)	(-8.051)	(-8.926)	(-8.046)
$Dturn_{(t)}$	-0.161	-0.056	-0.161	-0.056	-0.161	-0.056
	(-0.834)	(-0.670)	(-0.834)	(-0.670)	(-0.834)	(-0.668)
$Sigma_{(t)}$	16.015***	5.948***	16.008***	5.944***	16.007***	5.943***
	(12.041)	(14.662)	(12.016)	(14.615)	(12.014)	(14.615)
$Return_{(t)}$	10.820	7.947**	10.776	7.926**	10.767	7.920**
	(0.890)	(2.348)	(0.885)	(2.336)	(0.884)	(2.336)
$Ln(total\ assets)_{(t)}$	0.227***	0.099***	0.228***	0.100***	0.228***	0.100***
	(9.340)	(9.796)	(9.390)	(9.849)	(9.403)	(9.886)
$Leverage_{(t)}$	-0.641***	-0.251***	-0.636***	-0.248***	-0.636***	-0.249***
	(-5.468)	(-5.026)	(-5.412)	(-4.954)	(-5.411)	(-4.959)
$Mtb_{(t)}$	0.005***	0.002**	0.005***	0.002**	0.005***	0.002**
	(2.607)	(2.305)	(2.617)	(2.317)	(2.615)	(2.311)
$Ln(number\ of\ directors)_{(t)}$	0.150**	0.071**	0.153**	0.072**	0.154**	0.073**
	(2.140)	(2.346)	(2.162)	(2.364)	(2.203)	(2.390)
$\%\ non-British\ directors_{(t)}$	0.001	-0.003	0.005	-0.001	0.005	-0.001
	(0.011)	(-0.071)	(0.058)	(-0.017)	(0.058)	(-0.029)
$Ln(SD\ of\ board\ age)_{(t)}$	-0.040	-0.012	-0.042	-0.013	-0.042	-0.013
	(-0.828)	(-0.589)	(-0.863)	(-0.629)	(-0.866)	(-0.626)
$CEO\ duality_{(t)}$	-0.092	-0.036	-0.092	-0.036	-0.093	-0.036
	(-1.477)	(-1.363)	(-1.476)	(-1.365)	(-1.477)	(-1.372)
$Board\ independance_{(t)}$	0.001	0.000	0.001	0.000	0.001	0.000
	(0.588)	(0.994)	(0.649)	(1.063)	(0.654)	(1.063)
Intercept	-3.452***	-1.532***	-3.472***	-1.540***	-3.478***	-1.543***
	(-12.186)	(-12.671)	(-12.267)	(-12.750)	(-12.344)	(-12.834)
Observations	14,346	14,346	14,346	14,346	14,346	14,346
Adjusted R-squared	0.157	0.122	0.156	0.122	0.156	0.122
Firm Fes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fes	Yes	Yes	Yes	Yes	Yes	Yes

Continuous variables are winsorized at the 1% and 99% levels. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

CHAPTER 3 Female CFOs and Stock Price Crash Risk

3.1 Introduction

In today's business world, the presence of women in leadership positions has become a key area of interest and policy discussion. In the United Kingdom, this focus has been reflected through several government-supported initiatives such as *The Davies Review*, *The Hampton-Alexander Review*, and the *FTSE Women Leaders Review*. These efforts have set voluntary targets to increase female representation on corporate boards and in executive roles. Notably, such initiatives have led to substantial progress. For instance, in 2024, women accounted for 24% of all FTSE 100 CFOs a significant rise from only 3% in 2005 (Vinnicombe et al., 2024). This shift has inspired a growing body of research examining how gender differences among top executives influence corporate decision-making and firm performance. Most studies find notable gender-based differences in risk tolerance and ethical behavior (Jianakoplos and Bernasek, 1998; Powell and Ansic, 1997; Schubert, 2006). For instance, female executives are often linked to more conservative financial reporting (Francis et al., 2015), enhanced transparency in disclosures (Ben-Amar et al., 2022), lower leverage ratios (Faccio et al., 2016; Schopohl et al., 2021); and a reduced likelihood of financial misreporting (Gupta et al., 2020).

Building on this literature, my research examines the impact of female CFOs on stock price crash risk, a phenomenon often attributed to the delayed release of bad news and lack of transparency in financial reporting. Prior studies have shown that opaque financial reporting practices significantly contribute to such crashes (Hutton et al., 2009; Jin and Myers, 2006). Drawing on evidence that female executives are generally more risk-averse and less overconfident than their male counterparts (Faccio et al., 2016; Huang and Kisgen, 2013), I expect them to engage in less risky investment behavior. Furthermore, given their tendency toward more conservative and transparent financial reporting, female CFOs are also less likely to withhold negative information. These behavioral traits are expected to reduce the likelihood of stock price crashes. Accordingly, I argue that firms led by female CFOs might be expected to be associated with lower stock price crash risk. This chapter assesses the empirical support for this hypothesis.

To examine this relationship, I use a sample of CFOs at publicly listed firms on the London Stock Exchange over the period 2000–2021. I focus on the role of the CFO rather than the CEO to examine the impact of gender on stock price crash risk. This is because the CFO is directly responsible for financial reporting quality, disclosure practices, and risk management, which are key drivers of crash risk, making this position particularly relevant for such an analysis (Hoitash et al., 2016). Following related literature (e.g., Hasan et al., 2023; Jebran et al., 2020), I measure stock price crash risk using the negative skewness of firm-specific weekly returns (*NCSKEW*) and the down-to-up volatility of firm-specific weekly returns (*DUVOL*). The main analysis employs OLS regressions with controls for time and industry fixed effects. My findings suggest that firms with female CFOs are associated with lower stock price crash risk, supporting my main hypothesis. To address potential endogeneity concerns related to selection on observable characteristics, I employ propensity score matching. This approach allows me to match firms with female CFOs to similar firms with male CFOs, ensuring that the matched sample shares comparable firm-level characteristics, except for the gender of the CFO. Additionally, I incorporate high-dimensional fixed effects to control for unobserved heterogeneity that could influence crash risk. Specifically, I include firm fixed effects and interacted year-industry fixed effects. These robustness checks reinforce my main findings and consistently indicate a negative and statistically significant association between female CFOs and stock price crash risk.

I further investigate whether the negative relationship between female CFOs and stock price crash risk is particularly significant in firms where the CEO is less powerful, in high opacity firms, and in high-risk firms. The motivation behind considering these specific conditions is that the influence of a CFO, particularly a female CFO, on firm outcomes may not be uniform across all organizational settings (Li and Zeng, 2019; Schopohl et al., 2021). In firms with less powerful CEOs, CFOs may have greater autonomy and influence in financial decision-making, allowing their individual risk preferences and ethical standards to manifest more clearly in reporting practices. Prior literature shows that female CFOs tend to be more conservative and risk-averse. Therefore, in the absence of strong CEO power, their ability to curb excessive risk-taking and limit the hoarding of bad news becomes more pronounced. Likewise, in high opacity firms, where information asymmetry is greater and financial reporting is less transparent, the role of the CFO becomes more crucial in shaping the quality of disclosure. In such environments, female CFOs' tendency toward more conservative disclosure and ethical reporting may help reduce crash risk. Similarly, in high-risk firms, the influence of a risk-averse CFO becomes particularly important. The conservative approach typically associated with female CFOs may help reduce the likelihood stock price crashes.

This study makes several important contributions to the literature on corporate governance, gender diversity in executive leadership, and stock price crash risk. First, it adds to the small but growing body of empirical research examining the relationship between female CFOs and stock price crash risk (Hasan et al., 2023; Li and Zeng, 2019) by providing new evidence from the UK. As noted by Schopohl et al. (2021), the UK offers a particularly suitable context for such investigations due to its distinctive corporate governance structure. For instance, CFOs in the UK tend to hold more significant responsibilities than their counterparts in the US (Florackis and Sainani, 2018).

Moreover, UK CEOs typically have less concentrated power than US CEOs (Keenan, 2004), thereby allowing for greater variation in the CFO's influence on firm-level outcomes. Second, this study contributes to the literature by demonstrating that female CFOs are associated with lower stock price crash risk; however, this relationship is contingent on the degree of autonomy they possess within the organization. Specifically, the negative association between female CFOs and crash risk is evident in firms characterized by less powerful CEOs, higher levels of information opacity, or greater exposure to risk. Hence, this exploration enriches the understanding of the gender-performance relationship by identifying the conditions under which female CFOs have a particularly pronounced effect in mitigating crash risk. Furthermore, this study provides important implications for policymakers and regulators. To enhance the influence and effectiveness of female CFOs, it is essential to consider the broader organizational context in which they operate. My findings indicate that factors such as CEO dominance and the firm's financial transparency environment play a significant role in shaping a female CFO's capacity to influence corporate policies. Therefore, policymakers should create an environment that grants female CFOs the autonomy necessary to influence corporate outcomes effectively.

The remainder of the study is structured as follows. Section 3.2 reviews the literature and states my hypotheses. Section 3.3 describes the dataset and explains the baseline methodology. Section 3.4 provides descriptive statistics and main empirical findings. Section 3.5 provides results for additional analysis. Section 3.6 tests the robustness of my results. Section 3.7 provides some concluding remarks.

3.2 Related Literature and Hypothesis Development

3.2.1 Stock Price Crash Risk

Stock price crash risk refers to the likelihood of a sudden and significant decrease in a firm's stock value, often triggered by the accumulation and delayed disclosure of negative information. Managers may strategically withhold adverse news to protect their own interests, such as maintaining compensation incentives or avoiding reputational damage, but once this suppressed information is eventually disclosed, the market can respond sharply, leading to a substantial stock price drop (Hutton et al., 2009; Kim et al., 2011b). Major corporations such as Enron and WorldCom are well-known examples of companies that collapsed due to concealing critical information from the public, ultimately resulting in significant stock price crashes (An et al., 2018). Consequently, understanding the underlying factors of stock price crash risk has become increasingly important for researchers, investors, and policymakers alike. Jensen and Meckling's (1976) Agency Theory provides a foundational framework to understand stock price crash risk. It highlights the conflicts of interest between shareholders and managers, where the latter may prioritize personal gains over shareholder value, leading to information asymmetry. The bad news hoarding hypothesis (Jin and Myers, 2006) builds on this framework, suggesting that managers' tendency to delay disclosure of negative news leads to an accumulation effect, thereby increasing the likelihood of a sudden market correction once the information is released. This risk is often amplified in environments with weak corporate governance or ineffective regulatory oversight, which fail to curb managerial opportunism and inadequate disclosure practices (Hutton et al., 2009).

Previous research has identified multiple factors that contribute to future stock price crash risk and has provided empirical evidence supporting the bad news hoarding theory. For instance, Hutton et al. (2009) show that firms with opaque financial reporting, measured through discretionary accruals as a common proxy for earnings management, tend to exhibit higher crash risk due to hidden firm-specific information. Similarly, Kim et al. (2011) find that aggressive corporate tax avoidance, often used to hide important financial information from investors, is positively associated with crash risk. Managers may employ tax strategies as a channel to conceal negative information, thereby increasing stock price crash risk. Conversely, mechanisms that promote transparency and accountability have been found to mitigate crash risk. For example, Kim and Zhang (2016) find that conditional conservatism in financial reporting, particularly in firms with high information asymmetry, can reduce the probability of future crashes by discouraging earnings overstatements. In the same vein, greater financial statement comparability improves transparency, thereby reducing stock price crash risk (Kim et al., 2016). Ertugrul et al. (2017) further support this notion by linking less readable and more ambiguous annual reports to greater crash risk. Earnings management practices, particularly real earnings management and earnings smoothing, have also been identified as contributors to crash risk. Francis et al., (2016) show that the risk is even more pronounced in the post-Sarbanes–Oxley era, while Chen et al. (2017) find that firms with fewer analysts, limited institutional ownership, and high discretionary accruals are especially vulnerable. These findings suggest that both the nature and context of earnings manipulation play a crucial role in shaping market outcomes.

The banking sector reflects similar findings. Du et al. (2016) find that banks operating in more transparent information environments have less stock price crash risk, while Cohen et al. (2014) find that earnings management and financial statements opacity increase crash risk in banks as in other industries. Finally, regulatory reforms, particularly those aimed at enhancing transparency, have been shown to curb stock price crash risk. DeFond et al. (2015) find that the mandatory adoption of International Financial Reporting Standards (IFRS) reduces crash risk, especially among firms with previously weak disclosure standards. This suggests that improving transparency through better accounting and disclosure standards effectively mitigates the risk of stock price crashes.

3.2.2 Female CFOs and Stock Price Crash Risk

An expanding body of research in finance and accounting investigates the influence of executive gender on corporate outcomes. CFOs in particular play a pivotal role in determining firms' financial disclosure quality, accounting policies, and risk management strategies. A CFO who is more conservative and transparent in financial reporting may mitigate the likelihood of accumulating hidden negative information that can lead to financial crashes.

The literature on stock price crash risk identifies financial reporting and corporate disclosures as key determinants of crash risk (Habib et al., 2018). As CFOs play a pivotal role in shaping a firm's financial policies and disclosures, their individual characteristics, such as gender, may influence the firm's risk exposure. Empirical studies suggest that female CFOs tend to be more conservative in their decision-making and risk tolerance. Consequently, the presence of a female CFO may influence stock price crash risk through several channels, including improved financial reporting and transparency, reduced earnings management, more cautious risk management practices, and conservative strategic financial decisions.

To assess the influence of female CFOs on stock price crash risk, it is important to consider their role within the broader literature on gender and corporate behavior. Several studies have found that female executives tend to enhance financial reporting quality and adopt more risk-averse management styles, both factors vital for maintaining stock price stability. For example, Huang and Kisgen (2013) find that male executives tend to be more overconfident than their female counterparts, often leading to riskier decisions such as more frequent acquisitions and higher debt issuance. In contrast, companies led by female executives exhibit greater caution and financial discipline. Supporting this, Barua et al. (2010) show that firms with female CFOs have higher accruals quality, while Peni and Vähämaa (2010) report that these firms are less likely to engage in earnings management, a distinction not observed between male and female CEO. Similarly, Francis et al. (2015) find that CFO transitions from male to female are associated with increased accounting conservatism. Gupta et al. (2020) further emphasize that female CFOs are less likely to be linked with financial statement irregularities, underscoring their commitment to ethical standards and transparent reporting. Complementary findings arise from broader research on gender diversity in corporate governance. Gul et al. (2011) show that gender-diverse boards are associated with higher stock price informativeness, largely due to improved transparency and reduced information asymmetry brought about by female directors. While direct research on the relationship between board gender diversity and stock price crash risk remains limited, studies like Qayyum et al. (2021) highlight that having three or more females on a board significantly reduces firm-specific crash risk, suggesting that critical mass matters in influencing corporate outcomes.

In recent years, empirical studies have started to examine the specific link between female CFOs and stock price crash risk. Li and Zeng (2019), analyzing U.S. firms from 2006 to 2015, find that those led by female CFOs have significantly lower future crash risk than those with male CFOs, reinforcing the idea that CFOs have more influence than CEOs in curbing bad news hoarding. Consistent with this, Hasan et al. (2023) report that firms with female CFOs in the U.S. from 1994 to 2015 exhibit lower crash risk, even after accounting for variables such as accounting conservatism, equity incentives, and the presence of female CEOs. Consistent evidence emerges from other regions as well. For instance, Wang and Fung (2022), show that in Taiwanese firms, female CFOs reduce tail risk through R&D-focused investment strategies, while female CEOs, who more frequently engage in mergers and acquisitions, may increase it. Nonetheless, not all studies yield consistent conclusions, and the context plays a significant role. For example, Jodinesa and Dony (2023), analyzing Indonesian firms from 2019 to 2021, find that female CFOs are associated with higher stock price crash risk. This result contradicts most previous studies and might be due to the distinctive sample traits or the short timeframe of analysis.

Building on this literature, the following hypothesis is proposed:

Hypothesis 1: *Firms with female CFOs exhibit a lower risk of stock price crashes than those with male CFOs.*

3.2.3 Powerful CEOs, Female CFOs, and Crash Risk

Building on the findings of Friedman (2014), Feng et al. (2011) and Al Mamun et al. (2020), I extend my analysis by exploring the power dynamics among top executives, focusing specifically on how CEO power moderates the relationship between female CFOs and stock price crash risk. This is motivated by prior research indicating that as CEOs gain more power, agency problems tend to intensify, often resulting in overinvestment in low-quality projects and a decline in shareholder value (Pan et al., 2016). Powerful CEOs have also been shown to choose investment projects for their personal benefit at the expense of shareholders thereby increasing the likelihood of stock price crashes (Al Mamun et al., 2020). Furthermore, powerful CEOs can exert significant influence over CFOs. Friedman (2014) demonstrates that such dynamics can pressure CFOs to manipulate earnings in ways that serve CEO compensation incentives. Similarly, Feng et al. (2011) find that CFOs often engage in accounting manipulations not out of personal financial motivation, but due to pressure from CEOs. This interaction becomes especially relevant when considering the more conservative financial behavior and lower risk tolerance typically associated with female CFOs. While female CFOs may seek to implement risk-mitigating strategies, such as limiting bad news hoarding that can trigger stock price crashes, their influence may be restricted in firms where CEO power is concentrated. Drawing on managerial discretion theory, which emphasizes the role of internal power structures in shaping executive influence (Wangrow et al., 2015), this study suggests that the impact of female CFOs on crash risk is conditional on CEO power. In organizations with less powerful CEOs, female CFOs are more likely to exert their risk-averse tendencies and influence corporate outcomes. In contrast, in firms dominated by powerful CEOs, especially those with dual CEO-chairman roles, female CFOs may face constraints that limit their ability to mitigate crash risk. Accordingly, I formulate the following hypothesis:

Hypothesis 2: *Female CFOs are more effective in reducing stock price crash risk in firms with less powerful CEOs.*

3.2.4 Information Opacity, Female CFOs, and Crash Risk

following the approach of Jebran et al. (2020) and in line with the agency theory of Jin and Myers (2006) which links stock price crash risk to information asymmetry between management and external investors, this study considers the role of corporate transparency in shaping crash risk. Prior research has shown that stock price crash risk tends to be higher in firms with greater information opacity (Hutton et al., 2009; Kim et al., 2011b). At the same time, studies have found that female CFOs are generally associated with enhanced financial transparency (Francis et al., 2015; Gupta et al., 2020). Accordingly, I expect the presence of a female CFO to have a stronger impact in reducing crash risk in firms characterized by higher opacity. While, in low opacity firms or more transparent firms, where the potential for further improvement is limited, the marginal impact of CFO gender on crash risk is likely to be less pronounced. Hence, I develop the hypothesis below:

Hypothesis 3*: Female CFOs are more effective in affecting stock price crash risk in firms with high opacity.*

3.2.5 Firm Risk, Female CFOs, and Crash Risk

Research indicates that gender-based behavioral differences in risk-taking are most relevant in firms where managing risk is a critical challenge, particularly in high-risk firms (Li and Zeng, 2019). Female CFOs are generally less likely to pursue aggressive or risky projects and are less likely to hide information (Croson and Gneezy, 2009; Gupta et al., 2020; Huang and Kisgen, 2013). Consequently, the behavioral contrast between male and female CFOs becomes more pronounced in high-risk environments, where the implications of risk-related decisions are magnified. In such settings, the conservative approach typically adopted by female CFOs has a greater impact on mitigating crash risk (Li and Zeng, 2019). Therefore, I argue that the negative association between female CFO presence and crash risk is more significant in high-risk firms. In contrast, in low-risk firms, where risk levels are already low, there is less opportunity for gender-based differences in risk behavior to affect crash outcomes, making the effect less observable. This discussion leads to the following hypothesis:

Hypothesis 4: *Female CFOs are more effective in reducing stock price crash risk in firms with high levels of risk.*

3.3 Research Design

3.3.1 Sample and Data Collection

My sample consists of CFOs at publicly listed firms on the London Stock Exchange, specifically covering the years 2000 through 2021. Following Florackis and Sainani (2018) and Schopohl et al. (2021), I utilize the BoardEx database to identify CFOs by selecting individuals holding specific roles such as CFO, Chief Financial Officer, Finance Director (FD), Group Finance Director (GFD), and Executive Director (Finance). Board-level characteristics are also obtained from BoardEx, while firm-level financial data are obtained from Thomson Reuters Datastream.

Consistent with prior studies on crash risk (Hutton et al., 2009; Kim et al., 2011b), I exclude observations with (i) non-positive book values and total assets, (ii) fiscal year-end prices of less than $1, (iii) fewer than 26 weeks of stock return data, (iv) missing values. Furthermore, I exclude firms from the finance and utility sectors due to their distinct corporate structures. To minimize the impact of outliers, I winsorize all continuous variables at the 1^{st} and 99^{th} percentiles. The final sample consists of 11,347 firm-year observations across 1,448 unique firms.

3.3.2 Econometric Model and Variables Description

To examine the impact of CFO gender on firm-specific future stock price crash risk, I estimate the following model:

$$Crash\ Risk_{j,t+1} = \beta_0 + \beta_1\ FemaleCFO_{j,t} + \sum \beta_i\ Control\ Variables_{j,t}\ + YearFE + IndustryFE + \varepsilon_{j,t} \qquad (1)$$

The dependent variable in this study, $Crash\ Risk_{j,t+1}$, represents the future crash risk of company j in year $t + 1$ and is measured using either negative conditional skewness of firm-specific returns ($NCSKEW_{(t+1)}$) or down-to-up volatility ($DUVOL_{(t+1)}$). The main independent variable of interest, $FemaleCFO_{j,t}$, is defined as a dummy variable taking the value one if the CFO of firm j in year t is a woman, and zero otherwise. Additionally, the empirical model includes a comprehensive set of board-level, firm-level, and director-level control variables ($Control\ Variables_{j,t}$), previously identified in the literature as significant determinants of firms' stock price crash risk. The analysis also controls for year fixed effects and industry fixed effects and clustered standard errors at both firm and year level. Detailed definitions and computations of all variables are provided in sections 3.3.2.1 and 3.3.2.2.

3.3.2.1 Dependent Variable: Firm Specific Crash Risk

Following Chen et al. (2001) and Kim et al. (2011b), the main measures of stock price crash risk, $NCSKEW$ and $DUVOL$, are computed using residuals derived from the expanded market model, as specified in Equation (2). Employing residuals from this model ensures that the crash risk measures capture firm-specific factors rather than broader market movements.

$$r_{j,t} = \alpha_j + \beta_{1,j} r_{m,t-2} + \beta_{2,j} r_{m,t-1} + \beta_{3,j} r_{m,t} + \beta_{4,j} r_{m,t+1} + \beta_{5,j} r_{m,t+2} + \varepsilon_{j,t} \qquad (2)$$

Where $r_{j,t}$ is the return on stock j in week t and $r_{m,t}$ is the return on the FTSE All-Share Index in week t. To correct for non-synchronous trading, lead and lag variables are included in the model, as recommended by Dimson (1979).

The firm-specific weekly return for firm j in week t ($W_{j,t}$) is calculated in Eq. (3) as the natural logarithm of one plus the residual return from Eq. (2). The natural log transformation decreases the positive skewness observed in the distribution of stock returns, and thus enhances symmetry (Chen et al., 2001).

$$W_{j,t} = Ln(1 + \varepsilon_{j,t}) \qquad (3)$$

I then calculate the first measure of stock price crash risk, the negative coefficient of skewness ($NCSKEW$), by taking the negative of the third moment of firm-specific weekly returns for each sample year and dividing it by the standard deviation of firm-specific weekly returns raised to the third power. $NCSKEW$ for firm j in year t is calculated as follows:

$$NCSKEW_{j,t} = -\left[n(n-1)^{3/2} \sum W_{j,t}^{3}\right] / \left[(n-1)(n-2)\left(\sum W_{j,t}^{2}\right)^{3/2}\right] \qquad (4)$$

Where n is the number of firm-specific weekly returns during the fiscal year t. The negative sign is used at the beginning of the $NCSKEW$ equation so that a higher value of $NCSKEW$ indicates a higher crash risk and vice versa (Chen et al., 2001; Kim et al., 2014).[5]

The second measure of crash risk is the down-to-up volatility ($DUVOL$). For each firm j in year t, the firm-specific weekly returns are divided into two groups: “the down weeks”, which are all the

[5] Scaling the raw third moment by the normalization factor allows for comparison across stocks with different variances (Chen et al., 2001).

weeks with firm-specific weekly returns below the annual mean and "the up weeks", which are firm-specific returns above the annual mean. I then compute the standard deviation of firm-specific weekly returns for each group separately and employ the natural logarithm of the ratio of the standard deviation of the down weeks to the standard deviation of the up weeks:

$$DUVOL_{j,t} = \log\{[(n_u - 1)\sum_{DOWN} W_{j,t}^2]/[(n_d - 1)\sum_{UP} W_{j,t}^2]\} \quad (5)$$

Where n_u and n_d are the number of up and down weeks, respectively. A higher value of $DUVOL$ indicates a higher crash risk and vice versa (Kim et al., 2014). I then forward these two measures by one year so that my dependent variables $NCSKEW_{(t+1)}$ and $DUVOL_{(t+1)}$ refer to one year ahead in the future.

3.3.2.2 Independent Variable of Interest and Control Variables

The main independent variable of interest, $FemaleCFO_{j,t}$, is a binary indicator denoting whether the firm has a female CFO. Following prior literature, I control for the following variables that are found to be associated with a firm's stock price crash risk. Chen et al. (2001) suggest that firms with higher past return skewness, higher past stock volatility, and higher past returns tend to have increased stock price crash risk. Accordingly, I control for the prior stock price crash risk $NCSKEW_{(t)}$, measured as the negative skewness (third moment) of firm-specific weekly returns for fiscal year t; the volatility $Sigma_{(t)}$ or the second moment of firm-specific weekly stock returns for fiscal year t; and the mean $Return_{(t)}$ representing the first moment of firm-specific weekly returns for fiscal year t. Chen et al. (2001) also show that trading volume, a proxy for investor belief heterogeneity, predicts stock price crash risk. Therefore, I control for changes in detrended stock trading volume $Dturn_{(t)}$, calculated as the difference between the mean monthly stock turnover in year t and the mean monthly stock turnover in year $t-1$, where monthly stock turnover represents monthly trading volume divided by the total shares outstanding during the month (Kim et al., 2011). Research has documented a positive effect of firm size and market-to-book value ratio on crash risk (Chen et al., 2001; Hutton et al., 2009). Accordingly, I control for both variables in the analysis. Firm size, denoted as $Ln(total\ assets)_{(t)}$, is computed as the natural logarithm of total assets. Market-to-book ratio, denoted as $Mtb_{(t)}$, is measured as the market value of equity over the book value of equity. I also control for $Leverage_{(t)}$, which is computed as the ratio of total debt to total assets at the end of fiscal year t, as it has been found to have a negative effect on stock price crash risk according to Hutton et al. (2009) and $Ln(Firm\ age)_{(t)}$ calculated as the natural logarithm of the number of years since a firm has been listed on the exchange.

In addition to this, I control for a set of board characteristics. Specifically, I control for CEO duality, denoted as $Duality_{(t)}$, which equals one when the CEO also serves as the Chairman of the Board, and zero otherwise. This control accounts for the potential positive correlation between CEO duality and crash risk as denoted by Chen et al. (2015). I control for $Board\ size_{(t)}$, estimated as the natural logarithm of the number of directors on the board, and $Board\ independence_{(t)}$, calculated as the percentage of independent directors relative to the total directors at the end of fiscal year t, as both are expected to have a negative effect on crash risk (Jebran et al., 2020). I also control for the percentage of non-British directors on the board, denoted by $\%\ non - British\ directors_{(t)}$, at the end of the fiscal year t. In addition, I apply year fixed effects and industry fixed effects to control for variation in stock price crash risk across time and sectors. Table A.3.1 in the appendix of this chapter presents the variable definitions and data sources used in this study.

3.4 Descriptive Statistics and Empirical Results

3.4.1 Descriptive Statistics

Table 3.1 reports the descriptive statistics. The stock price crash risk variables, $NCSKEW_{(t+1)}$ and $DUVOL_{(t+1)}$, have means (standard deviations) of 0.163 (1.242) and 0.015 (0.518), respectively. These figures align closely with findings from previous studies examining crash risk measures in the UK (e.g., Albert et al., 2025). With respect to board and executive characteristics, 8.7% of CFOs in the sample are female. On average, 9.7% of board members are women, while 18.3% are non-British. Approximately 54.5% of directors are classified as independent, and 4.7% of CEOs also hold the position of board chair. In terms of firm characteristics, the average leverage is 0.16, the mean firm size is 11.8, and the average market-to-book value ratio is 3.204. These statistics are also consistent with findings from prior UK-based studies (e.g., Schopohl et al., 2021).

Table 3.1 Summary Statistics

This table reports the descriptive statistics for crash risk measures, Female CFO, board characteristics, and firm characteristics. The sample consists of all firms listed on the London Stock Exchange over the period 2000-2021. All variables are defined in table A.3.1 in the Appendix.

VARIABLES	N	Mean	SD	Min	Max	P25	P50	P75
Crash Risk Measures								
$NCSKEW_{(t+1)}$	11,347	0.163	1.242	-6.428	7.051	-0.484	0.040	0.604
$DUVOL_{(t+1)}$	11,347	0.015	0.518	-2.484	3.033	-0.307	-0.016	0.280
$FemaleCFO_{(t)}$	11,347	0.087	0.282	0.000	1.000	0.000	0.000	0.000
Firm Characteristics								
$NCSKEW_{(t)}$	11,347	0.170	1.191	-6.428	8.487	-0.464	0.039	0.592
$Dturn_{(t)}$	11,347	0.000	0.048	-0.456	0.569	-0.011	0.000	0.010
$Sigma_{(t)}$	11,347	0.053	0.035	0.001	0.710	0.031	0.044	0.064
$Return_{(t)}$	11,347	-0.002	0.003	-0.087	0.039	-0.002	-0.001	0.000
$Ln(total\ assets)_{(t)}$	11,347	11.810	2.176	6.114	17.940	10.25	11.630	13.23
$Leverage_{(t)}$	11,347	0.160	0.155	0.000	0.869	0.013	0.130	0.264
$Mtb_{(t)}$	11,347	3.204	6.406	0.030	142.400	1.090	1.850	3.360
$Opacity_{(t)}$	11,347	1.917	2.669	0.000	29.890	0.540	1.031	2.077
Board Characteristics								
$Ln(number\ of\ directors)_{(t)}$	11,347	1.890	0.316	0.693	3.091	1.609	1.946	2.079
$\%\ non-British\ directors_{(t)}$	11,347	0.183	0.233	0.000	0.900	0.000	0.000	0.300
$CEO\ duality_{(t)}$	11,347	0.047	0.212	0.000	1.000	0.000	0.000	0.000
$Board\ independance_{(t)}$	11,347	0.545	0.165	0.000	1.000	0.429	0.571	0.667
$Ln(Firm\ age)_{(t)}$	11,347	3.370	0.501	1.609	4.094	2.996	3.332	3.738

3.4.2 Correlation Matrix

Table 3.2 presents the Pearson correlation matrix of the variables in the sample. The two crash risk measures, $NCSKEW_{(t+1)}$ and $DUVOL_{(t+1)}$, are highly positively correlated at 0.959, indicating that they capture similar dimensions of crash risk. The results also show a significant negative correlation between the presence of a female CFO and $DUVOL_{(T+1)}$ and a negative but statistically insignificant correlation with $NCSKEW_{(t+1)}$. These findings provide preliminary support for Hypothesis 1, which suggests that firms with female CFOs are associated with lower crash risk. Furthermore, the correlations between crash risk measures and control variables are generally consistent with prior literature. Most correlation coefficients are below 0.50, suggesting that multicollinearity is not a major concern in the analysis

Table 3.2 Correlation Matrix

This reports the pairwise correlation of the variables over the period 2000-2021. All continuous variables are winsorized at the 1% and 99% percentiles before the correlation analysis. All variables are defined in Appendix(A). ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$NCSKEW_{(t+1)}$(1)	1						
$DUVOL_{(T+1)}$ (2)	0.959***	1					
$FemaleCFO_{(t)}$(3)	-0.0168	-0.0187*	1				
$NCSKEW_{(t)}$(4)	0.0447***	0.0393***	-0.0175	1			
$Dturn_{(t)}$(5)	-0.00281	-0.00578	-0.00669	0.0141	1		
$Sigma_{(t)}$(6)	0.0127	-0.0169	-0.00660	0.339***	0.0482***	1	
$Return_{(t)}$(7)	-0.00581	0.0166	0.0116	-0.306***	-0.0562***	-0.884***	1
$Ln(total\ assets)_{(t)}$(8)	0.0129	0.0470***	-0.0364***	0.0445***	-0.0307**	-0.349***	0.244***
$Leverage_{(t)}$(9)	0.0124	0.0274**	-0.0199*	0.0195*	0.0155	-0.0838***	0.0529***
$Mtb_{(t)}$(10)	0.0224*	0.0193*	0.00603	0.0170	-0.00407	0.0314***	-0.0222*
$Ln(number\ of\ directors)_{(t)}$(11)	0.00221	0.0284**	-0.0498***	0.0354***	-0.0128	-0.254***	0.181***
$\%\ non-British\ directors_{(t)}$ (12)	0.0127	0.0205*	-0.00641	0.0244**	-0.00818	-0.0139	-0.00480
$CEO\ duality_{(t)}$(13)	0.0186*	0.0135	-0.0186*	-0.0125	-0.00225	0.0191*	-0.0210*
$Board\ independance_{(t)}$(14)	0.00548	0.0193*	0.0158	0.0269**	-0.0281**	-0.115***	0.0773***
$Ln(Firm\ age)_{(t)}$(15)	-0.00975	0.00793	-0.0270**	-0.00589	-0.0316***	-0.258***	0.177***

Table 3.2 Correlation Matrix- Cont'd

	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
$Ln(total\ assets)_{(t)}(8)$	1							
$Leverage_{(t)}(9)$	0.412^{***}	1						
$Mtb_{(t)}(10)$	-0.0645^{***}	0.00665	1					
$Ln(number\ of\ directors)_{(t)}(11)$	0.677^{***}	0.253^{***}	0.0279^{**}	1				
$\%\ non-British\ directors_{(t)}\ (12)$	0.346^{***}	0.116^{***}	0.0165	0.321^{***}	1			
$CEO\ duality_{(t)}(13)$	-0.0906^{***}	-0.0625^{***}	-0.0177	-0.105^{***}	-0.0325^{***}	1		
$Board\ independance_{(t)}(14)$	0.424^{***}	0.163^{***}	0.0450^{***}	0.289^{***}	0.261^{***}	-0.168^{***}	1	
$Firm\ age_{(t)}(15)$	0.371^{***}	0.121^{***}	-0.0681^{***}	0.258^{***}	0.0511^{***}	0.0296^{**}	0.0536^{***}	1

3.4.3 Main Results

Table 3.3 examines the impact of female CFOs on a firm's stock price crash risk by estimating Equation (1). The results show that female CFOs significantly reduce a firm's crash risk across both measures: $NCSKEW_{(T+1)}$ and $DUVOL_{(T+1)}$. Specifically, the presence of a female CFO is significantly negatively associated with one-year-ahead crash risk, as estimated by both proxies. In terms of economic significance, a female CFO is associated with a 49% decrease in $NCSKEW_{(T+1)}$ at the mean (= 0.08 / 0.163) and a 246.66% decrease in $DUVOL_{(T+1)}$ at the mean (= 0.037 / 0.015). These results indicate that the effect of CFO gender on future stock price crash risk is not only statistically significant but also economically meaningful. The magnitude and significance of the Female CFO coefficient are comparable to those reported in previous literature (e.g., Li and Zeng, 2019). My findings align with hypothesis 1 and support existing literature suggesting that women are generally more risk-averse than men and are less likely to engage in behavior that increases crash risk. The estimated coefficients for the control variables are broadly consistent with prior research. Firms with higher prior crash risk, greater return volatility, higher past returns, and larger firm size tend to have higher future crash risk (Hasan et al., 2023; Jebran et al., 2020; Li and Zeng, 2019). Table 3.3 presents evidence supporting the notion that female CFOs can mitigate managerial incentives to withhold bad news, thereby decreasing the risk of stock price crashes. These findings align with the view that female CFOs are less likely to conceal unfavorable information and are more likely to enhance transparency, ultimately reducing the probability of future stock price declines.

Table 3.3 Female CFOs and Stock Price Crash Risk

This table reports the panel regression results for the OLS model examining the impact of female CFOs on future stock price crash risk. The sample covers 11,347 firm-year observations with non-missing values for all variables during the period 2000-2021. Columns (1) and (2) report results for the dependent variables, the two measures of stock price crash risk, $NCSKEW_{(T+1)}$ and $DUVOL_{(T+1)}$, respectively. The analysis controls for industry and year fixed effects, with results based on standard errors clustered by firm and year. Continuous variables are winsorized at the 1% and 99% levels. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Variables	(1) $NCSKEW_{(T+1)}$	(2) $DUVOL_{(T+1)}$
$FemaleCFO_{(t)}$	-0.080*	-0.037**
	(-1.894)	(-2.104)
$NCSKEW_{(t)}$	0.038***	0.016***
	(2.936)	(2.903)
$Dturn_{(t)}$	-0.222	-0.095
	(-0.871)	(-0.920)
$Sigma_{(t)}$	1.648**	0.272
	(2.204)	(0.881)
$Return_{(t)}$	13.967**	4.239
	(2.175)	(1.623)
$Ln(total\ assets)_{(t)}$	0.014	0.010**
	(1.408)	(2.423)
$Leverage_{(t)}$	0.058	0.028
	(0.661)	(0.778)
$Mtb_{(t)}$	0.004	0.001
	(1.456)	(1.448)
$Ln(number\ of\ directors)_{(t)}$	-0.034	0.001
	(-0.625)	(0.031)
$\%\ non-British\ directors_{(t)}$	0.060	0.024
	(1.019)	(1.003)
$CEO\ duality_{(t)}$	0.122**	0.045*
	(2.035)	(1.843)
$Board\ independance_{(t)}$	-0.000	-0.000
	(-0.388)	(-0.509)
$Ln(Firm\ age)_{(t)}$	-0.010	0.001
	(-0.365)	(0.105)
Intercept	0.254	-0.037
	(1.552)	(-0.555)
Observations	11,347	11,347
Adjusted R-squared	0.018	0.023
Industry dummy	Yes	Yes
Year dummy	Yes	Yes

3.5 Results for Additional Analysis

3.5.1 Powerful CEOs, Female CFOs, and Crash Risk

The main finding of this study is that female CFOs are associated with a lower risk of stock price crashes. However, prior research suggests that a manager's ability to influence corporate outcomes depends significantly on the power dynamics within the top management team, particularly between the CFO and CEO. For example, powerful CEOs have been shown to pressure CFOs into reporting biased financial measures and engaging in accounting manipulation to serve their personal incentives (Feng et al., 2011; Friedman, 2014). In line with this, Schopohl et al. (2021) found that while CFOs generally work to reduce leverage, indicating a more conservative financial strategy, this effect disappears in the presence of a powerful CEO, highlighting how executive influence can be conditional on the internal power structure. Building on this literature, Hypothesis 2 suggests that CEO power moderates the relationship between female CFOs and stock price crash risk. Specifically, I expect that the beneficial effect of having a female CFO, namely a reduced likelihood of crash risk, will be diminished when the CEO holds significant power.

To empirically test this, I follow Adams et al. (2005), who measure CEO power based on the concentration of leadership titles. In particular, I use $CEO\ duality_{(t)}$ as a proxy for CEO power, defined as a dummy variable equal to one if the CEO also serves as the board chair. This measure has been widely adopted in the literature, including in studies by Schopohl et al. (2021) and Li and Zeng (2019), to examine the influence of CEO power on corporate governance structures and financial outcomes. To explore the moderating role of CEO power, I divide the sample into firms with non-dual roles and those with dual roles. Table 3.4 presents the results of this subsample analysis. The coefficients on $FemaleCFO_{(t)}$ are significantly negative in the non-dual-role subsample (columns 1 and 2), whereas they are insignificant in the dual-roles subsample (columns

3 and 4). The results support the argument that CEO power has a significant impact on the ability of female CFOs to influence crash risk.

Table 3.4 The moderating role of CEO power on the relationship between female CFOs and stock price crash risk

This table reports the influence of female CFOs on future stock price crash risk based on CEO power. Columns (1) and (2) present the results for a sample without CEO duality, while columns (3) and (4) present the results for a sample with CEO duality. The analysis controls for industry and year fixed effects, with results based on standard errors clustered by firm and year. Continuous variables are winsorized at the 1% and 99% levels. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	CEO is Not Chairman		CEO is Chairman	
Variables	(1) $NCSKEW_{(T+1)}$	(2) $DUVOL_{(T+1)}$	(3) $NCSKEW_{(T+1)}$	(4) $DUVOL_{(T+1)}$
$FemaleCFO_{(t)}$	-0.087**	-0.041**	0.065	0.077
	(-2.049)	(-2.341)	(0.254)	(0.667)
$NCSKEW_{(t)}$	0.036***	0.015***	0.044	0.019
	(2.719)	(2.708)	(0.744)	(0.706)
$Dturn_{(t)}$	-0.182	-0.078	-0.736	-0.278
	(-0.700)	(-0.735)	(-0.584)	(-0.545)
$Sigma_{(t)}$	1.958**	0.403	-6.600	-3.130
	(2.573)	(1.289)	(-1.405)	(-1.585)
$Return_{(t)}$	14.425**	4.365	-27.571	-12.036
	(2.175)	(1.634)	(-0.699)	(-0.734)
$Ln(total\ assets)_{(t)}$	0.018*	0.012***	-0.093*	-0.029
	(1.766)	(2.760)	(-1.753)	(-1.389)
$Leverage_{(t)}$	0.051	0.025	0.018	0.019
	(0.568)	(0.673)	(0.038)	(0.099)
$Mtb_{(t)}$	0.004	0.001	0.018	0.001
	(1.470)	(1.528)	(0.816)	(0.158)
$Ln(number\ of\ directors)_{(t)}$	-0.026	0.004	-0.122	-0.039
	(-0.461)	(0.180)	(-0.498)	(-0.382)
$\%\ non-British\ directors_{(t)}$	0.044	0.020	0.357	0.094
	(0.738)	(0.788)	(1.030)	(0.674)
$Board\ independance_{(t)}$	-0.000	-0.000	0.001	0.000
	(-0.376)	(-0.512)	(0.117)	(0.218)
$Ln(Firm\ age)_{(t)}$	-0.015	-0.001	0.078	0.011
	(-0.545)	(-0.056)	(0.492)	(0.169)
Intercept	0.196	-0.063	1.772*	0.636
	(1.173)	(-0.927)	(1.897)	(1.624)
Observations	10,811	10,811	536	536
Adjusted R-squared	0.017	0.022	0.038	0.046
Industry dummy	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes

3.5.2 Information Opacity, Female CFOs, and Crash Risk

This study also investigates whether the mitigating effect of female CFOs on crash risk varies based on the firm's level of information opacity. By exploring this, I contribute to the literature on corporate governance, executive gender, and financial risk, offering insights into how leadership composition can shape firm-level outcomes in information-sensitive environments. To test this hypothesis, I estimate the effect of female CFOs on the two measures of crash risk, $NCSKEW_{(T+1)}$ and $DUVOL_{(T+1)}$, across firms with varying levels of firm opacity. Information opacity is proxied by the absolute value of discretionary accruals, as detailed in appendix (B) of this chapter. Firms are then classified into high- and low-opacity groups based on the median absolute value of discretionary accruals.[6] The results in Table 3.5 reveal a significant negative relationship between the presence of a female CFO and crash risk in the high-opacity group (columns 3 and 4), while the relationship is statistically insignificant in the low-opacity group (columns 1 and 2). These findings hold across both crash risk measures and suggest that the presence of a female CFO is particularly effective in reducing crash risk in environments characterized by greater information opacity.

3.5.3 Firm Risk, Female CFOs, and Crash Risk

To examine whether firm risk moderates the relationship between CFO gender and the likelihood of a stock price crash, I follow the approach of Li and Zeng (2019) by using the median value of firms' financial leverage to classify firms into low-risk and high-risk groups. Table 3.6 presents the results for these subsamples. The findings indicate that female CFOs are associated with a

[6] A similar approach was employed by Jebran et al. (2020).

statistically significant reduction in crash risk only among firms with above-median leverage. These results are consistent with Li and Zeng's (2019) findings, suggesting that the effect of CFO gender on crash risk is most evident in firms characterized by high risk levels.

Table 3.5 Female CFOs and Future Stock Price Crash Risk in Low and High Information Opacity Firms

This table reports the cross-sectional relation between female CFOs, future stock price crash risk, and information opacity. The subsamples are divided based on the median of Firm opacity. Columns (1) and (2) present the results for low information opacity firms, while columns (3) and (4) present the results for the high information opacity firms. The analysis controls for industry and year fixed effects, with results based on standard errors clustered by firm and year. Continuous variables are winsorized at the 1% and 99% levels. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Low Information Opacity		High Information Opacity	
	(1)	(2)	(3)	(4)
Variables	$NCSKEW_{(T+1)}$	$DUVOL_{(T+1)}$	$NCSKEW_{(T+1)}$	$DUVOL_{(T+1)}$
$FemaleCFO_{(t)}$	-0.039	-0.018	-0.119**	-0.053**
	(-0.663)	(-0.757)	(-1.974)	(-2.135)
$NCSKEW_{(t)}$	0.061***	0.022***	0.011	0.008
	(3.345)	(2.922)	(0.599)	(1.039)
$Dturn_{(t)}$	-0.098	-0.037	-0.367	-0.163
	(-0.294)	(-0.265)	(-0.969)	(-1.087)
$Sigma_{(t)}$	2.120**	0.493	0.551	-0.215
	(2.477)	(1.325)	(0.374)	(-0.381)
$Return_{(t)}$	21.309***	6.993**	-1.336	-1.763
	(3.294)	(2.424)	(-0.094)	(-0.333)
$Ln(total\ assets)_{(t)}$	0.012	0.008	0.013	0.011*
	(0.835)	(1.353)	(0.920)	(1.832)
$Leverage_{(t)}$	0.089	0.044	0.025	0.011
	(0.723)	(0.882)	(0.199)	(0.222)
$Mtb_{(t)}$	0.003	0.001	0.005	0.002
	(1.024)	(0.942)	(1.252)	(1.358)
$Ln(number\ of\ directors)_{(t)}$	0.046	0.036	-0.111	-0.033
	(0.602)	(1.137)	(-1.415)	(-0.986)
$\%\ non-British\ directors_{(t)}$	0.062	0.031	0.067	0.021
	(0.728)	(0.902)	(0.816)	(0.599)
$CEO\ duality_{(t)}$	0.151*	0.049	0.103	0.045
	(1.736)	(1.422)	(1.242)	(1.276)
$Board\ independance_{(t)}$	-0.000	-0.000	-0.001	-0.000
	(-0.088)	(-0.119)	(-0.440)	(-0.580)
$Ln(Firm\ age)_{(t)}$	-0.025	-0.007	0.000	0.008
	(-0.660)	(-0.431)	(0.011)	(0.501)
Intercept	0.210	-0.052	0.366	0.001
	(0.932)	(-0.562)	(1.502)	(0.006)
Observations	5,718	5,718	5,629	5,629
Adjusted R-squared	0.022	0.026	0.012	0.016
Industry dummy	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes

Table 3.6 Female CFOs and Future Stock Price Crash Risk in Low and High Financial Leverage Firms

This table reports the cross-sectional relation between female CFOs, future stock price crash risk, and financial leverage. The subsamples are divided based on the median of firm financial leverage. Columns (1) and (2) present the results for low financial leverage firms, while columns (3) and (4) present the results for the high financial leverage firms. The analysis controls for industry and year fixed effects, with results based on standard errors clustered by firm and year. Continuous variables are winsorized at the 1% and 99% levels. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Low Financial Leverage		High Financial Leverage	
Variables	(1) $NCSKEW_{(T+1)}$	(2) $DUVOL_{(T+1)}$	(3) $NCSKEW_{(T+1)}$	(4) $DUVOL_{(T+1)}$
$FemaleCFO_{(t)}$	-0.039	-0.020	-0.144**	-0.062**
	(-0.642)	(-0.835)	(-2.476)	(-2.508)
$NCSKEW_{(t)}$	0.034*	0.014*	0.039**	0.016**
	(1.883)	(1.826)	(2.106)	(2.096)
$Dturn_{(t)}$	-0.244	-0.070	-0.214	-0.128
	(-0.720)	(-0.508)	(-0.553)	(-0.825)
$Sigma_{(t)}$	1.536	0.246	1.711	0.306
	(1.517)	(0.623)	(1.533)	(0.607)
$Return_{(t)}$	16.072*	5.389*	9.493	2.082
	(1.957)	(1.791)	(0.949)	(0.444)
$Ln(total\ assets)_{(t)}$	0.012	0.010*	0.023	0.013**
	(0.830)	(1.704)	(1.623)	(2.115)
$Leverage_{(t)}$	-0.362	-0.192	0.162	0.082
	(-0.876)	(-1.138)	(1.058)	(1.328)
$Mtb_{(t)}$	0.004	0.001	0.003	0.001
	(1.116)	(1.005)	(0.933)	(1.129)
$Ln(number\ of\ directors)_{(t)}$	0.057	0.029	-0.132	-0.030
	(0.747)	(0.905)	(-1.644)	(-0.906)
$\%\ non-British\ directors_{(t)}$	0.140	0.051	0.000	0.002
	(1.606)	(1.432)	(0.002)	(0.056)
$CEO\ duality_{(t)}$	0.148*	0.058*	0.076	0.021
	(1.931)	(1.858)	(0.791)	(0.505)
$Board\ independance_{(t)}$	-0.000	-0.000	-0.001	-0.000
	(-0.041)	(-0.086)	(-0.785)	(-0.851)
$Ln(Firm\ age)_{(t)}$	-0.044	-0.018	0.023	0.018
	(-1.063)	(-1.047)	(0.632)	(1.202)
Intercept	0.226	-0.025	0.230	-0.063
	(0.944)	(-0.250)	(0.970)	(-0.649)
Observations	5,680	5,680	5,667	5,667
Adjusted R-squared	0.021	0.027	0.016	0.019
Industry dummy	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes

3.6 Robustness checks

3.6.1 Propensity Score Matching

My findings reveal a statistically and economically significant association between CFO gender and the risk of a stock price crash. However, concerns about selection bias remain, as firms that appoint female CFOs may systematically differ from those that do not based on certain observable characteristics. To address potential endogeneity and enhance causal inference, I implement propensity score matching following Rosenbaum and Rubin (1983). This technique helps construct a more balanced comparison by matching firms with female CFOs (treatment group) to similar firms with male CFOs (control group) based on observable firm-level characteristics.

First, I estimate a probit model where the dependent variable is $FemaleCFO_{(t)}$. The independent variables include all control variables listed in Table 3.3: $NCSKEW_{(t)}$, $Dturn_{(t)}$, $Sigma_{(t)}$, $Return_{(t)}$, $Ln(total\ assets)_{(t)}$, $Leverage_{(t)}$, $Mtb_{(t)}$, $Ln(number\ of\ directors)_{(t)}$, $\%\ non-British\ directors_{(t)}$, $CEO\ duality_{(t)}$, $Board\ independance_{(t)}$, $Ln(Firm\ age)_{(t)}$, as well as year fixed effects and industry fixed effects. Using the estimated propensity scores, I apply nearest-neighbor matching with a 1% caliper without replacement to create the matched sample. To evaluate the effectiveness of the matching procedure, I re-estimate the probit model using the matched sample. Panel (A) of Table 3.7 presents the results: Column (1) shows that smaller firms, those with smaller boards, younger firms, and firms with fewer CEO duality roles are more likely to appoint female CFOs. In contrast, Column (2), which represents the post-matching sample, shows no statistically significant coefficients. This suggests that the observable characteristics between the treatment and control groups are well-balanced post-matching. Further, I conduct difference-in-means tests and report the average values for both groups. Panel (B) of Table 3.7

confirms that none of the univariate test statistics are statistically significant, reinforcing the conclusion that the matched treatment and control groups have similar observable firm characteristics.

Finally, I re-estimate Equation (1) using the matched sample. Panel (C) of Table 3.7 shows that the negative association between female CFOs and future stock price crash risk remains robust. Specifically, both crash risk proxies $NCSKEW_{(t+1)}$ and $DUVOL_{(t+1)}$, are significantly lower for firms with female CFOs at the 5% level, even after controlling for endogeneity through the propensity score matching analysis. This result provides stronger evidence and supports the main hypothesis.

Table 3.7 Propensity Score Matching (PSM)

Panel (A)		
Panel (A) presents the coefficients from the probit model used to estimate the propensity scores. The dependent variable is $FemaleCFO_{(t)}$. Column (1) reports the pre-match propensity score regression whereas column (2) reports the post-match diagnostic regression. The model controls for year and industry fixed effects. Statistical significance is indicated by ***, **, and * for the 1%, 5%, and 10% levels, respectively.		
	(1)	(2)
Variables	pre-match	post-match
$NCSKEW_{(t)}$	-0.019	0.001
	(-1.208)	(0.027)
$Dturn_{(t)}$	-0.211	-0.184
	(-0.707)	(-0.290)
$Sigma_{(t)}$	0.086	1.013
	(0.096)	(0.368)
$Return_{(t)}$	11.406	14.307
	(1.420)	(0.434)
$Ln(total\ assets)_{(t)}$	-0.036***	0.013
	(-2.584)	(0.550)
$Leverage_{(t)}$	-0.035	0.274
	(-0.271)	(1.306)
$Mtb_{(t)}$	-0.002	-0.003
	(-0.701)	(-0.837)
$Ln(number\ of\ directors)_{(t)}$	-0.184**	-0.136
	(-2.270)	(-1.086)
$\%\ non-British\ directors_{(t)}$	0.083	-0.020
	(0.996)	(-0.142)
$CEO\ duality_{(t)}$	-0.183**	-0.040
	(-2.086)	(-0.253)
$Board\ independance_{(t)}$	0.001	0.000
	(0.687)	(0.020)
$Ln(Firm\ age)_{(t)}$	0.105***	-0.020
	(2.781)	(-0.306)
Intercept	-1.606***	-0.240
	(-6.181)	(-0.508)
Observations	11,335	1,972
Pseudo R^2	0.032	0.007
Industry dummy	Yes	Yes
Year dummy	Yes	Yes

Table 3.8 Cont'd

Panel (B)

Panel (B) reports the univariate comparisons of firm characteristics between treatment and control groups. In columns (1) and (2) I report the mean value of firm characteristics. In column (3), I report the differences between treatment and control groups. In column (4), I report the t-statistics of the univariate comparisons. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	(1) Treated	(2) Control	(3) Difference	(4) T-stat
$NCSKEW_{(t)}$	0.010	0.106	-0.096	-0.05
$Dturn_{(t)}$	-0.002	-0.001	-0.001	-0.46
$Sigma_{(t)}$	0.053	0.053	0.000	0.04
$Return_{(t)}$	-0.002	-0.002	0.000	0.19
$Ln(total\ assets)_{(t)}$	11.561	11.583	-0.022	-0.22
$Leverage_{(t)}$	0.150	0.144	0.006	0.93
$Mtb_{(t)}$	3.301	3.670	-0.369	-1.05
$Ln(number\ of\ directors)_{(t)}$	1.839	1.855	-0.016	-1.10
$\%\ non-British\ directors_{(t)}$	0.178	0.180	-0.002	-0.13
$CEO\ duality_{(t)}$	0.345	0.037	0.308	-0.24
$Board\ independance_{(t)}$	55.400	55.637	-0.237	-0.32
$Ln(Firm\ age)_{(t)}$	3.326	3.330	-0.004	-0.15

Panel (C)

Panel (C) compares the results between the unmatched and matched samples. Columns (1) and (2) show results for the unmatched sample. Columns (3) and (4) present results for the PSM sample. All control variables are included in all regressions but not reported for brevity. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Unmatched Sample		**Matched Sample**	
	(1) $NCSKEW_{(t+1)}$	(2) $DUVOL_{(t+1)}$	(3) $NCSKEW_{(t+1)}$	(4) $DUVOL_{(t+1)}$
$FemaleCFO_{(t)}$	-0.080*	-0.037**	-0.129**	-0.056**
	(-1.894)	(-2.104)	(-2.251)	(-2.379)
Intercept	0.254	-0.037	0.529	0.144
	(1.552)	(-0.555)	(1.411)	(0.901)
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes
Adjusted R-squared	0.018	0.023	0.009	0.017
Observations	11,347	11,347	1,972	1,972

3.6.2 High-Dimensional Fixed Effects

A key limitation of propensity score matching is that it only accounts for observable firm characteristics, potentially leaving the analysis subject to bias arising from unobserved heterogeneity. For instance, the relationship between female CFOs and stock price crash risk may be influenced by time-varying heterogeneity across industries or firm-specific unobservables. To address this concern, and in line with recent literature such as Li and Zeng (2019) and Schopohl et al. (2021), I follow the recommendation of Gormley and Matsa (2014) by employing a high-dimensional fixed effects model. Specifically, I control for both firm and interacted industry-year fixed effects in equation (1). As shown in Table 3.8, the results remain consistent with the baseline findings: the presence of a female CFO is significantly negatively associated with future stock price crash risk. The estimated coefficients for the $NCSKEW_{(t+1)}$ and $DUVOL_{(t+1)}$ measures are -0.123 and -0.055, respectively, both significant at the 5% level. These findings reinforce the robustness of the initial results and provide additional support that female CFOs reduce stock price crash risk.

Table 3.9 High-Dimensional Fixed Effects Model

This table reports the high-dimensional fixed effects model estimation results for the influence of female CFOs on future stock price crash risk, controlling for firm and interacted industry-year fixed effects. t-statistics are reported in parentheses and ***, ** and * indicate significance at the 1%, 5% and 10% level respectively.

Variables	(1) $NCSKEW_{(T+1)}$	(2) $DUVOL_{(T+1)}$
$FemaleCFO_{(t)}$	-0.123**	-0.055**
	(-2.141)	(-2.277)
$NCSKEW_{(t)}$	-0.059***	-0.025***
	(-5.206)	(-5.199)
$Dturn_{(t)}$	-0.150	-0.085
	(-0.599)	(-0.818)
$Sigma_{(t)}$	-0.518	-0.324
	(-0.568)	(-0.852)
$Return_{(t)}$	8.595	3.139
	(1.023)	(0.896)
$Ln(total\ assets)_{(t)}$	0.219***	0.095***
	(7.476)	(7.775)
$Leverage_{(t)}$	-0.260*	-0.124**
	(-1.795)	(-2.053)
$Mtb_{(t)}$	0.008***	0.003***
	(3.235)	(3.207)
$Ln(number\ of\ directors)_{(t)}$	0.007	0.018
	(0.092)	(0.536)
$\%\ non-British\ directors_{(t)}$	-0.005	-0.027
	(-0.046)	(-0.566)
$CEO\ duality_{(t)}$	0.005	0.009
	(0.052)	(0.247)
$Board\ independance_{(t)}$	-0.003**	-0.001**
	(-2.023)	(-2.141)
Intercept	-2.224***	-1.036***
	(-6.523)	(-7.288)
Observations	11,165	11,165
Adjusted R-squared	0.061	0.066
Firm Fixed Effects	Yes	Yes
Year#Industry Fixed Effects	Yes	Yes

3.7 Summary

In this study, I investigate the impact of female CFOs on stock price crash risk. Using a sample of UK-listed public firms, I find a negative and statistically significant relationship between the presence of female CFOs and stock price crash risk. I validate my results through robustness checks, including a matched sample analysis and the use of a high-dimensional fixed effects model. Furthermore, I find that this negative association is context dependent. Specifically, the relationship is more pronounced in firms with less powerful CEOs, higher levels of information opacity, or greater exposure to risk. These findings contribute to the literature on stock price crash risk and corporate risk-taking by identifying specific conditions under which female CFOs are associated with reduced crash risk.

Appendix To Chapter 3

Table A. 3.1 Variables Definitions and Data Sources

Variable	Definition	Source
$NCSKEW_{(t+1)}$	The negative coefficient of skewness of firm specific weekly returns over the fiscal year (Chen et al., 2001).	Datastream
$DUVOL_{(t+1)}$	The natural logarithm of the ratio of the standard deviation of firm specific weekly returns for the "down-week" sample to the standard deviation of firm specific weekly returns for the "up week" sample over the fiscal year (Chen et al., 2001).	Datastream
$FemaleCFO_{(t)}$	A dummy variable equal to one if the CFO is female, zero otherwise at the end of the fiscal year.	Boardex
$NCSKEW_{(t)}$	The negative coefficient of skewness of firm specific weekly returns at the end of fiscal year.	Datastream
$Dturn_{(t)}$	The detrended stock trading volume at the end of fiscal year.	Datastream
$Sigma_{(t)}$	The volatility of firm specific weekly stock returns at the end of fiscal year.	Datastream
$Return_{(t)}$	The mean of firm-specific weekly stock returns at the end of fiscal year.	Datastream
$Ln(total\ assets)_{(t)}$	The natural logarithm of total assets at the end of fiscal year.	Datastream
$Leverage_{(t)}$	The ratio of total debt to total assets at the end of fiscal year.	Datastream
$Mtb_{(t)}$	The Market-to-Book value of equity at the end of fiscal year.	Datastream
$Ln(number\ of\ directors)_{(t)}$	The natural logarithm of the number of directors on the board.	Boardex
$\%\ non-British\ directors_{(t)}$	The percentage of non-British directors on the board at the end of the fiscal year.	Boardex
$Board\ independance_{(t)}$	The percentage of independent directors over total directors at the end of fiscal year.	Boardex
$CEO\ duality_{(t)}$	A dummy variable equal to one if the Chief Executive Officer is also the Chairman, zero otherwise.	Boardex
$Ln(Firm\ age)_{(t)}$	The natural logarithm of the number of years since a firm has been listed in the exchange at the end of the fiscal year.	Datastream
$Opacity_{(t)}$	The absolute value of discretionary accruals from the Modified Jones Model.	Datastream

Appendix (B)

Following Jebran et al. (2020), I measure information opacity as the absolute value of discretionary accruals. To compute this, I employ the modified Jones model (Dechow et al., 1995) where I estimate the following cross-sectional Equation in each industry-year.[7]

$$\frac{TACC_{it}}{TA_i} = b_1\left(\frac{1}{TA_i}\right) + b_2\left(\frac{\Delta Sales_{it}}{TA_i}\right) + b_3\left(\frac{PPE_{it}}{TA_i}\right) + e_{it}$$

Where:

$TACC_{it}$: Net income before extraordinary items minus operating cash flow

TA_i: Average of total assets

$\Delta Sales_{it}$: change in revenues

PPE_{it}: property, plant, and equipment

I then obtain the estimates of b_1, b_2, and b_3 from the cross-sectional regressions and estimate discretionary accruals as per the below equation where ΔREC_{it} is the change in receivables:

$$DACC_{it} = \frac{TACC_{it}}{TA_i} - \left[\widehat{b_1}\left(\frac{1}{TA_i}\right) + \widehat{b_2}\left(\frac{\Delta Sales_{it} - \Delta REC_{it}}{TA_i}\right) + \widehat{b_3}\left(\frac{PPE_{it}}{TA_i}\right)\right]$$

[7] Similarly to Harakeh et al. (2019) the industry classification is based on the Datastream variable 'INDM2'.

CHAPTER 4 Bond Market Reaction to Female Executive Appointment Announcements

4.1 Introduction

Over the last few decades, women have gradually climbed the corporate ladder to reach senior executive roles, yet they continue to be significantly underrepresented in these positions. For instance, figures from 2024 show that women occupy only 11.8% of C-suite roles in publicly traded U.S. firms (Chiang et al., 2024). Persistent gender disparities in leadership roles have led to significant research on the effects of female executives on company outcomes, including strategic decisions and financial performance (Faccio et al., 2016; Francis et al., 2015; Huang and Kisgen, 2013; Peni and Vähämaa, 2010). In parallel, studies have shown that investors respond sensitively to corporate releases and announcements (Antweiler and Frank, 2006; Neuhierl et al., 2013), highlighting the importance of perception and signaling in financial markets.

Building on these strands of literature, a crucial aspect of ongoing research is understanding how capital markets respond to the appointment of females in leadership positions. Changes in leadership are major corporate events that can have a substantial impact on what investors anticipate. When a company announces a new CEO or CFO, markets may react by reevaluating the firm's future strategy and perceived level of risk. As more women have assumed executive leadership positions in the United States, understanding how these appointments are perceived by financial markets has become increasingly important. While a significant amount of research has focused on how stock markets respond to such appointments, the reaction of the bond market remains under-explored (Oyotode - Adebile et al., 2015). This leads to an important question: how do bond investors respond when a female is appointed to the role of CEO or CFO?

Exploring this question is vital, as bonds play a major role in financing firms but are often neglected when assessing the impact of corporate events on firm value. This can lead to incomplete or misleading conclusions about firm outcomes and market perception (Maul and Schiereck, 2016). Bondholders and stockholders differ in their interests; while creditors prioritize downside risk and long-term financial stability, shareholders are generally more focused on maximizing earnings growth and short-term returns (Merton, 1974). As a result, these two investor groups may react differently to the same corporate events. For instance, Adams and Mansi (2009) document different responses between equity and debt markets following CEO successions, and Wei and Yermack (2011) demonstrate that bond and stock markets can move in opposite directions in response to CEO compensation structures. Furthermore, Jensen and Meckling (1976) suggest that offering managers incentives that have equal proportions of debt and equity mitigates the agency cost of debt in leveraged firms. These findings highlight the necessity of examining both markets to gain a comprehensive understanding of investor sentiment.

This event study seeks to address this gap in the literature by investigating how the U.S. corporate bond market responds to announcements of female CEO and CFO appointments, and by assessing whether bondholder reactions differ based on the executive's role, CEO versus CFO, as well as the nature of the appointment, specifically whether the executive is an internal or external hire. I also compare the bond market reaction to that of the equity market to explore potential differences in investor sentiment and risk assessment between bondholders and shareholders in response to female leadership transitions.

In this chapter, the focus of the analysis shifts from the UK to the US market, primarily due to data availability. The TRACE database, which offers comprehensive daily trade data for corporate bonds, is limited to the US bond market. Given the research question, examining bond market reaction to female executive appointments, access to high-frequency bond trade data is essential. Additionally, the analysis draws on a uniquely constructed, hand-collected dataset that captures the precise announcement dates of CEO and CFO appointments, along with detailed characteristics of each appointment. Consequently, the US market provides the most appropriate and data-rich context for addressing this research question.

This study focuses on the 2004–2018 period, as this period provides data coverage from both TRACE and ExecuComp while also capturing a time of increasing attention to gender diversity in corporate leadership. I adopt an event study approach because it enables the isolation of short-term market reactions to specific announcements, thereby minimizing the influence of unobserved or hard-to-measure confounding factors that are unlikely to change over such a very short period. Furthermore, I complement the event study with cross-sectional regression analysis, as the primary interest lies in examining cross-firm variation in abnormal returns at the time of the announcement, rather than within-firm dynamics over time.

The rest of the paper is organized as follows. Section 4.2 discusses the previous literature. Section 4.3 explains the data and sample construction. Section 4.4 outlines the methodology. Section 4.5 provides descriptive statistics and discusses the empirical results. Section 4.6 provides robustness checks. Section 4.7 concludes.

4.2 Literature review

There is a substantial body of research in finance examining how female executives influence firm outcomes, often in comparison to their male counterparts. Studies have focused on the distinct risk preferences and decision-making styles of female executives, particularly CEOs and CFOs, and how these differences shape firm performance, financial reporting quality, and market reactions.

In general, the literature finds that female executives tend to adopt more conservative approaches in both financial reporting and strategic decision-making. For example, Faccio et al. (2016) show that firms led by female CEOs tend to have lower leverage, less volatile earnings, and higher survival rates compared to otherwise similar firms with male CEOs. Likewise, Huang and Kisgen (2013) find that male executives are more likely to pursue large acquisitions and issue debt, whereas female executives tend to exhibit more cautious decision-making in corporate policies. Interestingly, Huang and Kisgen (2013) also find that the market reacts more favorably to major decisions such as acquisitions and capital market decisions made by firms with female executives. Specifically, acquisitions by firms with male executives have announcement returns approximately 2% lower than those made by firms with female executives, and similar patterns hold for debt issuances. Other related research further supports the notion that female CFOs contribute to this broader narrative of conservatism and enhanced governance. For example, Peni and Vähämaa (2010) find that firms with female CFOs engage in more conservative earnings management practices, resulting in higher financial reporting quality. These findings suggest that the market may perceive decisions by female executives as more value-enhancing, potentially due to the more cautious approach they tend to adopt.

4.2.1 Equity Market Reactions to Female Executive Appointments

A growing body of literature has examined how stock markets respond to executive appointments, with particular attention to the role of gender. This interest has been driven by the persistent underrepresentation of women in top executive roles and the potential implications for investor behavior. For instance, Lee and James (2007) analyzed stock market reactions to female CEO appointments in U.S. firms between 1990 and 2000. They found that announcements of female

CEO appointments are met with significantly more negative investor reactions compared to their male counterparts. Notably, the negative response is less pronounced when the female CEO is promoted from within the firm, suggesting that internal candidates face less uncertainty than external appointees. The authors argue that such investor responses may reflect underlying gender biases and stereotypes, particularly concerns about whether women can fit the traditional "tough" leader image of a CEO. In contrast, Martin et al. (2009), using a U.S. sample from 1992 to 2007, found no significant difference in the immediate stock market reaction to CEO appointments based on gender. However, they observe a subsequent decline in stock return volatility following the appointment of a female CEO, supporting the notion that female executives tend to pursue more risk-averse strategies than their male counterparts. Extending the analysis beyond the U.S., Brinkhuis et al. (2018), using an international sample of 15 countries covering the period 2004–2014, examined stockholder responses to 100 announcements of female top executives replacing male counterparts. They found no significant abnormal stock price reaction to female CEO or CFO appointments. The authors conclude that, in this broader international context, stockholders do not value the appointment of female executives significantly differently from that of males. Early evidence often pointed to negative investor reactions to the appointment of females to top executive roles, largely driven by uncertainty and gender-based stereotypes. However, as the number of female appointments increased and gender diversity became more normalized in corporate leadership, stock market responses appear to have shifted, becoming mainly insignificant. This may suggest that the uncertainty once associated with female leadership has diminished over time, and investors may no longer perceive gender as a relevant signal of risk or competence. Therefore, I formulate the following hypotheses:

Hypothesis 1: *The stock market exhibits a statistically significant difference in its reaction to the announcement of female executive appointments compared to male executive appointments.*

4.2.2 Bond Market Reactions to Female Executive Appointments – Existing Evidence

Unlike the equity market, research on bond market reactions to executive appointments remains limited. One of the few notable studies is by Adams and Mansi (2009), who examine CEO turnover events in U.S. firms between 1973 and 2000. Their findings reveal a divergence in stakeholder responses, bondholders tend to react negatively to CEO turnover announcements, whereas shareholders respond positively. This suggests conflicting interests between debt and equity holders in response to changes in leadership. Regarding gender-specific responses, a working paper by Oyotode - Adebile et al. (2015) is among the earliest to explore the bond market's reaction to female CEO appointments. Analyzing a sample of U.S. firms consisting of 65 matched female and male CEO appointments, they report negative abnormal bond returns following female CEO appointments, in contrast to positive reactions for male appointments. However, a key methodological limitation undermines the timing precision of their results. The study uses the CEO's official start date rather than the actual appointment announcement date. As a result, it fails to capture the bond market's immediate reaction, as the market likely incorporated the information when the appointment was initially publicly disclosed. In a recent study, Yur-Austin et al. (2024) analyze a large panel of U.S. corporate bond data from 2002 to 2019 to examine the long-term impact of CEO gender transitions on firms' credit risk. They find that the appointment of female CEOs is associated with a reduction in credit risk, which subsequently leads to lower bond yields and bond return volatility over time. While their research emphasizes the long-term effects of female leadership on the bond market, this study focuses on the immediate bond market reaction to executive female appointments, specifically around the announcement day.

Given that bondholders are highly sensitive to governance quality and financial transparency, it is possible that executive gender, through its association with differing governance and reporting practices, could influence their reaction to leadership appointments. Prior research demonstrates that bondholders price in information uncertainty and asymmetry, demanding a significant risk premium when such concerns are elevated (Lu et al., 2010). Similarly, bondholders view real earnings management as a default credit risk factor, which leads to higher cost of debt (Ge and Kim, 2014). The importance of corporate governance in bond pricing is further emphasized by Schauten and Blom (2006), who find that firms with higher governance quality benefit from lower debt costs. In the same vein, Prevost et al. (2008) show that poor earnings quality, proxied by high discretionary accruals, leads to higher bond yields due to increased perceived information risk.

These dynamics are particularly relevant in the context of gender-diverse leadership. A growing body of literature suggests that female executives are associated with improved earnings quality (Srinidhi et al., 2011), more conservative financial reporting (Francis et al., 2015), and stronger corporate governance structures (Francoeur et al., 2008). Such characteristics might be viewed favorably by bondholders, who prioritize long-term stability and transparency. Within the agency framework of Jensen and Meckling (1976), female leadership may be more inclined to adopt corporate policies that align managerial behavior with the interests of debtholders, thereby reducing the agency costs of debt.

Building on this literature, firms led by female CEOs or CFOs are generally expected to maintain lower leverage and demonstrate more stable growth patterns, reflecting their risk-averse and conservative management approaches. For bondholders, these traits are particularly desirable, as lower leverage and reduced earnings volatility imply a lower probability of default (Traczynski, 2017). Consequently, bondholders may respond positively to the appointment of a female executive. Conversely, male executives, who on average may pursue more aggressive financial strategies, could be perceived as increasing firm risk, potentially leading to a less favorable bond market reaction. This contrast points to the potential for gender-based differences in abnormal bond returns following executive appointments.

However, the appointment of a female executive may also be perceived by bondholders as a source of initial uncertainty, particularly in traditionally male-dominated corporate environments. Despite the long-term benefits associated with female leadership, such as enhanced governance and risk mitigation, bond investors may adopt a cautious, 'wait-and-see' stance in the short term. As a result, the immediate bond market reaction could be neutral or even negative due to market unfamiliarity with gender-diverse leadership transitions. Hence, I formulate the following hypotheses:

Hypothesis 2: *The bond market exhibits a statistically significant difference in its reaction to the announcement of female executive appointments compared to male executive appointments.*

Although there is growing scholarly interest in gender and leadership, the literature does not offer a definitive understanding of how bondholders respond to the appointment of female executives. Most prior research has focused on equity markets, leaving the bondholder perspective relatively unexplored. Given the distinct risk exposures and priorities of bondholders, such as governance quality, financial stability, and default risk, their reactions may diverge significantly from those of shareholders. This study is the first to examine bond market responses to female CEO and CFO appointment announcements, thereby addressing a critical gap in the literature at the intersection of gender, executive leadership, and credit market behavior. Accordingly, this study investigates whether bondholders react differently to the appointment announcements of female executives and whether their response diverges from that of shareholders.

Further, existing research suggests that the context in which an executive is appointed plays a crucial role in shaping investor perceptions. For example, Lee and James (2007) and Furtado and Rozeff (1987) find that internal hires are generally perceived more positively by investors than external hires, due to their familiarity with firm-specific operations. Similarly, Adams and Mansi (2009) document that bondholders react negatively to external CEO turnovers, reinforcing the notion that outsider appointments introduce greater uncertainty. However, these findings are not uniform. For instance, Charitou et al. (2010) find positive abnormal returns surrounding the announcement of outsider CEO appointments, suggesting that markets may sometimes interpret external leadership as an opportunity for improved future performance. These mixed findings highlight the complexity of investor sentiment toward executive appointments. Accordingly, this study seeks to offer a more comprehensive understanding of how bondholders interpret changes in executive leadership, with a particular emphasis on the interaction between gender dynamics and appointment type, whether internal or external.

4.3 Data and Sample Construction

This study utilizes a sample of CEOs and CFOs from the S&P 1500 companies. I begin by identifying CEO and CFO turnovers between 2002 and 2018 using the ExecuComp database, which provides information on executive compensation. The announcement dates of these appointments are then manually collected from the Dow Jones Newswires, resulting in 581 female

CEO and CFO announcements based on the earliest available announcement date for each appointment.

Additionally, I gather information on the gender of the previous CEO/CFO to construct gender transition groups. I also collect data on the nature of each appointment, specifically whether it involves an internal or external hire and whether it is an interim or non-interim appointment. For certain cases where data was incomplete or unavailable through news sources, I refer to SEC filings, primarily 8-K and 10-K reports, to obtain the required appointment details.

To examine bond market reaction, I use the TRACE database to obtain daily bond trade data for firms that experienced female executive appointment events. TRACE provides corporate bond transaction data since July 1, 2002, thereby my sample period starts from 2002. After obtaining bond daily trades, only 279 female appointment announcement events remain over a sample period of 2004 to 2018. This reduction is due to several factors: (1) some announcements belong to firms without outstanding bonds, (2) certain bonds matured before the executive appointment date, (3) some bonds were issued after the appointment date, and (4) others were called, exchanged, or converted prior to the announcement.

To ensure data quality, I apply the SAS cleaning code developed by Dick-Nielsen (2009) to address common TRACE reporting errors by removing trades flagged as cancelled, corrected, reversed, or involving commissions.

Following the methodology of Ederington et al. (2015) and Bessembinder et al. (2009), I exclude trades classified as "when issued" or "special price," those with special sale conditions attached, transactions under $100,000, and trades flagged by TRACE's "as of" indicator, which denotes irregular timing. Additionally, I remove trades executed at prices below $25 per $100 par value, often interpreted as effectively in default, as well as those with settlement dates more than one week in the future.

I further obtain bond characteristics data from the Thomson Reuters database[8] and apply the bond trade cleaning procedure outlined by Ederington et al. (2015). Consistent with this approach, I restrict the sample to bonds that are non-convertible, non-puttable, and non-zero coupon; denominated in USD; have a $1,000 par value; pay semi-annual coupons; are not in default; and have a remaining maturity between one and fifty years.

I match the female executive sample with a male executive sample based on the year of the appointment announcement, executive role (CEO or CFO), industry classification, and firm size. Industry is classified using the Fama and French 10 industry groupings, and firm size is measured by total assets. Where possible, each female appointment is matched with multiple male appointments. To ensure consistency, I apply the same data cleaning process to bond trades and bond characteristics for male events.

The cleaned and matched sample initially includes 418 executive appointment announcements, 128 female appointments matched with 290 male appointments, corresponding to 135,382 daily bond trades. However, after computing bond returns, the final bond sample consists of 271 appointments (83 females and 188 males) incorporating 53,257 bond trades and 1277 bonds within the 11-day event window around the announcement date (-5 days; + 5 days). Accordingly, the sample size for the bond event study is 271 events, while the equity event study retains the full 418 events sample.

[8] I obtain maturity date, type of bond, coupon payment, coupon frequency, coupon type, par amount, currency, call announcement date, tender notice date, tender expiration date, default bonds, default date, callable bond, call date, convertible bonds, puttable bonds, bankruptcy date.

The sample size is consistent with prior bond event studies, which typically feature fewer observations than equity-based studies due to the smaller number of bond-issuing firms (Bessembinder et al., 2009). Moreover, the sample size highlights two notable challenges in corporate finance: the underrepresentation of women in senior executive roles and the relatively illiquid nature of corporate bond markets, which results in the exclusion of several events due to insufficient trading activity.

4.4 Methodology

4.4.1 Abnormal Bond Returns

To accurately measure abnormal bond returns, I adopt the methodology outlined by Bessembinder et al. (2009), who demonstrate that using TRACE intraday bond data significantly enhances the statistical power of performance tests compared to monthly data. I compute daily bond prices using the "trade-weighted price" method, which weights each trade by its size and excludes trades below $100,000. This approach reduces the noise from small, potentially less informative trades and places greater emphasis on institutional transactions.[9]

To compute abnormal bond returns, I use a benchmark matched portfolio based on bonds rating and maturity. In cases where firms have multiple outstanding bonds, I apply the "firm-level approach," where the firm's abnormal return is calculated as the weighted average of its bonds'

[9] Institutional trades have relatively lower execution cost which might reveal a more precise price of the bond (Bessembinder et al., 2009).

abnormal returns. This method provides a more comprehensive and accurate reflection of the impact of corporate events on firm value.

Furthermore, I account for heteroskedasticity as recommended by Ederington et al. (2015) who find that bond return volatility tends to increase with longer maturity and lower credit ratings, violating the assumption of homoskedasticity. To mitigate this issue and enhance test reliability, I standardize bond returns in line with their recommendation.

4.4.1.1 Constructing the average daily bond price

To construct the average daily bond price (P), I remove trades under $100,000 and apply the "trade-weighted price" method, weighting each trade by the square root of its size[10]. I then calculate the raw bond returns, RR (−1, +1), two-day returns from day *t − 1* to day *t + 1*, using the following formula:

$$RR\ (-1, +1) = \ln(P_{t+1}) - \ln(P_{t-1})$$

where, RR (−1, +1) represents the difference between the natural logarithms of the average daily bond prices on days *t + 1* and *t – 1*.

4.4.1.2 Abnormal standardized returns (ABSR)

Ederington et al. (2015) demonstrate that correcting for heteroskedasticity by standardizing bond returns using time-series standard deviations over non-event periods results in more powerful tests. Following their approach, I standardize each bond's raw return by dividing it by its standard deviation (σ_i), calculated over the non-event period. Specifically, I compute the standard deviation of 2-day returns for each bond around event date using observed 2-day returns over the (t–55, t–

[10] Ederington et al. (2015) apply the "trade-weighted price" approach using three different weighting methods: trade size, the square root of trade size, or equally and find that the square root method gives more powerful tests.

6) and (t+6, t+55) period. This yields the standardized raw return (SRR) for the event window (−1, +1):

$$SRR(-1,+1) = \frac{RR(-1,+1)}{\sigma_i}$$

To compute the abnormal standardized returns ABSR (t – 1, t + 1), I construct 24 benchmark portfolios based on combinations of credit rating and maturity. Specifically, I use six Moody's rating categories[11]—Aaa and Aa, A, Baa, Ba, B, and below B—and four maturity groupings: 1–3 years, 3–5 years, 5–10 years, and over 10 years. For each bond, I identify its corresponding rating/maturity portfolio and calculate the portfolio's standardized benchmark return (SBM) as the average SRR of all bonds within that group.

Then to obtain the standardized benchmark SBM $(-1, +1)_n$, I average the standardized raw returns of bonds that belong to the same rating/maturity portfolio. Finally, I calculate abnormal standardized returns ABSR (t – 1, t + 1) as:

$$\text{ABSR}\ (t-1, t+1)_n = \text{SRR}\ (-1, +1)_n - \text{SBM}\ (-1, +1)_n$$

4.4.1.3 Firms with more than one bond

Unlike equities, a firm may have multiple bonds outstanding. In such cases, I follow the "Firm-Level Approach" proposed by Bessembinder et al. (2009), calculating the firm abnormal standardized return as the value-weighted average of the abnormal standardized returns (ABSR) for each bond issued by the firm.

[11] In case Moody's bonds rating is not available, I use Standard & Poor's bond rating

4.4.1.4 Event window

Ederington et al. (2015) highlight that using a short event window, such as (t − 1, t + 1), can significantly reduce the sample size in bond market studies. This is because firms may not have any trades on the days immediately surrounding the event. Moreover, due to the infrequent nature of bond trading, firms might only have one or two trades on days *t − 1* and *t + 1*, which introduces considerable noise into the standardized bond return calculation. On the other hand, increasing the event window would bring in more unrelated news or information into the abnormal bond return calculation.

To address this, Ederington et al. (2015) study the impact of increasing the event window and find that doing so significantly increases the sample size and improves the power of statistical tests. Importantly, they recommend assigning more weight to windows closer to the event date to average out unrelated information, while still capturing the main market response.

Given that executive turnovers are rare, non-recurrent events, and that female executives remain underrepresented in top management, my sample is relatively small. However, this limitation is consistent with prior studies examining the impact of female executive presence on corporate events (Huang and Kisgen, 2013; Lee and James, 2007). Accordingly, I expand the event window to include five days before and five days after the event.

Following Ederington et al. (2015), I calculate the abnormal standardized returns ABSR{t - 5, t + 5} by averaging the returns of ABSR over the windows (t – 5, t + 1), (t – 5, t + 2), (t – 5, t + 3), (t – 5, t + 4), (t – 5, t + 5), (t – 4, t + 1), (t – 4, t + 2), (t– 4, t + 3), (t – 4, t + 4), (t – 4, t + 5), (t – 3, t + 1), (t – 3, t + 2), (t – 3, t + 3), (t – 3, t + 4), (t –3, t + 5), (t – 2, t + 1), (t – 2, t + 2), (t – 2, t + 3), (t – 2, t + 4), (t – 2, t + 5), (t – 1, t + 1), (t – 1, t + 2), (t – 1, t + 3), (t – 1, t + 4) and (t – 1, t + 5) as long as they can be calculated. This approach allocates more weight to trades closer to the event date as the standard deviation of the abnormal bond returns increases as the event window increases. For example, I divide by the standard deviation of 2-day returns to calculate the abnormal bond return for the (t − 1, t + 1) interval, and by the standard deviation of 3-day returns for the (t − 1, t + 2) interval.

4.4.2 Abnormal Stock Returns

following prior similar research (e.g., Brinkhuis et al., 2018), abnormal stock market returns are computed using the market model (MacKinlay, 1997). The event day *(t = 0)* is defined as the date on which the appointment of the top executive is publicly announced. First, I calculate the actual stock return for firm *j* as the natural logarithm of the ratio of the firm's share price on day *t* to its share price on the previous trading day (*t–1*), as follows:

$$R_{j,t} = ln\left(\frac{P_{j,t}}{P_{j,t-1}}\right)$$

Daily abnormal returns (ARs) for firm *j* at day *t* are then computed as the difference between actual stock return and market portfolio return using the following equation:

$$AR_{j,t} = R_{j,t} - (\alpha_j + \beta_j \cdot R_{m,t})$$

Where I apply CRSP value-weighted index as the market portfolio. $R_{m,t}$ is the return of the market at day *t*; α_j and β_j are parameters in the market model; α_j is the intercept term and β_j is systematic risk. Following Adams and Mansi (2009), the estimation period for the daily market coefficients is comprised of 255 trading days, ending 31 days before the announcement date. Average abnormal returns (AARs) are then obtained by dividing the sum of the ARs by the number of events *N*. In event studies, researchers often examine multi-day event windows to account for the time market participants may need to become aware of the event or to reflect uncertainty regarding the speed at which the event's effects are incorporated into security prices (Campbell et al., 2010). Accordingly, my analysis considers several event windows surrounding the announcement day: (-3,+3); (-1, +1); (-1 , 0); (0 , +1). The cumulative abnormal return for stock *j* over the event window of days T1 through T2 is computed as:

$$CAR_j(T_1, T_2) = \sum_{t=T_1}^{T_2} AR_{j,t}$$

And the cumulative average abnormal returns (CAARs) are calculated by taking the average of the individual CARs as follows:

$$CAAR(T_1, T_2) = \frac{1}{N}\sum_{j=1}^{N} CAR_j(T_1, T_2)$$

To determine significance, I use both parametric and non-parametric tests. The first is a standardized cross-sectional test (Boehmer et al., 1991). In event studies, the variance of abnormal returns changes due to the event itself. Therefore, the "standardized cross-sectional test" takes this into account and uses standardized abnormal returns (SARs) rather than abnormal return (ARs) as in the ordinary cross-sectional test and is calculated as follows:

$$t_{scs} = \frac{\frac{1}{N}\sum_{j=1}^{N} SAR_{j,t}}{\sqrt{\frac{1}{N(N-1)}\sum_{j=1}^{N}\left[SAR_j - \frac{1}{N}\sum_{j=1}^{N} SAR_j\right]^2}}$$

$$SAR_{j,t} = \frac{AR_{j,t}}{\sqrt{Var\left(\varepsilon_{AR_j}\right)}}$$

In addition, Corrado's non-parametric rank test is used (Corrado, 1989). This rank test procedure estimates abnormal returns by ranking daily returns over the estimation and event windows together as one single time series. Each day's abnormal return for a given stock-event pair is assigned a rank by increasing order. $K_{j,t}$ denotes the rank of the abnormal return $AR_{j,t}$ for stock-event j on day t and T_{total} represents the total number of days in the combined estimation and event period. The test statistics are calculated using the formula:

$$Z_R = d^{1/2} \frac{\overline{K}_D - m_{rank}}{\left[\sum_{t=1}^{T_{total}} (\overline{K}_t - m_{rank})^2 / T_{total}\right]^{1/2}}$$

Where:

- $\overline{K}_D$ is the average rank across the n securities and d days of the event window.
- m_{rank} is the mean rank.
- $\overline{K}_t$ is the average rank across n stocks on the day t of the combined T_{total} day estimation and event period.
- d is the number of days in the event window.

4.5 Descriptive Statistics and Empirical Results

4.5.1 Descriptive statistics

Table 4.1 presents the annual distribution of executive appointment announcements by gender over the sample period. The data reveals a gradual increase in female executive appointments, particularly in the latter half of the period. Female announcements remained relatively low until 2011 but began to rise more noticeably from 2012 onward. A sharp increase is observed in 2016, marking the highest number of female appointments in the sample. This spike is also reflected in media reports highlighting a record number of female CEOs in 2017.[12] Table 4.2 presents the distribution of executive appointment announcements across the Fama and French 10 industry classifications. Most executive appointments fall under the "Other" category, which includes industries such as mining, construction, building materials, transportation, hospitality, business services, entertainment, and finance, accounting for 51.29% of the total sample. Table 4.3 further breaks down appointments by type and role. Most appointments are internal hires (67.9%), with 184 inside versus 87 outside appointments. Interim appointments are relatively rare, representing only 10.3% of the sample. Most executives were appointed to CFO roles (70.1%), while CEO appointments accounted for just 29.9%. Table 4.4 shows that A-rated bonds comprise the largest share of the sample at 49.02%, while only 0.31% of bonds fall into the Below B category. The average bond maturity is 9.51 years, with a balanced distribution across short-, medium-, and long-term maturities. Table 4.5 provides a summary statistic of the key variables later used in the analysis. All variables are defined in Table A.4.1 in the appendix of this chapter.

[12] For further information, check https://fortune.com/2017/06/07/fortune-women-ceos/

Table 4.1 The Annual Distribution of Executive Appointment Announcements by Gender

Year	No. of Female Announcements	No. of Male Announcements	Total Number of Announcements	% Total Number of Announcements
2004	1	3	4	1.48%
2005	1	2	3	1.11%
2006	6	17	23	8.49%
2007	2	12	14	5.17%
2008	3	10	13	4.80%
2009	5	4	9	3.32%
2010	2	3	5	1.85%
2011	7	16	23	8.49%
2012	9	16	25	9.23%
2013	4	17	21	7.75%
2014	8	15	23	8.49%
2015	7	19	26	9.59%
2016	19	30	49	18.08%
2017	8	23	31	11.44%
2018	1	1	2	0.74%
Total	83	188	271	100%

Table 4.2 The Distribution of Executive Appointment Announcements Over the Fama and French 10 Industry Classifications

Fama and French 10 industry classifications	Freq.	Percent
Consumer Non-Durables: Food, Tobacco, Textiles, Apparel, Leather, Toys	20	7.38
Manufacturing: Machinery, Trucks, Planes, Chemicals, Off Furn, Paper, Com Printing	51	18.82
Oil, Gas, and Coal Extraction and Products	5	1.84
Business Equipment: Computers, Software, and Electronic Equipment	10	3.69
Telephone and Television Transmission	3	1.11
Wholesale, Retail, and Some Services (Laundries, Repair Shops)	23	8.49
Healthcare, Medical Equipment, and Drug	2	0.74
Utilities	18	6.64
Other: Mines, Constr, BldMt, Trans, Hotels, Bus Serv, Entertainment, Finance	139	51.29

Table 4.3 The Distribution of Executive Appointment Announcements by Type, Gender, and Role

	All Sample	Female Sample	Male Sample
Panel A - Inside/Outside Appointment			
Inside Appointment	184	51	133
Outside Appointment	87	32	55
Total	271	83	188
Panel B- Interim/Non-interim Appointment			
Interim Appointment	28	7	21
Non-Interim Appointment	243	76	167
Total	271	83	188
Panel C- CEO/CFO Appointment			
CEO Appointment	81	25	56
CFO Appointment	190	58	132
Total	271	83	188

Table 4.4 The Distribution of Bonds by Credit Rating and Maturity Structure

Bond Rating	**N**	**Percent**
Aaa & Aa	127	9.95%
A	626	49.02%
Baa	414	32.42%
Ba	62	4.86%
B	44	3.45%
Below B	4	0.31%
Total	1277	100%

Maturity Group	**N**	**Percent**
1-3 years	278	21.77%
3-5 years	268	20.99%
5-10 years	429	33.59%
Over 10 years	302	23.65%
Total	1277	100%

	N	**Mean**	**Std. Dev.**	**Min**	**Max**
Maturity (years)	1277	9.51	8.99	1.01	49.69

Table 4.5 Descriptive Statistics of Key Variables Used in the Analysis

Variables	N	Mean	SD	Min	Max	P25	P50	P75
ABSR{-5,+5}	271	-0.0375	0.831	-2.958	2.614	-0.334	0.00864	0.322
ABSR{-3,+3}	227	-0.0053	0.804	-3.045	2.595	-0.253	0.00778	0.322
ABSR(-1,+1)	142	-0.0399	0.788	-2.819	2.595	-0.378	0.000168	0.298
Female_Executive	271	0.306	0.462	0	1	0	0	1
Ln (Executive_Age)	271	3.914	0.130	3.526	4.277	3.829	3.912	3.989
Inside_Appointment	271	0.679	0.468	0	1	0	1	1
Executive_Role	271	0.701	0.459	0	1	0	1	1
Interim_Appointment	271	0.103	0.305	0	1	0	0	0
Firm_Size	271	10.15	1.794	6.174	14.67	8.893	10.13	11.12
Leverage	271	0.249	0.190	0	1.575	0.101	0.227	0.340
ROA	271	0.0880	0.185	-2.598	0.525	0.0329	0.0902	0.138
Market to Book	271	3.350783	6.36058	-13.443	46.865	1.393	1.998	3.216
Female_Percentage	237	0.180	0.0891	0	0.417	0.111	0.182	0.231

4.5.2 Main Results

This section presents the main results where I first perform univariate analyses to detect abnormal returns in bonds and stocks around the date of the female executive appointment announcement. Panel (A) of Table 4.6 presents the univariate analysis of Abnormal Standardized Bond Returns (ABSR) around executive appointment announcement dates. The ABSR values for the overall sample are negative across all event windows; however, none are statistically significant. This indicates that, in general, bond markets do not exhibit a significant reaction to executive appointment announcements.

To assess whether investors react differently to the appointment of female versus male executives, the difference in mean ABSR is calculated as the mean ABSR for female appointments minus the mean ABSR for matched male appointments. The test statistics show that these differences are not statistically significant across any event window. Therefore, I conclude that bond investors do not appear to differentiate between the appointment of male and female executives.

To understand whether bondholders react differently based on the gender of the previous executive, specifically when a female executive is appointed following a male, I examine the ABSR across different gender transition groups. Panel (B) of Table 4.6 presents the univariate analysis of ABSR by gender transition groups, namely male-to-male, male-to-female, female-to-male, and female-to-female transitions. For male-to-male transitions, the ABSR values are negative across all event windows, but none are statistically significant, indicating no meaningful bond market reaction. For male-to-female transitions, while the ABSR is more negative in the shortest window (−1,+1), it is not statistically significant. Interestingly, the ABSR turns positive in the widest window {-5,+5}, yet still remains statistically insignificant. The results for female-to-male and female-to-female transitions, although based on small sample sizes, show positive ABSR values in the wider event windows, particularly for female-to-female transitions, but again, the associated p-values are well above any conventional threshold for statistical significance. Overall, these results suggest that bondholders do not significantly react to executive appointments based on gender transition patterns, reinforcing the earlier conclusion that gender does not appear to drive bond market responses to top executive appointments.

Table 4.6 Bond Market Reactions Surrounding Executive Appointment Announcements Dates

Panel (A) presents the bond market's response to announcements of female executive appointments. Panel (B) presents the results by gender transition groups. ABSR refers to Standardized Abnormal Bond Returns. Date ranges in braces (e.g., {-3,+3}) denote a composite return from day -3 to day +3 including all possible ABSR as defined in Ederington et al., 2015).

Panel (A)

	All Sample			Female Sample			Male Sample			Difference in Mean Standardized Abnormal Bond Returns (female-Male)		
	N	Mean	t-test (p-value)	N	Mean	t-test (p-value)	N	Mean	t-test (p-value)	N	Mean	t-test (p-value)
ABSR (-1,+1)	142	-0.03989	0.5472	43	-0.10126	0.437	99	-0.01323	0.8635	142	-0.08803	0.5594
ABSR {-3,+3}	227	-0.00539	0.9196	70	-0.01773	0.8517	157	0.000111	0.9986	227	-0.01784	0.8765
ABSR {-5,+5}	271	-0.03754	0.4579	83	0.050144	0.5759	188	-0.07625	0.2139	271	0.12639	0.2446

Panel (B)

	male-to-male transitions			male-to-female transitions			female-to-male transitions			female-to-female transitions		
	N	Mean	t-test (p-value)	N	Mean	t-test (p-value)	N	Mean	t-test (p-value)	N	Mean	t-test (p-value)
ABSR (-1,+1)	97	-0.01284	0.8702	38	-0.14568	0.2974	2	-0.03227	0.7964	5	0.236324	0.5557
ABSR {-3,+3}	154	-0.00819	0.9012	64	-0.02747	0.776	3	0.426374	0.1455	6	0.086166	0.8521
ABSR {-5,+5}	185	-0.08362	0.1788	76	0.045219	0.6241	3	0.378385	0.1238	7	0.103613	0.7949

I further investigate whether the bond market reacts differently to changes in general management (CEO) versus financial leadership (CFO), and whether gender influences these reactions. Table 4.7 presents the ABSRs around the executive appointment announcements, based on executive role (CEO vs. CFO) and gender. Overall, while there is a consistent tendency for more negative bond market reactions to CEO appointments compared to CFO appointments, none of the results are statistically significant. When classified by gender, female CEO appointments are associated with more negative ABSRs across all event windows relative to male CEOs, but these differences are also not statistically significant. In contrast, female CFO appointments exhibit slightly more positive ABSRs than their male counterparts, particularly in longer windows, though again, the differences lack statistical significance. These findings suggest that the bond market does not exhibit a statistically significant reaction to executive appointments based on role or gender.

Table 4.8 presents the mean Standardized Abnormal Bond Returns following executive appointment announcements, categorized by type of appointment (inside vs. outside) and executive gender. This analysis is important for understanding how bondholders perceive leadership continuity vs. change, and whether this perception varies based on the gender of the appointee. The results indicate that the bond market does not exhibit a statistically significant differential response between inside and outside appointments overall. However, the market reacts more positively to outside female appointments than to male ones over the wider event window {-5,+5}, with the difference being statistically significant at the 5% level. In contrast, table 4.8 also provides statistically significant evidence (at the 5% level) that the bond market reacts more negatively to inside female appointments compared to male ones in the short term (−1,+1). In general, the findings suggest that there is no significant immediate reaction from the bond market to the appointment of female executives overall. However, when the sample is further classified by appointment type, a notable pattern emerges. Bondholders react more favorably to outside female appointments than outside male counterparts, while inside female appointments are met with a relatively more negative reaction than inside males. This market response may indicate that bondholders perceive externally appointed female executives as potentially bringing in less risky decision-making and conservative financial strategies. On the other hand, the more negative reaction to inside female hires could suggest uncertainty or a lack of confidence in internally promoted females, possibly due to perceived alignment with existing internal practices.

Table 4.7 Bond Market Reactions Surrounding Executive Appointment Announcements Dates by Executive Role and Gender

	CEO Appointments			CFO Appointments			Difference in Mean Standardized Abnormal Bond Return (CEO-CFO)		
	N	Mean	t-test (p-value)	N	Mean	t-test (p-value)	N	Mean	t-test (p-value)
ABSR (-1,+1)	44	-0.1007	0.4661	98	-0.0126	0.8648	142	-0.0881	0.573
ABSR {-3,+3}	72	-0.1159	0.3028	155	0.0459	0.4319	227	-0.1618	0.2015
ABSR {-5,+5}	81	-0.1379	0.1593	190	0.0052	0.929	271	-0.1431	0.2093

	Female CEO Appointments			Male CEO Appointments			Difference in Mean Standardized Abnormal Bond Return for CEOs by gender (female CEO-male CEO)		
	N	Mean	t-test (p-value)	N	Mean	t-test (p-value)	N	Mean	t-test (p-value)
ABSR (-1,+1)	15	-0.2529	0.3123	29	-0.0219	0.8968	44	-0.2311	0.4379
ABSR {-3,+3}	23	-0.1687	0.3353	49	-0.0911	0.5301	72	-0.0776	0.7302
ABSR {-5,+5}	25	-0.1420	0.3629	56	-0.1361	0.2754	81	-0.0059	0.976

	Female CFO Appointments			Male CFO Appointments			Difference in Mean Standardized Abnormal Bond Return for CFOs by gender (female CFO-male CFO)		
	N	Mean	t-test (p-value)	N	Mean	t-test (p-value)	N	Mean	t-test (p-value)
ABSR (-1,+1)	28	-0.0199	0.8959	70	-0.0097	0.9094	98	-0.0103	0.9528
ABSR {-3,+3}	47	0.0561	0.6209	108	0.0415	0.5437	155	0.0146	0.9117
ABSR {-5,+5}	58	0.1329	0.2252	132	-0.0509	0.4672	190	0.1838	0.1569

Table 4.8 Bond Market Reactions Surrounding Executive Appointment Announcement Dates Based on Whether the Executive Appointment is Internal (Inside) or External (Outside), and Further Classified by Gender

	Outside Appointments			Inside Appointments			Difference in Mean Standardized Abnormal Bond Return (outside-inside)		
	N	Mean	t-test (p-value)	N	Mean	t-test (p-value)	N	Mean	t-test (p-value)
ABSR (-1,+1)	48	0.0129	0.9216	94	-0.0669	0.3713	142	0.0798	0.598
ABSR {-3,+3}	75	0.0287	0.7953	152	-0.0222	0.704	227	0.0509	0.6839
ABSR {-5,+5}	87	-0.0283	0.7962	184	-0.0419	0.4366	271	0.0136	0.9113

	Outside female Appointments			Outside male Appointments			Difference in Mean Standardized Abnormal Bond Return for outside appointments by gender (outside female- outside male)		
	N	Mean	t-test (p-value)	N	Mean	t-test (p-value)	N	Mean	t-test (p-value)
ABSR (-1,+1)	16	0.2199	0.2391	32	-0.0904	0.607	48	0.3103	0.2217
ABSR {-3,+3}	26	0.1714	0.3358	49	-0.0469	0.7414	75	0.2183	0.3354
ABSR {-5,+5}	32	0.2351	0.1604	55	-0.1816	0.2042	87	0.4167	0.0578

	Inside female Appointments			Inside male Appointments			Difference in Mean Standardized Abnormal Bond Return for inside appointments by gender (inside female- inside male)		
	N	Mean	t-test (p-value)	N	Mean	t-test (p-value)	N	Mean	t-test (p-value)
ABSR (-1,+1)	27	-0.2916	0.0937	67	0.0236	0.7622	94	-0.3152	0.0549
ABSR {-3,+3}	44	-0.1294	0.2343	108	0.0214	0.758	152	-0.1509	0.2424
ABSR {-5,+5}	51	-0.0659	0.5164	133	-0.0326	0.6088	184	-0.0332	0.7826

As for the equity market reaction, Panel (A) of Table 4.9 reveals a statistically significant negative average abnormal return on day +1 for the full sample (AAR = -0.29%), indicating an immediate negative stock market reaction to executive appointment announcements. This result is robust across both the standardized cross-sectional test and Corrado's rank test, with significance at the 1% level. Notably, this negative effect is primarily driven by male appointments, which exhibit a significant negative AAR of –0.38% on day +1, with significance at the 1% level. In contrast, the female appointment sample does not display any statistically significant abnormal returns during the same window, suggesting a more neutral market response. The results also reveal a statistically significant negative abnormal return for the female sample on day -3 which may reflect noise or information leakage with possible skepticism or uncertainty towards the newly appointed female executives. However, the mean cumulative abnormal returns (CAAR) over all event windows are statistically insignificant for all samples. Moreover, Panel (B) shows that the differences in mean cumulative abnormal returns between female and male appointments across all event windows are not statistically significant, indicating no evidence of differential market reaction by gender. Panel (C) of this table also provides a gender-transition-based analysis of cumulative abnormal returns following executive appointment announcements. The findings indicate that there is no statistically significant difference in stock market reactions based on the gender combination of the outgoing and incoming executives. Regardless of whether the transition is male-to-male, male-to-female, female-to-male, or female-to-female, the cumulative abnormal returns remain statistically insignificant across all event windows, suggesting that the market does not systematically react to executive gender transitions. To ensure consistency in cross-market comparisons, an equity subsample analysis is conducted using the same 227 events as the bond sample over the (-3, +3) event window. The results of this subsample analysis, which show consistent patterns with the main findings, are presented in the appendix.

Table 4.9 Stock Market Reactions Surrounding Executive Appointment Announcements Dates

This table presents the stock market's response to announcements of female executive appointments. Panel (A) reports average abnormal returns (AARs) around the event date, along with the cumulative average abnormal returns (CAARs) over various event windows, separately for the full sample, female sample, and male sample. Panel (B) presents difference in CAARs between female and male samples. Finally, Panel (C) reports the CAARs by gender transition groups—male-to-male, male-to-female, female-to-male, and female-to-female.

Panel (A)

	All Sample N= 418			Female Sample N= 128			Male Sample N= 290		
Day	AAR (%)	Standardized cross-sectional test (p-value)	Corrado's rank test (p-value)	AAR (%)	Standardized cross-sectional test (p-value)	Corrado's rank test (p-value)	AAR (%)	Standardized cross-sectional test (p-value)	Corrado's rank test (p-value)
-3	-0.10%	0.54266	0.14524	-0.31%	0.06096	0.01492	-0.01%	0.69419	0.42659
-2	-0.04%	0.66098	0.4921	0.08%	0.82696	0.21774	-0.09%	0.47059	0.302
-1	0.15%	0.10284	0.01986	0.19%	0.2219	0.15182	0.13%	0.21959	0.03084
0	-0.01%	0.61056	0.17579	-0.14%	0.5654	0.18278	0.05%	0.47146	0.29445
1	-0.29%	0.00731	0.01698	-0.06%	0.57736	0.39745	-0.38%	0.00546	0.00645
2	0.06%	0.29434	0.38774	0.11%	0.60303	0.31412	0.04%	0.33169	0.24272
3	0.08%	0.41489	0.45237	0.11%	0.59982	0.48354	0.07%	0.53245	0.45156

Event window	CAAR (%)	Standardized cross-sectional test (p-value)	Event window	CAAR (%)	Standardized cross-sectional test (p-value)	Event window	CAAR (%)	Standardized cross-sectional test (p-value)
(-3, +3)	-0.14%	0.98362	(-3, +3)	-0.02%	0.8167	(-3, +3)	-0.19%	0.87418
(-1, +1)	-0.14%	0.74342	(-1, +1)	-0.01%	0.85588	(-1, +1)	-0.20%	0.7806
(-1 , 0)	0.14%	0.18813	(-1 , 0)	0.05%	0.7791	(-1 , 0)	0.18%	0.19444
(0 , +1)	-0.29%	0.28005	(0 , +1)	-0.20%	0.39544	(0 , +1)	-0.33%	0.40769

Table 4.9 Cont'd

Panel (B)

Event window	Difference in CAAR (%) by gender (Female-Male) N=418	P-value
(-3, +3)	0.17%	0.7487
(-1, +1)	0.19%	0.614
(-1 , 0)	-0.13%	0.6668
(0 , +1)	0.13%	0.7156

Panel (C)

male-to-male transitions N= 286			**male-to-female transitions N= 116**			**female-to-male transitions N= 4**			**female-to-female transitions N= 12**		
Event window	CAAR (%)	Standardized cross-sectional test (p-value)	Event window	CAAR (%)	Standardized cross-sectional test (p-value)	Event window	CAAR (%)	Standardized cross-sectional test (p-value)	Event window	CAAR (%)	Standardized cross-sectional test (p-value)
(-3, +3)	-0.24%	0.9551	(-3, +3)	-0.13%	0.5663	(-3, +3)	3.56%	0.35355	(-3, +3)	0.69%	0.57649
(-1, +1)	-0.19%	0.78441	(-1, +1)	0.03%	0.89347	(-1, +1)	-0.60%	0.94411	(-1, +1)	-0.64%	0.65011
(-1 , 0)	0.20%	0.17696	(-1 , 0)	0.04%	0.80133	(-1 , 0)	-1.11%	0.25254	(-1 , 0)	0.00%	0.93975
(0 , +1)	-0.33%	0.39658	(0 , +1)	-0.12%	0.54927	(0 , +1)	-0.13%	0.85341	(0 , +1)	-1.15%	0.1968

Table 4.10 shows that the differences in CAARs between CFO and CEO appointment announcements are negative across all event windows. However, none of these differences are statistically significant, indicating no evidence that the equity market reacts differently to CFO versus CEO appointments. When these samples are analyzed by gender, a statistically significant negative difference in CAAR at the 10% level is observed for female CEO appointments relative to male CEO appointments in the (−1, 0) event window. This may reflect a short-term negative market reaction around the announcement day for female CEOs, potentially driven by investor uncertainty. In contrast, the findings indicate that CAARs are consistently higher for female CFO appointments compared to male CFO appointments, with positive differences across all event windows. However, statistical significance is observed only in the (−1, +1) window at the 10% level. These results suggest that shareholders may interpret female CFO appointments as a favorable signal, possibly reflecting expectations of greater financial prudence or governance quality, whereas female CEO appointments may still be met with short-term market uncertainty.

Furthermore, the difference in mean CAARs between outside and inside hires is positive across all event windows, with a statistically significant difference observed only in the (−1, +1) window. This suggests that the immediate market response tends to be more favorable toward outside appointments, potentially reflecting investor optimism about strategic changes associated with external hires. The results for the equity subsample analysis show consistent patterns with the main findings and are presented in the appendix.

Table 4.10 Differences in cumulative average abnormal returns (CAAR) across various subsamples, segmented by executive role (CEO vs. CFO), appointment type (internal vs. external), and executive gender

(CFO - CEO) N=418

Event window	Difference in CAAR (%)	P-value
(-3, +3)	-1.07%	0.1225
(-1, +1)	-0.61%	0.2655
(-1 , 0)	-0.78%	0.1016
(0 , +1)	-0.83%	0.1219

CEO appointments by gender (female - male) N=107

Event window	Difference in CAAR (%)	P-value
(-3, +3)	-0.90%	0.4901
(-1, +1)	-1.21%	0.1638
(-1 , 0)	-1.33%	0.0569
(0 , +1)	-1.18%	0.1622

CFO appointments by gender (female - male) N=311

Event window	Difference in CAAR (%)	P-value
(-3, +3)	0.57%	0.2996
(-1, +1)	0.69%	0.09
(-1 , 0)	0.32%	0.3281
(0 , +1)	0.56%	0.147

(outside-inside appointments) N=418

Event window	Difference in CAAR (%)	P-value
(-3, +3)	0.63%	0.2542
(-1, +1)	0.80%	0.0588
(-1 , 0)	0.34%	0.3073
(0 , +1)	0.60%	0.1511

inside appointments by gender (female-Male) N=268

Event window	Difference in CAAR (%)	P-value
(-3, +3)	-0.17%	0.8017
(-1, +1)	-0.01%	0.9919
(-1 , 0)	-0.14%	0.7198
(0 , +1)	0.02%	0.9572

outside appointments by gender (female-Male) N=150

Event window	Difference in CAAR (%)	P-value
(-3, +3)	0.47%	0.5924
(-1, +1)	0.24%	0.707
(-1 , 0)	-0.22%	0.6588
(0 , +1)	0.10%	0.8686

4.6 Multivariate Regression Analysis

While the univariate analysis provides useful preliminary insights, it remains incomplete, as it does not control for other factors that may influence bondholder reactions to female executive appointments. To address this limitation, I conduct a multivariate analysis. While equity event studies typically use a two- or three-day return window surrounding the event date, bond event studies often require longer estimation windows (Chen and Stock, 2018). Ederington et al. (2015) recommend using an extended event window, spanning from three days before to three days after the event date, to increase the number of observable bond returns and enhance the statistical power of the tests.

Accordingly, I use the standardized abnormal bond returns over a seven-day event window, ABSR{−3, +3}, as the dependent variable. The key independent variable, *Female_Executive*, is a binary indicator equal to one if the appointed executive is female, and zero otherwise. Consistent with prior literature (e.g., Lee and James, 2007; Martin et al., 2009), I include a set of control variables to account for other firm- and executive-level characteristics that may influence bondholder responses. These include the nature of the appointment (internal vs. external), interim status, executive role (CEO or CFO), executive age, firm size, leverage, return on assets (ROA), market-to-book ratio, and the proportion of female directors on the board. Full definitions and computational details for all variables are provided in the Appendix.

As further robustness checks, I also report regression results using the three-day standardized abnormal bond returns ABSR (−1, +1), and eleven-day standardized abnormal bond returns ABSR{−5, +5}, as the dependent variable. Table 4.11 shows that, consistent with the preliminary analysis, the coefficient on *Female_Executive* is consistently negative across all three event windows ABSR (−1,+1), ABSR {−3,+3}, and ABSR {−5,+5}, but remains statistically insignificant throughout. This indicates that there is no meaningful bond market reaction to the appointment of female executives, suggesting that gender does not influence bondholders' assessments of credit risk or firm value in the short term. The results also show that among the control variables, leverage is negatively associated with abnormal bond returns at the 1% significance level across all event windows. This is in line with expectations and prior literature, as bondholders tend to penalize firms with higher financial risk (Chen and Stock, 2018). In addition, the results indicate a positive and statistically significant bond market reaction (at the 10% significance level) to CFO appointments, specifically over the {-3,+3} event window.

Further robustness checks are conducted using multivariate regression analysis, incorporating interaction terms between the gender of the appointee, executive role, and appointment type. Notably, the results reveal a positive and statistically significant bondholder reaction (at the 10% significance level) to female outside appointments, observed over both the (-1,+1) and {-5,+5} event windows. These findings, presented in Table 4.12, are consistent with those reported in Table 4.8, reinforcing the earlier results. The results suggest that bondholders perceive the appointment of female executives from outside the firm as value-enhancing and potentially leading to less risky decisions and more conservative financial approaches.

As for the equity market, multivariate regressions are further estimated using the cumulative abnormal returns, CAR(−1,+1) and CAR(−3,+3), as the dependent variables. The results, presented in Table 4.13, indicate no statistically significant equity market reaction to the gender of the newly appointed executive. Equity investors do not seem to perceive female executive appointments as events that influence their expectations regarding the firm’s future performance or risk profile. These findings are consistent with prior studies, including Brinkhuis et al. (2018)

and Martin et al. (2009), which similarly report a muted investor response to gender-related executive changes.

Table 4.11 Multivariate Regression Models for Bond Market Reaction to Executive Appointment Announcements

This table presents the results of cross-sectional regression analyses examining the bond market's response to female executive appointments. Column (1) reports results using the standardized abnormal bond return over a seven-day event window, ABSR {−3,+3}, as the dependent variable. Columns (2) and (3) provide robustness checks using alternative event windows: ABSR (−1,+1) and ABSR {−5,+5}, respectively. All continuous variables are winsorized at the 1st and 99th percentiles t-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Variables	(1) ABSR {-3,+3}	(2) ABSR (-1,+1)	(3) ABSR {-5,+5}
Female_Executive	-0.079	-0.118	-0.007
	(-0.582)	(-0.664)	(-0.053)
Ln (Executive_Age)	0.636	0.196	-0.719
	(1.142)	(0.275)	(-1.366)
Inside_Appointment	0.001	-0.056	0.067
	(0.005)	(-0.328)	(0.498)
Executive_Role	0.248*	0.171	0.147
	(1.736)	(0.921)	(1.056)
Interim_Appointment	-0.286	-0.504	-0.134
	(-1.039)	(-1.037)	(-0.551)
Firm_Size	-0.041	-0.053	-0.030
	(-0.990)	(-0.956)	(-0.763)
Leverage	-1.223***	-1.603***	-1.038***
	(-3.210)	(-3.013)	(-2.729)
ROA	0.446	0.140	0.371
	(1.594)	(0.474)	(1.263)
Market to Book	-0.002	-0.003	0.001
	(-0.228)	(-0.219)	(0.117)
Female_Percentage	-0.237	-0.221	0.276
	(-0.330)	(-0.236)	(0.384)
Constant	-1.872	0.179	3.145
	(-0.834)	(0.063)	(1.472)
Observations	227	142	271
Adjusted R-squared	0.065	0.098	0.049

Table 4.12 Multivariate Regression Models for Bond Market Reaction to Outside Female Executive Appointment Announcements

This table presents the results of cross-sectional regression analyses examining the bond market's response to outside female executive appointments. Column (1) reports results using the standardized abnormal bond return over a seven-day event window, ABSR {−3,+3}, as the dependent variable. Columns (2) and (3) provide robustness checks using alternative event windows: ABSR (−1,+1) and ABSR {−5,+5}, respectively. The main independent variable is Female*Outside which is an interaction term of appointment corresponding to a female and outside appointment. All continuous variables are winsorized at the 1st and 99th percentiles. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Variables	(1) ABSR {-3,+3}	(2) ABSR (-1,+1)	(3) ABSR {-5,+5}
Female*Outside	0.345	0.622*	0.512*
	(1.247)	(1.852)	(1.878)
Female_Executive	-0.186	-0.327	-0.171
	(-1.157)	(-1.571)	(-1.096)
Ln (Executive_Age)	0.656	0.233	-0.731
	(1.177)	(0.332)	(-1.399)
Inside_Appointment	0.124	0.173	0.243
	(0.728)	(0.831)	(1.478)
Executive_Role	0.242*	0.157	0.137
	(1.687)	(0.854)	(0.983)
Interim_Appointment	-0.296	-0.544	-0.140
	(-1.078)	(-1.134)	(-0.578)
Firm_Size	-0.044	-0.061	-0.035
	(-1.071)	(-1.119)	(-0.891)
Leverage	-1.215***	-1.581***	-0.989***
	(-3.233)	(-3.012)	(-2.656)
ROA	0.452	0.185	0.393
	(1.629)	(0.634)	(1.358)
Market to Book	0.000	-0.004	0.001
	(0.215)	(-0.277)	(0.562)
Female_Percentage	-0.247	-0.373	0.275
	(-0.348)	(-0.402)	(0.390)
Constant	-2.007	-0.002	3.110
	(-0.894)	(-0.001)	(1.467)
Observations	227	142	271
Adjusted R-squared	0.069	0.122	0.063

Table 4.13 Multivariate Regression Models for Stock Market Reaction to Executive Appointment Announcements

This table presents the results of cross-sectional regression analyses examining the stock market's response to female executive appointments. Columns (1) and (2) report results using the cumulative abnormal returns CAR(-1,+1) and CAR(-3,+3) as the dependent variables, respectively. All continuous variables are winsorized at the 1st and 99th percentiles. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Variables	(1) CAR(-1,+1)	(2) CAR(-3,+3)
Female_Executive	-0.002	-0.001
	(-0.323)	(-0.168)
Ln (Executive_Age)	0.001	-0.014
	(0.055)	(-0.500)
Inside_Appointment	-0.005	-0.001
	(-0.946)	(-0.165)
Executive_Role	-0.001	-0.001
	(-0.157)	(-0.186)
Interim_Appointment	-0.001	-0.002
	(-0.076)	(-0.151)
Firm_Size	-0.001	-0.001
	(-0.327)	(-0.413)
Leverage	-0.017	0.005
	(-1.098)	(0.231)
ROA	0.005	-0.008
	(0.379)	(-0.463)
Market to Book	0.000	-0.000
	(0.410)	(-0.056)
female_percentage	0.006	0.019
	(0.215)	(0.509)
Constant	0.009	0.063
	(0.099)	(0.549)
Observations	418	418
Adjusted R-squared	0.026	0.035

4.7 Summary

This study is the first to investigate the bond market reaction to the announcement of female executive appointments. In parallel, it also explores the inconclusive evidence on the stock market response to similar events. The analysis begins with a standard event study methodology, followed by univariate analysis and robustness checks using multivariate regression. To address potential heteroskedasticity arising from variations in bond characteristics such as maturity and credit rating across and within firms, it uses standardized bond returns. Overall, the findings reveal that neither the bond nor the stock market exhibits a statistically significant reaction to female executive appointments in the short run. This indicates that gender alone is not seen as signal of increased risk or added value by investors, at least in the short term. This may reflect a growing normalization of female representation in top executive roles.

The study further explores whether investor responses vary based on specific appointment characteristics, specifically whether the executive is hired internally or externally, and whether the role is that of CEO or CFO. The results indicate a positive and statistically significant bond market reaction to female outside appointments. This suggests that when a female executive is appointed from outside the firm, creditors may interpret it as a signal of positive change that brings in benefits to them.

This study contributes to the academic literature by addressing a notable gap concerning bondholder responses to female executive appointments. It further adds to the literature on stock market reactions by employing a unique dataset that incorporates detailed appointment characteristics. Beyond its academic value, the study provides practical insights for investors and firms, shedding light on how executive gender and appointment may influence market perceptions.

Appendix to Chapter 4

Table A. 4.1 Variables Definitions and Data Sources

Variable	Definition	Source
Female_Executive	A dummy variable equal to one if the appointed executive is female, and zero otherwise	ExecuComp
Ln (Executive_Age)	The natural logarithm of the executive's age	ExecuComp
Inside_Appointment	An indicator variable equal to one if the appointment is internal, and zero if external	Dow Jones Newswires
Executive_Role	An indicator variable equal to one if the appointment is for a CFO role, and zero if CEO	Dow Jones Newswires
Interim_Appointment	An indicator variable equal to one if the appointment is interim, and zero otherwise	Dow Jones Newswires
Firm_Size	The natural logarithm of total assets	Compustat
ROA	Return on assets, calculated as EBITDA divided by total assets	Compustat
Market to Book	The Market-to-Book value of equity	Compustat
Leverage	The ratio of total debt to total assets	Compustat
Female_Percentage	The Percentage of females on the board	Boardex

Equity Subsample Results

Table A. 4.2 Stock Market Reactions Surrounding Executive Appointment Announcements Dates - Subsample

This table presents the stock market's response to announcements of female executive appointments, using the same sample employed in the bond market analysis. Panel (A) reports average abnormal returns (AARs) around the event date, along with the cumulative average abnormal returns (CAARs) over various event windows, separately for the full sample, female sample, and male sample. presents difference in CAARs between female and male samples. Finally, Panel (C) reports the CAARs by gender transition groups—male-to-male, male-to-female, female-to-male, and female-to-female.

Panel (A)

	All Subsample N= 227			**Female Subsample N= 70**			**Male Subsample N= 157**		
Day	AAR (%)	Standardized cross-sectional test (p-value)	Corrado's rank test (p-value)	AAR (%)	Standardized cross-sectional test (p-value)	Corrado's rank test (p-value)	AAR (%)	Standardized cross-sectional test (p-value)	Corrado's rank test (p-value)
-3	-0.12%	0.6532	0.4134	-0.50%	0.0497	0.0130	0.05%	0.3456	0.1171
-2	0.01%	0.6901	0.4958	0.17%	0.8531	0.3999	-0.07%	0.7135	0.4292
-1	0.13%	0.0769	0.0505	0.22%	0.3349	0.2140	0.10%	0.1376	0.0715
0	-0.02%	0.8199	0.2009	-0.22%	0.7513	0.1437	0.07%	0.7142	0.3753
1	-0.42%	0.0089	0.0059	-0.40%	0.1402	0.1054	-0.43%	0.0316	0.0130
2	0.09%	0.2945	0.2394	0.26%	0.3899	0.2872	0.02%	0.5511	0.3125
3	0.03%	0.8728	0.4509	-0.03%	0.5989	0.4527	0.06%	0.5736	0.4103

Event window	CAAR (%)	Standardized cross-sectional test (p-value)	Event window	CAAR (%)	Standardized cross-sectional test (p-value)	Event window	CAAR (%)	Standardized cross-sectional test (p-value)
(-3, +3)	-0.30%	0.8654	(-3, +3)	-0.49%	0.3423	(-3, +3)	-0.21%	0.6797
(-1, +1)	-0.31%	0.6627	(-1, +1)	-0.40%	0.4359	(-1, +1)	-0.27%	0.9060
(-1 , 0)	0.11%	0.3065	(-1 , 0)	0.00%	0.8073	(-1 , 0)	0.17%	0.3155
(0 , +1)	-0.44%	0.2438	(0 , +1)	-0.62%	0.1898	(0 , +1)	-0.36%	0.4827

Table A4.2 Cont'd

Panel (B)

Event window	Difference in CAAR (%) by gender (Female-Male) N=227	P-value
(-3, +3)	-0.29%	0.6788
(-1, +1)	-0.13%	0.8054
(-1 , 0)	-0.16%	0.7136
(0 , +1)	-0.25%	0.6097

Panel (C)

male-to-male transitions N= 154			**male-to-female transitions N= 64**			**female-to-male transitions N= 3**			**female-to-female transitions N=6**		
Event window	CAAR (%)	Standardized cross-sectional test (p-value)	Event window	CAAR (%)	Standardized cross-sectional test (p-value)	Event window	CAAR (%)	Standardized cross-sectional test (p-value)	Event window	CAAR (%)	Standardized cross-sectional test (p-value)
(-3, +3)	-0.24%	0.7132	(-3, +3)	-0.84%	0.0895	(-3, +3)	1.31%	0.7125	(-3, +3)	3.25%	0.2699
(-1, +1)	-0.29%	0.8671	(-1, +1)	-0.35%	0.5130	(-1, +1)	0.83%	0.5563	(-1, +1)	-0.88%	0.2335
(-1 , 0)	0.18%	0.3000	(-1 , 0)	0.10%	0.5773	(-1 , 0)	-0.56%	0.5363	(-1 , 0)	-1.04%	0.3616
(0 , +1)	-0.40%	0.4339	(0 , +1)	-0.50%	0.3113	(0 , +1)	1.41%	0.4584	(0 , +1)	-1.91%	0.1119

Table A. 4.3 The differences in CAARs around executive appointment announcements for the same sample used in the bond market analysis, classified by executive gender, role (CEO vs. CFO), and appointment type (internal vs. external)

(CFO - CEO) N=227			CEO appointments by gender (female - male) N= 72			CFO appointments by gender (female - male) N=155		
Event window	Difference in CAAR (%)	P-value	Event window	Difference in CAAR (%)	P-value	Event window	Difference in CAAR (%)	P-value
(-3, +3)	-1.05%	0.2044	(-3, +3)	-1.87%	0.2397	(-3, +3)	0.37%	0.5687
(-1, +1)	-0.50%	0.4513	(-1, +1)	-1.94%	0.0748	(-1, +1)	0.72%	0.2157
(-1 , 0)	-0.66%	0.2266	(-1 , 0)	-1.22%	0.1511	(-1 , 0)	0.91%	0.1358
(0 , +1)	-0.75%	0.2481	(0 , +1)	-1.52%	0.1354	(0 , +1)	0.34%	0.546

(outside-inside appointments) N=227			inside appointments by gender (female-Male) N=152			outside appointments by gender (female-Male) N=75		
Event window	Difference in CAAR (%)	P-value	Event window	Difference in CAAR (%)	P-value	Event window	Difference in CAAR (%)	P-value
(-3, +3)	0.85%	0.2232	(-3, +3)	0.27%	0.7646	(-3, +3)	-1.41%	0.2156
(-1, +1)	1.38%	0.0174	(-1, +1)	-0.02%	0.9817	(-1, +1)	-0.58%	0.5111
(-1 , 0)	0.97%	0.0414	(-1 , 0)	-0.26%	0.6378	(-1 , 0)	-0.15%	0.8469
(0 , +1)	1.10%	0.0564	(0 , +1)	0.23%	0.7021	(0 , +1)	-1.34%	0.1272

CHAPTER 5 Conclusions

5.1 Summary of the Findings and Contributions of the Thesis

Over the past few decades, the representation of women in corporate leadership has increased significantly, drawing substantial scholarly attention. A growing body of research in psychology and finance suggests that, on average, women demonstrate distinct behavioral traits compared to their male counterparts, such as greater risk aversion, lower levels of overconfidence, and a stronger orientation toward ethical decision-making (Bertrand, 2011; Charness and Gneezy, 2012; Croson and Gneezy, 2009; Cumming et al., 2015). These differences carry important implications for corporate decision-making, governance, and firm outcomes, prompting extensive empirical investigations into the effects of gender diversity within top management and boardroom settings. The aim of this thesis is to advance our understanding of how gender diversity in corporate leadership influences firm risk and market behavior. Each of the three empirical chapters of the thesis focuses on a specific aspect of this relationship, analyzing key dimensions through which gender diversity in corporate leadership influences firm-level risk exposure and market reactions.

In Chapter 2, using a sample of UK-listed public companies from 1999 to 2021, I examine the impact of board gender diversity on future stock price crash risk. The analysis reveals that board gender diversity does not have a significant effect on crash risk. Furthermore, I find no significant effect even among firms that increased female board representation following the Davies Report. These findings hold consistently even in subsamples where the CFO or CEO is also a female.

In chapter 3, I investigate the impact of female CFOs on future stock price crash risk in the UK. I find a negative and statistically significant relationship between the presence of female CFOs and stock price crash risk. I also show that this negative association is context dependent. Specifically, the relationship is more pronounced in firms with less powerful CEOs, higher levels of information opacity, or greater exposure to risk.

In Chapter 4, I examine the U.S. bond market reaction to the appointment announcements of female CEOs and CFOs and investigate whether this response differs from that of the stock market. The findings reveal that neither the bond nor the stock market exhibits a statistically significant reaction to female executive appointments in the short run. However, further analysis of investor responses based on specific appointment characteristics, particularly whether the executive is hired internally or externally and whether the role is CEO or CFO, shows a positive and statistically significant bond market reaction to female outside appointments.

This thesis provides meaningful contributions to academic research and carries important implications for policymakers, regulators, and investors. Specifically, it contributes to several key strands of literature within corporate finance, governance, and behavioral finance. It enriches the literature on gender diversity in corporate finance by examining the gender dimension in both board composition and executive roles, as well as the dynamics of executive appointments and their impacts on firm risk and market behavior. While prior studies have largely focused on how the presence of women on boards and in top executive roles influences firm performance or governance practices (Amin et al., 2024; Brahma et al., 2021; Francoeur et al., 2008; Li and Chen, 2018), Chapters 2 and 3 of this thesis focus on outcome-specific measures, notably stock price crash risk.

In addition, Chapters 2 and 3 offer valuable insights specific to the UK context. Chapter 3 introduces a novel examination of the link between female CFO presence and stock price crash risk in the UK. More specifically, the results are consistent with and support prior findings, particularly those of Li and Zeng (2019), who emphasized the role of CFO gender in shaping crash risk. Chapter 3 confirms that their findings hold within the UK context. Chapter 2 also makes a novel contribution by delivering empirical evidence on the relationship between board gender diversity and future stock price crash risk in the UK. The UK setting is particularly valuable here, as initiatives like the Davies Report created a quasi-experimental environment by setting explicit targets for female representation on corporate boards, enabling a unique exploration of diversity's impact on firm risk outcomes. This chapter specifically assesses the impact of the Davies Report on firm-level crash risk outcomes. Notably, the findings show no significant impact of board gender diversity on crash risk, even following the implementation of the Davies targets, thereby challenging the common assumption that increasing board-level gender diversity directly leads to reduced firm risk.

Furthermore, chapter 3 expands on the small but growing literature on female CFOs and their influence on firm outcomes. It also contributes to the broader literature on stock price crash risk by emphasizing the pivotal role of the CFO. While prior research has examined how female CFOs affect earnings quality (Barua et al., 2010), earnings management (Peni and Vähämaa, 2010), accounting conservatism (Francis et al., 2015), and leverage (Schopohl et al., 2021), chapter 3 offers the first empirical analysis of the link between female CFO presence and stock price crash risk in the UK. The CFO is responsible for overseeing financial reporting, disclosure practices, and risk management, all of which are key factors tied to the buildup of hidden bad news that can ultimately trigger crash risk. This chapter makes an additional contribution by supporting the findings of Schopohl et al. (2021), demonstrating that the influence of CFOs on firm outcomes is context dependent. Specifically, it shows that the association between CFO gender and crash risk becomes stronger under conditions of less CEO power, greater firm opacity, or higher firm risk.

This thesis also bridges corporate governance research and behavioral finance, offering new insights into how investor perceptions and expectations interact with gender-related corporate signals. To the best of my knowledge, Chapter 4 presents the first empirical study investigating the bond market reaction to announcements of female executive appointments. While prior research has extensively examined equity market responses, the bond market has remained largely underexplored, despite its critical role in corporate financing. This chapter uses a unique and hand-collected dataset to provide an understanding of how bondholders, who have different priorities and risk sensitivities compared to equity investors, interpret executive leadership changes, particularly regarding gender. The finding that bondholders react positively and significantly to female outside appointments suggests they perceive such transitions as signals of potential governance improvements. This contribution adds important new evidence to the literature on corporate governance and behavioral finance, particularly by highlighting the differentiated reactions across financial markets.

This thesis also offers valuable implications to policymakers and regulators. Specifically, Chapter 2 sheds light on the implications of soft law mechanisms on firm-level risk outcomes. It examines the impact of female board directors on stock price crash risk before and after the introduction of the Davies Report (2011), a major initiative aimed at increasing the percentage of women on FTSE 350 boards, and investigates whether such gender focused interventions translate into measurable risk related outcomes. While many prior studies highlight the positive effects of board gender diversity on various firm-level outcomes, this chapter finds that the increase in female board representation encouraged by the Davies Report does not significantly affect future stock price crash risk, neither increasing nor reducing it. This insight is important for policymakers because, although no specific link to reducing crash risk is identified, the findings suggest that such interventions play a critical role in promoting gender equality and representation, regardless of their impact on firm risk outcomes. These findings underscore the necessity of supporting diversity initiatives not just for their potential financial or risk-related benefits, but for their wider social and governance importance.

Furthermore, Chapter 3 provides evidence that the presence of female CFOs, especially under specific firm conditions such as weaker CEO power, higher information opacity, or elevated firm risk, is associated with lower stock price crash risk. These findings are important for policymakers seeking to enhance gender diversity beyond the boardroom by focusing on executive leadership roles. They offer valuable insights, suggesting that female CFOs can play a significant role in reducing crash risk, while also highlighting the importance of considering the organizational environment in which these female CFOs operate.

The findings of chapter 4 also offer regulators deeper insights into market dynamics by revealing how bond and equity markets respond to female executive appointments in the short run. While no significant overall market reactions are detected, the positive bondholder response to female outside appointments suggests that external female hires may signal potential governance improvements. This indicates that gender diversity can carry important signaling effects, which may vary depending on the context and the specific market segment.

Additionally, this thesis provides investors with critical insights into the relationship between gender diversity in corporate leadership and firm risk, helping them make more informed investment decisions. The findings presented in Chapter 3 offer valuable insights by demonstrating that female CFOs are associated with significantly lower stock price crash risk, particularly in firms with less CEO power, higher information opacity, or elevated firm risk. For investors, this underscores the pivotal role that female CFOs can play in enhancing financial transparency and strengthening risk management, while also highlighting the importance of understanding the organizational environments in which their positive impact is most pronounced.

Finally, Chapter 4 enhances investors' understanding of market reactions by demonstrating that neither bondholders nor stockholders exhibit significant short-term responses to the appointment of female executives. However, this chapter reveals important signals for fixed income investors, emphasizing the need to pay attention to the nature of executive appointments. In particular, external female hires may signal positive governance shifts within firms, which could have meaningful implications for long-term credit quality.

5.2 Limitations of the Findings and Suggestions for Future Research

As with any academic research, the results derived from the empirical analyses in this thesis come with some limitations. The strength and reliability of the findings depend closely on the quality, scope, and availability of the datasets. While considerable care was taken in the selection of data, variables, methodologies, and econometric models, some challenges and constraints remain that must be acknowledged.

One key limitation relates to the selection of samples across the chapters. The samples were chosen based on both data availability and the specific insights each context could provide. Chapters 2 and 3 focus on the UK, where relevant data were accessible and where the institutional context, particularly following the Davies Report, offered a quasi-experimental setting valuable for exploring gender diversity outcomes. By contrast, Chapter 4 focuses on the US, where prior research has shown that using daily bond trading data, particularly from the TRACE database, enhances the statistical power of the tests compared to using monthly data (Bessembinder et al., 2009).

Although Chapter 4 relies on a unique, hand-collected dataset that required substantial time and effort to compile, a notable limitation is the relatively small sample size. While this sample is larger than those used in some prior studies examining stock market reactions to female executive appointments (e.g., Brinkhuis and Scholtens, 2018; Lee and James, 2007), it nonetheless remains limited. This reflects a broader challenge in the field, where data availability and sample constraints often restrict the scope of empirical analysis.

Another important limitation is the country-specific nature of the findings. Since the results are drawn from the UK and US contexts, they cannot be easily generalized to other settings. Future research could extend this work by conducting similar studies using larger, cross-country samples over longer time periods to capture broader global trends. It would also be valuable to replicate the analyses in countries like Norway, where binding legal quotas on board gender diversity create a different institutional environment.

In addition to sample and context limitations, there are also theoretical and methodological gaps. For example, while Chapter 3 shows a negative relationship between the presence of female CFOs and stock price crash risk, it does not explore the specific channels through which female CFOs help reduce risk. Future research could expand on this research and investigate these pathways to better understand the underlying dynamics of this relationship.

From a methodological perspective, considerable effort was made to address potential endogeneity and sample selection bias using techniques such as propensity score matching, difference-in-differences designs in quasi-experimental settings, and high-dimensional fixed effects. However, the use of instrumental variables could provide an additional level of causal validity by addressing concerns related to omitted variables.

Another limitation is that Chapter 4 relies entirely on quantitative analysis when examining bondholder reactions to female executive appointment announcements. While the quantitative approach offers valuable insights, incorporating mixed-methods or qualitative research would allow for a deeper exploration of how bondholders perceive and interpret gender-related leadership changes.

Finally, future research could expand on this work by examining the specific attributes of female directors and executives, such as their educational backgrounds, tenure, or professional experience. Exploring whether these attributes differ from those of male counterparts, and whether female directors are actively engaged in corporate governance, such as through participation in board committees, would add important depth to the understanding of gender diversity impacts on firm risk outcomes.

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