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The Impact of Board Gender Diversity on Investor Reactions: An Empirical Investigation on Cumulative Abnormal Return

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Résumé

Cette thèse étudie les réactions des investisseurs à la nomination de femmes administrateurs par rapport aux administrateurs masculins en Amérique du Nord, en se concentrant sur la façon dont le comportement des investisseurs et les valorisations boursières diffèrent en réponse à ces nominations. Utilisant une méthodologie d'étude d'événements et deux ensembles de données nord-américaines, l'un couvrant la période 2010-2020 et l'autre couvrant la période 2005-2020 (segmenté en cinq périodes de trois ans), cette étude examine l'impact différentiel du sexe des administrateurs sur les rendements boursiers des entreprises, en tenant compte de divers caractéristiques des administrateurs (âge, expérience, formation, certification) et facteurs spécifiques au secteur. Bien que les résultats globaux fournissent de faibles preuves de l'hypothèse d'une relation positive entre les nominations de femmes administrateurs et les rendements boursiers sur l'ensemble de la période 2010-2020, une analyse plus nuancée de l'ensemble de données segmentées révèle une relation dynamique et dépendante du contexte qui évolue au fil du temps. Plus précisément, l'impact des caractéristiques des femmes administratrices sur les rendements boursiers et les résultats des entreprises varie selon les différentes périodes, soulignant l'importance du contexte temporel pour comprendre les effets de la diversité hommes-femmes au sein des conseils d'administration.

Mot clé: Diversité des genres au sein du conseil d'administration; Performance boursière; Étude d'événement; Caractéristiques de l'entreprise; Informations sur le directeur

Méthodes de recherche: Étude événementielle; Régression de panel

Abstract

This thesis investigates investor reactions to the appointment of female directors compared to male directors in North America, focusing on how investor behavior and market valuations differ in response to these appointments. Utilizing an event study methodology and two datasets of North American data, one spanning 2010-2020 and another covering 2005-2020 (segmented into five 3-year periods), this study examines the differential impact of director gender on firm stock returns, considering various director characteristics (age, experience, education, certification) and industry-specific factors. While the overall findings provide weak evidence for the hypothesized positive relationship between female director appointments and stock returns within the full 2010-2020 period, a more nuanced analysis of the segmented dataset reveals a dynamic and context-dependent relationship that evolves over time. Specifically, the impact of female director characteristics on stock returns and firm outcomes varies across different time periods, highlighting the importance of temporal context in understanding the effects of board gender diversity.

Keyword: Board Gender Diversity; Stock Performance; Event Study; Firm Characteristics; Director Information

Research methods: Event Study; Panel Regression

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List of abbreviations and acronyms

AR	Abnormal Return
BGD	Board Gender Diversity
CAR	Cumulative Abnormal Return
CAPM	Capital Asset Pricing Model
Compustat	Compustat Fundamentals database
CRSP	Center for Research in Security Prices, LLC
CSR	Corporate Social Responsibility
ESG	Environmental, Social, and Corporate Governance
OLS	Ordinary Least Squares
REC	Renewable Energy Consumption
ROA	Return on Assets
ROE	Return on Equity
WRDS	Wharton Research Data Services

1. Introduction

Female representation on corporate boards of directors is unsurprisingly becoming a popular and worth-discussing topic recently (Sanford and Tremblay-Boire, 2023). Many countries and areas even put laws to ensure the diversity of board gender composition. It is also highly related to firm environmental performance, sustainable development, social responsibility, and even renewable energy consumption (Lu & Herremans, 2019; Galletta et al., 2021; Amorelli & García-Sánchez, 2020; Atif et al., 2021).

However, the empirical evidence on the relationship between board gender diversity (abbreviated as BGD hereafter) and financial performance remains inconclusive. While numerous studies have investigated this association, employing various financial indicators such as stock returns (Wolfers, 2006), stock price informativeness (Gul et al., 2011), financial manipulation (Wahid, 2018), firm risk (Lenard et al., 2014), debt choice (Datta et al., 2021), and dividend payouts (Chen et al., 2017), the findings remain mixed.

Yet many studies report a positive relationship between BGD and financial performance, while others suggest an ambiguous (Allen et al., 2008), null (Farrell and Hersch, 2005), or even negative effect on firm value (Matsa and Miller, 2013; Reddy and Jadhav, 2019). Similar mixed results have been observed in studies examining BGD within specific regions. In most cases, appointing a female director to the board, whether due to a lawsuit or voluntary requirement, can be financially beneficial, particularly for boards with few or no women (Groening, 2019). However, studies on Norway (Ahern and Dittmar, 2012) and Japan (Wang et al., 2024) have reported sudden negative market reactions and decreased firm performance following the implementation of gender quotas.

This inconsistency enhances the need to better understand how investors perceive and react to changes in board composition, particularly the appointment of female directors. Do such appointments signal positive changes to the market, or do they raise concerns about potential disruptions? Understanding these dynamics is crucial not only for firms seeking to optimize their board composition but also for policymakers evaluating the effectiveness of gender diversity initiatives. To dig out deeper, in what

degree of directors' personal features (not only gender) is reflected to the infatuation of stock returns, and how entrants' genders and board position is related to firm characters are all the issues we would like to further concern.

The study aims to address this critical question by examining investor reactions to every appointment of female directors compared to male directors in North America. We utilize an event study methodology and two datasets of North American data collecting within Wharton Research Data Services (abbreviated as WRDS hereafter), one spanning 2010-2020 and another covering 2005-2020 (segmented into five 3-year intervals), to analyze the differential impact of director gender on firm stock returns, considering various director characters and industry-specific factors. Our objectives are twofold: 1) to investigate the influence of director gender and personal attributes on investor reactions and firm characters over a long period (2010-2020), and 2) to analyze whether these relationships change over time by applying consistent data processing procedures across different time periods.

To achieve these objectives, we calculate cumulative abnormal returns (abbreviated as CAR hereafter) using the Capital Asset Pricing Model (abbreviated as CAPM hereafter), establishing estimation and event windows to identify abnormal stock returns around director appointments. We integrate director, stock, and firm-level data, employing two panel regressions analyses with CAR as the dependent variable. The first regression explores the impact of director personal information, specifically examining the effects of age, experience, and education level for both female entrants and male entrants, as well as in mixed-gender appointment scenarios, to assess whether these director attributes differentially influence investor reactions. The second focuses on firm characters, to compare whether the genders of new entrants bring different impacts on firm features.

Comparing to previous studies that often focused on a single country, our research utilizes data from North America, who owns one of the world's largest and most mature financial markets, attracting a multitude of financial institutions and investors. The implementation of the North American Free Trade Agreement (abbreviated as NAFTA hereafter), which aimed to reduce trade and investment barriers among member countries (Maulana & Gunawan, 2021), has further bolstered this region's financial dynamism. The well-established financial infrastructure and the absence of significant

regional trade barriers provide a conducive environment for low-latency, high-efficiency trading and regulatory compliance. This context also facilitates the efficient collection of comprehensive data from various databases, minimizing missing values.

Besides, departing from previous event studies that pinpoint the exact implementation date of a new gender policy as the event date, our approach treats each new entrant as an independent event. This methodology generates numerous event windows and corresponding CARs, allowing us to dynamically assess the impact of each new board member's arrival. These dynamic CARs will then be utilized in subsequent regression analyses. It is worth noting that our sample comprehensively includes every director appointment to publicly traded firms across North America within the designated timeframe.

What is more, we employed CAR as the primary metric of analysis, in contrast to absolute returns utilized in some prior research (Wolfers, 2006), treating each director appointment as an independent event. To ensure a comprehensive assessment, we conducted comparative analyses between female board entrants, male board entrants, and all entrants, thus addressing the potential limitations of examining one gender without the context of the other (Sanford & Tremblay-Boire, 2023). The data encompasses publicly available North American data from BoardEx, CRSP, and Compustat, focusing on the recent 10-year period to mitigate the influence of major economic events (the 2008 Financial Crisis and the 2020 COVID-19 pandemic). The period comparison includes the 2008 Financial Crisis to examine potential variations in results across different economic contexts.

The remainder of this paper is organized as follows: Section 2 reviews the relevant literature on BGD; Section 3 details the data and methodology employed in this study; Section 4 presents the empirical results, analyzing the impact of director and firm characters on CARs; and Section 5 concludes with a discussion of the findings and their implications for theory and practice.

2. Literature review and hypotheses

This paper reviews the extant literature on BGD, encompassing research conducted over the past two decades. Thematically, the relevant literature can be categorized into three main areas, each with distinct research objectives and evolving trends, which will be elucidated in the subsequent sections. The first type discusses how BGD has been implemented and practiced in certain countries or areas, whether voluntary or legally mandated. The second contains how BGD is related with various kinds of firm index and third type is how BDG impacts on environmental development and social responsibility.

The insights gleaned from the first two areas have been instrumental in shaping the scope of our data collection and the formulation of our research questions. Meanwhile, the third area has served as a source of inspiration, prompting us to delve deeper into the potential positive influences associated with enhanced BGD.

2.1 BGD approach in different countries or areas

The first category of research examines the impact of legally mandated or voluntary approaches to gender quotas on corporate performance in a certain country or area. In recent years, there has been renewed interest in the effects of women's representation on corporate boards, with studies documenting their significant under-representation in the boardroom (Brahma, Nwafor, & Boateng, 2020). This has prompted many countries to enact guidelines and/or mandatory laws to increase the presence of women on boards (Reguera-Alvarado et al., 2015). As a result, in several countries or areas, steps have been taken to promote BGD, either through legal mandates or voluntary initiatives, based on the premise that female board representation can positively impact corporate performance.

In our study, we also opted to focus on a specific region, North America, which, thanks to initiatives like NAFTA, has cultivated a less restrictive and more efficient trade and financial market environment. Although countries like the U.S. and Canada lack nationwide gender quota laws, certain states and provinces have enacted legislation promoting BGD. For example, California introduced Senate Bill No. 826 (California State Senate, 2018). In contrast, Canadian policies such as New Brunswick's law for

gender-targeted public funding (GTPF) and Quebec's "Decision-making: A Matter of Equality" program (Maillé, 2022) primarily aim to increase female participation in politics and elections. However, according to Canadian Securities Administrators (CSA) reports (Levine et al., 2023), there is a positive trajectory for women in board and executive officer positions. This emphasis that BGD in North America, even without overarching quotas, underscores the region's longstanding commitment to diversity in corporate leadership. With a rather longer development history, our data carries even greater generalizable significance, offering insights relevant to a broader context where BGD is increasingly recognized as valuable.

While some studies suggest that appointing women to boards can lead to a short-term drop in stock price (Ahern and Dittmar, 2012), the long-term effect on financial performance is often positive (Groening, 2019). Even in a male-dominated country such as Turkey, the presence of female directors has been found to positively impact and enhance financial performance (Kılıç and Kuzey, 2016). However, the research landscape is nuanced, with findings indicating that sector-level competition and innovativeness may not consistently influence the presence of women on boards (Tyrowicz et al., 2020).

In their 2012 study, Ahern and Dittmar (2012) conducted a comprehensive analysis of the effects of the mandatory gender quota law enacted in Norway in 2003, which mandated that 40% of Norwegian firms' directors be women. Their findings revealed a significant drop in stock prices and Tobin's Q following the implementation of the quota, suggesting a rather negative market reaction and even a decrease in perceived firm value. Additionally, the quota led to younger and less experienced boards increased leverage and acquisitions, and a deterioration in operating performance. These results suggest that prior to the quota, firms were likely to maximize value with their board choices.

Later in 2015, Reguera-Alvarado, de Fuentes, and Laffarga (2015) examined the relationship between BGD and economic results in Spain, the second country to legally mandate gender quotas. Their analysis revealed a substantial 98% increase in female board representation from 2005 to 2009, underscoring the effectiveness of mandatory legislation in promoting gender diversity. Furthermore, they found a positive association between the increased presence of female board members and improved

economic performance, pointing out the potential benefits of gender diversity for firms.

Shifting the focus to an emerging market context, Kılıç and Kuzey (2016) examined the impact of BGD on firm performance in Turkey and revealed a similar positive association. Using instrumental variables regression analysis on data from 2008-2012 for companies listed on the Borsa Istanbul, the study found that although Turkish boards are predominantly male dominated, the inclusion of female directors is positively associated with financial performance, as measured by ROA, ROE, and ROS (return on sales). Their finding contributes to the limited research on BGD in emerging markets and suggests that female representation can enhance firm performance in Turkey.

Shifting the focus to an emerging market context, Kılıç and Kuzey (2016) examined the impact of BGD on firm performance in Turkey, revealing a similar positive association. Using instrumental variables regression analysis—specifically employing two-stage least squares, limited information maximum likelihood, and generalized method of moments estimators to mitigate potential endogeneity concerns—the authors assessed the impact of gender diversity on data from 2008-2012 for companies listed on the Borsa Istanbul. The study found that although Turkish boards are predominantly male dominated, the inclusion of female directors is positively associated with financial performance, as measured by ROA, ROE, and ROS (return on sales). Their finding contributes to the limited research on BGD in emerging markets and suggests that female representation can enhance firm performance in Turkey.

Studies in the UK (Brahma et al., 2020) and Italy (Groening, 2019) also reveal financial benefits linked to BGD. Notably, the UK study found this positive relationship strengthens significantly when three or more women are on the board, supporting the critical mass theory, which posits that a sufficient number of women on the board can lead to increased attention and action on issues relevant to women (Sarah & Mona, 2008). In Italy, firms with male dual CEO and board chair structures, and those with few women on board committees, saw particular financial gains after implementing BGD. Further, the UK research identified a positive correlation between firm performance and female directors' age, education, and executive positions, even after addressing endogeneity concerns. These findings inspire us to expand our research

focus beyond gender and explore how investor expectations might also be shaped by other director characters.

However, a nearest Japan case (Wang et al., 2024) reveals a negative relationship between BGD, particularly in smaller firms, those with higher leverage and lower institutional ownership, and in regulated and consumer-focused industries, especially before the COVID-19 pandemic.

Except for the research of BGD in a certain country, some other studies focus on the impact in a certain continent or a certain area. Taking Europe as an example, a study analyzed the prevalence of women directors on supervisory and management boards in over 20 million European firms (Tyrowicz et al.,2020). Despite a general increase in BGD, women remain rare on both supervisory and management boards across European firms. The study found that few systematic factors consistently explain greater gender diversity across both board types and firm ownership, with country-level gender equality and cultural institutions exhibiting differentiated correlations. Additionally, sector-level competition and innovativeness show little association with the presence of women on either board.

A more specific case is the California Senate Bill No. 826 (California State Senate, 2018), which mandated that publicly held corporations headquartered in California have a minimum of one female director by the end of 2019, and two or three female directors depending on board size by the end of 2021 (California State Senate, 2018). An analysis focusing on the impact of SB 826 on firm value (Greene et al., 2020), found an average -1.2% stock market reaction upon announcement. Firms with a larger gap to fill and fewer female candidates experienced more negative returns. Despite this, firms increased female board representation, with California firms outpacing those in other states.

The literature on the impact of BGD on corporate performance across various countries and regions presents mixed and complex results. While some studies find positive associations between BGD and firm performance, particularly in countries with strong shareholder protections or higher gender parity, other studies reveal neutral or even negative effects. The findings in Norway and Japan highlight potential challenges associated with mandatory gender quotas and suggest that the impact of BGD may be contingent on firm-specific characteristics, industry contexts, and broader

socio-cultural factors. The European study further underscores the complexity of this relationship, indicating that country-level gender equality and cultural institutions play a significant role in shaping board gender diversity. In general, previous research suggests that the relationship between BGD and firm performance is not universally positive or negative, but rather contingent on a range of contextual factors. Further research is necessary to disentangle these complexities and develop a more nuanced understanding of the impact of BGD across different contexts.

Based on the current literature, we also found out some insufficiency that can be upgraded in our model design. First, focusing solely on gender quota and board choice may be not enough, the influence of other personal characters of new entrants on investor reactions warrants investigation. Second, we enhance the selection of event dates. Previous natural experiments predominantly utilized the mandate or implementation date of relevant events (such as legal provisions) as event date 0. However, in contrast to the rather long-time range employed in some studies (e.g., the 4-year period examined in Spain and Turkey case (Reguera-Alvarado et al., 2015; Kılıç & Kuzey, 2016)), this approach often results in relatively narrow event windows. To address this, our model sets each director's board entry as an independent event, constructing corresponding event and estimation windows for each to calculate CARs. This aims to generate dynamic values for subsequent regression analysis as the dependent variable. Third, rather than adhering to a fixed time range, we partition the entire period into equal-length intervals for comparison. This approach allows us to detect whether and how a crisis environment, such as the 2008 financial crisis, might influence investors' attitudes toward director gender, facilitating a comparative observation of changes in the coefficients and significance levels of regression variables before, during, and after the crisis.

2.2 BGD and firm performance

The second category of research delves into the direct relationship between BGD and its financial implications, encompassing performance metrics and financial indices. Scholars aim to understand how BGD influences various corporate facets, such as top management representation, stock returns, and stock price informativeness.

The relationship between BGD and firm performance, however, is characterized

by mixed and sometimes contradictory findings. Reddy and Jadhav's (2019) comprehensive literature review underscored the diversity of outcomes in studies examining the impact of BGD on firm performance and the effects of gender quota legislation. They found evidence from both developed and emerging markets showcasing mixed results on the performance impact, with some studies showing positive effects and others showing neutral or even negative effects. Post & Byron's (2015) meta-analysis of 140 studies further confirmed the mixed relationship between female board representation and firm financial performance, though they did identify a positive association with accounting returns, particularly in countries with strong shareholder protections.

Delving deeper into specific areas of research, it is clear that the appointment of a director, especially a female, is not a gender-neutral action and can influence a company's financial indices (Farrell & Hersch, 2005). In most cases, the inclusion of female directors on boards has been associated with positive impacts, including enhanced managerial task performance (Dezső & Ross, 2012), reduced decision-making errors (Wahid, 2018), higher credit ratings (Datta et al., 2021), lower stock market return variability and reduced firm risk (Lenard et al., 2014), and greater dividend payouts (Chen et al., 2017). BGD can be particularly financially beneficial for firms with male CEO duality, less female representation in board committees, and those operating in competitive industries (Groening, 2019).

The positive implications of BGD even extend to scenarios where the "glass ceiling" phenomenon persists, emphasizing the gender disparities prevalent in the workplace (Momin et al., 2022; Galloway, 2012). Wolfers' (2006) research, investigating the potential underestimation of female CEOs in financial markets, found no systematic difference in returns for female-led S&P 1500 firms from 1992-2004, though the study acknowledged limitations in statistical power. Dezsö and Ross (2012) further argued for the importance of female representation in top management for improved firm performance, particularly in innovation-focused firms, attributing this to the unique informational and social diversity benefits women bring. Regardless of the direct impact on financial performance, BGD remains a critical consideration in today's market.

Nevertheless, the literature also acknowledges potential challenges and

complexities associated with BGD. As discussed previously, the mandatory gender quota law in Norway led to a decline in stock prices and Tobin's Q, alongside younger and less experienced boards (Ahern & Dittmar, 2012). This underscores the importance of considering the specific context and potential trade-offs of BGD implementation.

Papers in this section, constituting the most substantial part of our literature review, provide a comprehensive overview of the research on the relationship between BGD and various financial indicators. It serves as a valuable reference for our study and empirical analysis. Therefore, in addition to examining the impact of directors' personal characters on stock returns and investor reactions, we also conduct an empirical study to investigate the relationship and significance of changes between CARs and firm characteristics. This aims to further explore whether the gender of new entrants has a significant short-term impact on firm characteristics and how investors perceive these changes.

Together, research on the financial implications of BGD emphasizes the need for continued investigation into the multifaceted relationship between BGD and firm outcomes. While evidence suggests potential benefits, the impact of BGD on financial performance is contingent on various factors and necessitates careful consideration of the specific context in which it is implemented.

2.3 BGD and REC/ESG/CSR

The final part of the literature review explores the multifaceted relationship between BGD and environmental, social, and corporate governance (abbreviated as ESG hereafter) factors, including corporate social responsibility (abbreviated as CSR hereafter) and renewable energy consumption (abbreviated as REC hereafter).

Expanding the scope of inquiry beyond the direct impact of BGD on firm performance, researchers have also investigated its influence on various financial outcomes and decision-making processes within corporations. In the modern business landscape, corporate responsibility and sustainability have become increasingly important (Bergman et al., 2015; D'amato et al., 2009). A substantial body of research suggests that BGD can play a pivotal role in enhancing a firm's ESG performance. Lu and Herremans (2019) argued that boards with greater gender diversity demonstrate a stronger commitment to environmental performance and social responsibility.

Furthermore, studies have consistently shown a positive correlation between BGD and various aspects of ESG, including environmental impact mitigation, adoption of green initiatives, and long-term sustainability planning.

For instance, Liu (2018) found that firms with greater BGD are less likely to face environmental lawsuits. Lu and Herremans (2019) further explored this relationship from an industry perspective, revealing a positive association between BGD and firms' environmental performance scores, particularly in sectors with a significant environmental footprint. Atif et al. (2021) extended this line of inquiry by establishing a positive link between BGD and REC, underlining the role of female independent directors and the critical mass effect in driving this relationship.

Beyond environmental considerations, Galletta et al. (2021) examined the impact of female leadership on the broader sustainability performance of banks, encompassing financial, social, and environmental dimensions. Their findings indicated that while a higher proportion of female directors enhances financial and environmental performance, female managers tend to contribute more towards social performance and stakeholder engagement. This underscores the importance of a balanced representation of women in both director and managerial roles for comprehensive sustainability performance in the banking sector.

In light of these findings, Byron and Post (2016) advocate for initiatives that ensure board accountability to diverse stakeholders and enhance the status of women in society and the workforce to maximize the benefits of diversity for corporate social performance. This holistic approach aligns with the increasing recognition that BGD is not only a matter of ethical imperative but also a strategic advantage for companies navigating the complex landscape of ESG considerations in the modern business world.

The interconnectedness of ESG and BGD has led to increased scholarly attention on the relationship between BGD and CSR. Galbreath (2016) pointed out that female board representation positively influences CSR, which subsequently enhances financial performance. This suggests that CSR acts as a mediating mechanism, linking BGD to improved firm outcomes. Further research by Fernandez-Feijoo et al. (2012) revealed that boards with at least three female members tend to disclose more CSR information, albeit with fewer integrated reports, and emphasize the need for more comprehensive statements.

The discussion on BGD and CSR also extends to ethical considerations. Boulouta (2012) found that BGD significantly influences corporate social performance, particularly in areas addressing negative business practices. This suggests that female directors may exhibit greater sensitivity towards issues requiring empathy and ethical considerations.

However, due to the constraints of our empirical method design, our study did not delve deeply into the relationship between BGD and ESG, CSR, or REC. Instead, we conducted a period comparison to analyze how investor reactions to entrant gender might fluctuate during a crisis. For instance, while investors might typically favor new female directors with more experience, they may prefer younger directors for their proactiveness or aggressiveness in the aftermath of a crisis. Additionally, we sought to understand how investor reactions vary not solely based on gender but also concerning other director attributes. The existing literature has provided valuable insights and potential avenues for expanding BGD research and connecting it to the dynamics of the modern business market.

In summary, the existing literature highlights a complex and multifaceted relationship between BGD and ESG performance. While BGD appears to positively influence various aspects of ESG, CSR, and REC, the extent and nature of this relationship can vary depending on contextual factors such as industry, firm size, and national institutions. However, as a newly defined concept, further empirical evidence is needed to solidify the positive association between BGD and ESG, CSR, and other related concepts, despite the promising findings in numerous studies. Moreover, the literature suggests that BGD may not only enhance financial performance directly but also indirectly through its impact on CSR. Building on these insights, this study aims to examine the specific impact of female director appointments on firm value and investor reactions, considering various director characteristics and firm-specific factors."

Building upon the existing research, this study aims to further explore the relationship between BGD and investors' reactions by examining the following hypotheses:

H1a: The appointment of a female director with higher age is associated with

a more positive investor reaction.

The H1a hypothesis stems from the notion that female entrants with older ages, with their accumulated wisdom, experience, and extensive networks, may enhance decision-making and strategic oversight, leading to positive investor sentiment and stock return after the announcement. We suppose a positive correlation between the age of a newly appointed female director and the firm's stock return, which will be tested using an event study methodology, regressing CARs around the appointment announcement against the director's age, controlling for other relevant factors.

H1b: The appointment of a female director with more experience is associated with a more positive investor reaction.

Similar to H1a, H2b posits that experienced directors with valuable insights and skills, can potentially enhance board effectiveness and firm value, and furthermore raise investor expectation. We suppose a positive relationship between the experience level of a new female director and the firm's stock return, which will be tested using an event study approach, regressing CARs against the director's experience level while controlling for other relevant factors.

H1c: The appointment of a female director with higher education or certification is associated with a more positive investor reaction.

The H1c hypothesis is rooted in the speculation that higher education and professional certifications, serving as indicators of enhanced knowledge and capability, potentially lead to improved firm outcomes and positive market reactions. We suppose a positive relationship between a new female director's educational attainment or certification and the firm's stock return, which will be tested using an event study approach, regressing CARs against these two qualifications while controlling for other relevant factors. (See section 3.1 for the methodology of creating dummy variables for these qualifications).

H2: Firms with a higher representation of female directors on their boards are perceived more favorably by investors, leading to higher valuations.

The H2 hypothesis is grounded in the theoretical arguments surrounding board diversity and its potential benefits. A greater female presence on boards is often associated with enhanced monitoring, diverse perspectives, and improved corporate governance, which could translate into superior firm characters. We hypothesize a

positive relationship between the appointment of a new female director and several firm characteristics, such as profitability, size, and liquidity (see section 3.1 for details). This will be examined using an event study approach and panel regression analysis, where we will regress CARs against the proportion of female directors on the board and various firm-level factors to assess how these characters respond to the appointment of directors of different genders.

The alternative hypotheses for our research are as follows: for H1a, H1b, and H1c, the null hypothesis states that there is no significant relationship between the respective female director attributes (age, experience, and education/certification) and CARs, or no observable difference in CARs towards personal variables based on director gender. For H2, the null hypothesis proposes no significant association between the proportion of female directors and favorable firm characters. Our empirical analysis will prioritize clear variable definitions and operationalization, select appropriate control variables, and address potential endogeneity concerns.

3. Data and Methodology

3.1 Data selection and collection

The data for this study were primarily collected from three databases accessed through WRDS, a comprehensive platform providing financial and governance data on global companies across 38 countries (Wharton Research Data Services, n.d.).

Two distinct time ranges were employed in our analysis. Firstly, to mitigate the confounding effects of the 2008 Global Financial Crisis and the COVID-19 pandemic (which began in early 2020), a data collection period spanning from January 1st, 2010, to January 1st, 2020, was utilized. Secondly, we expanded the data range to encompass the period from January 1st, 2005, to January 1st, 2020, further segmenting this time frame into five 3-year intervals (2005.01.01 - 2007.12.31,2008.01.01-2010.12.31, and so forth). This approach aimed to incorporate the 2008 Global Financial Crisis into our analysis and to enable the observation of trends in the results across distinct time periods. The subsequent data processing steps were consistently applied to each of these time segments.

The innovation in our time range selection lies in not only adopting a long duration like most previous studies (Reguera-Alvarado et al., 2015; Kılıç & Kuzey, 2016) but also dividing it into equal-length intervals and performing the same data processing and analysis on each interval. This approach aims to horizontally compare the changes in regression parameters for each variable across different time periods, thereby observing whether the impact of the new entrant's gender on the polarity, significance, and coefficient magnitude of the corresponding variables changes and how it varies. Notably, we also include the 2008 Financial Crisis in our period comparison, which helps us discuss whether investors' attitudes towards the gender of board entrants change when facing and after a crisis event.

In our model selection, we opted for the CAPM. As a widely accepted single-factor model and benchmark for calculating expected returns, CAPM offers several advantages. In contrast to other asset pricing models, CAPM provides simplicity and convenience in calculating systematic risk. This is achieved through a straightforward OLS regression, followed by multiplication with an estimated market risk premium to obtain an estimate for excess return on equity (Bartholdy & Peare, 2005).

Other popular models, such as the Constant Return Model, assume returns are constant and disregard market fluctuations (Campbell, 2013). The Fama-French Model (1992) offers a three-factor model to estimate portfolio returns and incorporates additional factors like size and value effects (Bartholdy & Peare, 2005). However, for our study, we primarily require the market return, which CAPM adequately captures. The Constant Return Model lacks the ability to accurately reflect market volatility, while the Fama-French Model introduces unnecessary complexity due to its inclusion of multiple factors. Considering these trade-offs, we selected CAPM for its suitability to our research needs. The formula and further explanation of CAPM can be found in section 3.3.

Our data processing involves an event study and two panel regressions. To test our null hypothesis outlined in section 2, we employ an event study to calculate the cumulative abnormal return (abbreviated as CAR hereafter), which serves as our dependent variable. The two panel regressions utilize director information and firm characteristics, respectively, as independent variables. Therefore, we extracted relevant data from databases containing personal information, stock information, and firm-level characteristics, all accessed through the WRDS platform.

As mentioned in Section 2, in previous natural experiments, scholars used various metrics such as Tobin's Q (Ahern and Dittmar, 2012), abnormal return (Groening, 2019), absolute return (Wolfers, 2006), etc. Our choice of CAR as the primary metric is mainly due to its established role as a standard measure in event studies, facilitating comparison with existing research on investor reactions to corporate events. CARs focus on the deviation between actual and expected stock returns directly captures investor sentiment and aligns with the understanding that stock prices reflect investor assessments of company value (Tandelilin, 2010; Rahayu & Wardana, 2021). Moreover, it can accumulate abnormal returns over a time window and allow us to examine the sustained impact of board appointments on investor behavior, acknowledging that the effects of board diversity may unfold gradually and influence investment decisions (Samsuar, 2017). Thus, CAR provides a standardized, investor-centric, and temporally comprehensive lens for our investigation into the relationship between BGD and market reactions.

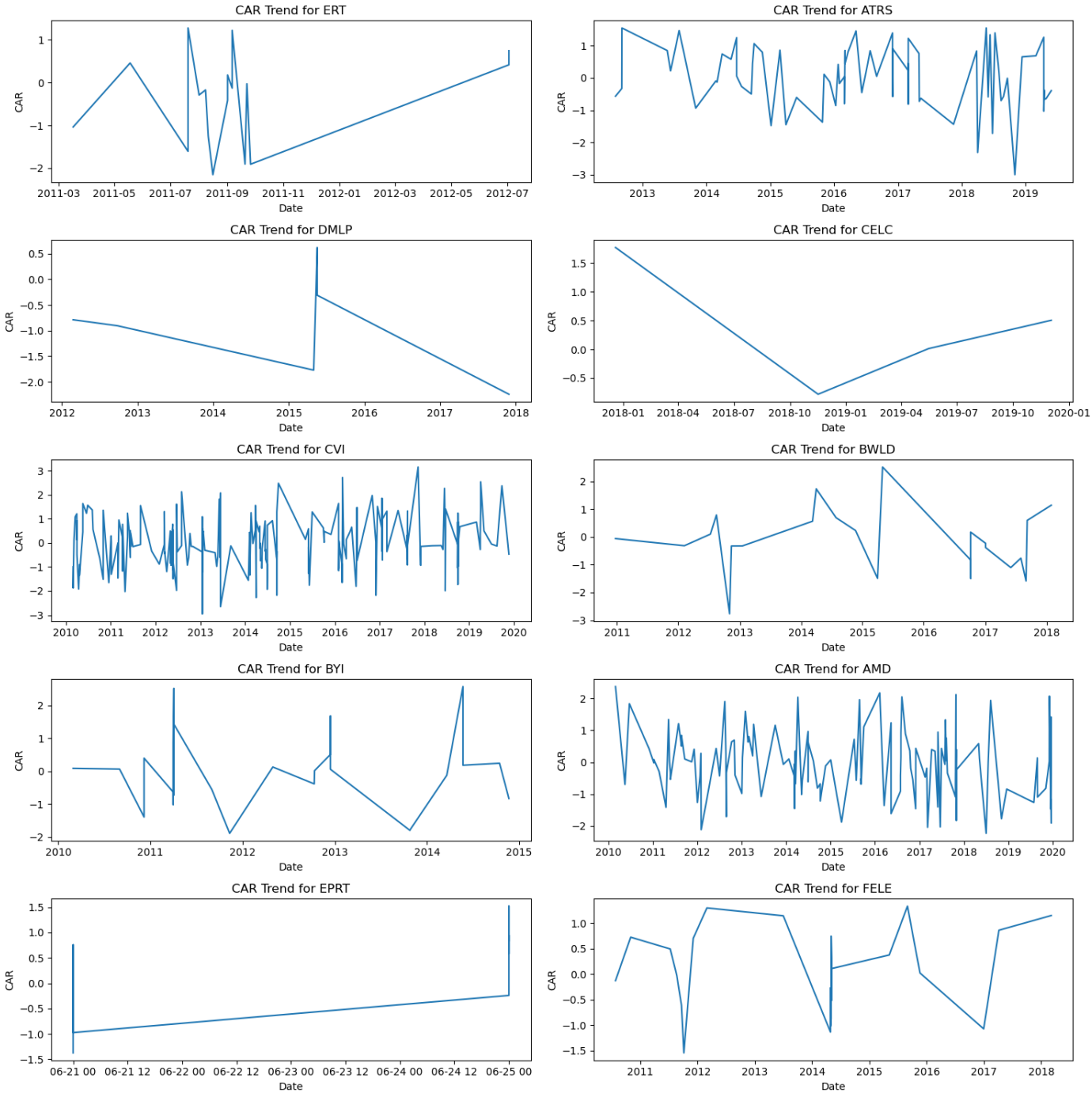

Figure 1 visualizes the time-series evolution of CARs for ten randomly chosen firms within our merged dataset.

Specifically, director information was collected from the BoardEx database, primarily focusing on board entry date, gender, age, work experience, education, and certifications, to test hypotheses H1a, H1b, and H1c. Stock information was obtained from The Center for Research in Security Prices, LLC (CRSP), with all items detailed

in Table 1. Firm-level characters were extracted from the Compustat Fundamentals database (Compustat), with definitions and calculations for each item and variable provided in Table 2 and Table 3.

All data extraction was restricted to North America and involved selecting the specific time period under investigation, identifying companies using their tickers, permnos, or CUSIPs, and exporting the relevant variables from each database in CSV format after conducting a thorough search within each database. As mentioned previously, we chose this geographical region due to its mature financial market and well-developed databases, which enabled us to minimize missing values in our dataset. The subsequent sections will elaborate on the details of our data collection and utilization process.

The primary source of director and CEO information was the BoardEx - North America database within WRDS. BoardEx, an enterprise solution for business development and relationship capital management, offers a rich repository of information on over 1.7 million corporate executives and board members from over 2.2 million organizations worldwide. This database provided essential details on age, gender, positions held, educational qualifications, compensation, stock holdings, and professional networks, enabling a comprehensive analysis of director characteristics and their potential impact on firm performance (BoardEx, n.d.).

For each director and board appointment, biographical and individual details were gathered from the "Individual Profile" subcategory within BoardEx, encompassing the "Individual Profile Details," "Individual Profile Employment," and "Individual Profile Education" subsets. This data included age, gender, nationality, company ID, director ID, board position, qualifications, and reward date for newly appointed directors. Additionally, board- and director-specific information, such as board name, director name, Time in Role, Time on Board, and Time in Company, were extracted from the "Organization Summary - Analytics" subset.

The initial step involved merging the BoardEx data into a comprehensive dataset, using Director ID as the primary key. To optimize data efficiency, we retained only the top 30 most frequent qualifications, accounting for approximately 80% of the data, and excluded less frequent ones.

To realize this, we created two dummy variables to represent directors' educational

backgrounds:

Graduate: This variable equals 1 if a director holds an MBA, JD, MS, Master's Degree, MA, JD (Cum Laude), MD, PhD, LLB, MSc, LLM, or JD (magna Cum Laude) qualification, and 0 otherwise.

Certification: This variable equals 1 if a director holds a CPA, CFA, or Certified Public Accountant qualification, and 0 otherwise.

The procedures of manually designing two dummy variables aim to create variables that can transform the originally categorical educational background and certification information into quantifiable variables, enabling us to assess the impact of education and certification on the dependent variable in subsequent regression analyses. These dummy variables employ a binary coding of 0 and 1, facilitating the processing and analysis of complex categorical information within statistical models. Meanwhile, it is impractical to record each one individually due to the inconsistent recording methods and vast variety (around thousands) of education and certification types across firms. Therefore, we have opted to select the top 20 most frequent graduate degrees (accounting for nearly 80% of the data) and the most significant and widely recognized certifications, with all others being assigned a value of 0.

To maintain data integrity and address potential autocorrelation concerns (see 3.3 AR1 Test), only the highest level of education for each director was retained, assuming minimal influence from multiple qualifications on the analysis outcome.

Subsequently, daily stock data for North American companies was collected from the CRSP database within WRDS, which maintains a comprehensive collection of security price, return, and volume data for major U.S. stock markets (NYSE, AMEX, and NASDAQ). Additional CRSP files provide information on stock indices, portfolios, treasury bonds, risk-free rates, mutual funds, and real estate data (Center for Research in Security Prices, n.d.).

From the "CRSP Daily Stock" subset under the "Stock / Security Files" category, and after defining the desired date range and applying company codes, we selected key stock variables such as price, volume, returns, number of shares outstanding, etc., along with firm identifiers like SIC and CUSIP. Table 1 provides a comprehensive definition for each of these CRSP data items.

Table 1 Presents definition of each CRSP items

Data Items	Full Definition
PRC	Price or Bid/Ask Average
VOL	Volume
RET	Returns
SHROUT	Number of Shares Outstanding
vwretd	Value-Weighted Return (includes distributions)
vwretx	Value-Weighted Return (excluding dividends)
ewretd	Equal-Weighted Return (includes distributions)
ewretx	Equal-Weighted Return (excluding dividends)

To merge the BoardEx and CRSP datasets, which lacked a common identifier, we created a unique merge key called 'tic_date'. This key was generated by combining the 'Ticker' and 'DateStartRole' from BoardEx, designating this date as the 'event date 0'. A similar process was applied to the CRSP data, resulting in a new dataframe(named as df_board) containing only the data corresponding to 'event date 0'. Subsequently, a loop was employed to merge this new data frame back into the complete stock data, enabling us to obtain data for all 'event dates'. For example, if a new director entry occurred on January 2nd, 2015, we designated January 1st, 2015 as 'event date -1' and January 3rd, 2015 as 'event date 1', and so on.

The subsequent stage of data processing involved merging the df_board back to CRSP stock data. To achieve this, a comprehensive dataset was constructed by iterating through each unique ticker symbol in the df_board DataFrame. For each ticker, corresponding rows in both CRSP data frame and df_board were identified. Then, for every director entry in df_boar2, the script calculated the event date by subtracting the director's start date (DateStartRole) from each exact date in the matching CRSP data for that ticker. The resulting dataset, included all the key variables to identify firm information, stock information and event date. This merged dataset enabled the subsequent event study analysis by associating stock price data with the specific dates of director appointments.

Firm-level characteristics were extracted from the Compustat Fundamentals

database within WRDS, a cornerstone resource for financial professionals providing standardized financial statements and market data for publicly traded companies. Utilizing the Compustat - Capital IQ subscriptions, we accessed quarterly fundamental data for North American companies. Following the selection of the appropriate time range and a comprehensive database search, key firm-level variables were identified for regression analysis. These variables included Total Assets (atq), Total Common/Ordinary Equity (ceqq), and Quarter Price Close (prccq), among others. From these variables, essential firm characteristics such as size, liquidity, ROA, ROE, debt-to-equity ratio, leverage, market-to-book ratio, and profitability were derived. A detailed definition of all Compustat data items employed in this study is provided in Table 2.

Table 2 Presents definition of each Compustat items

Data Items	Full Definition
fyearq	Fiscal Year
fqtr	Fiscal Quarter
tic	Ticker Symbol
conm	Company Name
datacqtr	Calendar Data Year and Quarter
datafqtr	Fiscal Data Year and Quarter
actq	Current Assets - Total
atq	Assets - Total
ceqq	Common/Ordinary Equity - Total
cogsq	Cost of Goods Sold
cshoq	Common Shares Outstanding
dlcq	Debt in Current Liabilities
dlttq	Long-Term Debt - Total
lctq	Current Liabilities - Total
ltq	Liabilities - Total
oibdpq	Operating Income Before Depreciation - Quarterly
saleq	Sales/Turnover (Net)

seqq	Stockholders Equity > Parent > Index Fundamental > Quarterly
teqq	Stockholders Equity - Total
xsgaq	Selling, General and Administrative Expenses
prccq	Price Close - Quarter

Given the discrepancy in data frequencies between quarterly Compustat data and daily BoardEX and CRSP data, specific procedures were implemented to ensure a smooth merging process. Initially, an outer join was performed between the Compustat data frame and the existing BoardEX and CRSP dataset, utilizing 'tic' and 'datadate' as merging keys. In the resulting dataset, each ticker was associated with two sections: one containing valid director and stock information but NaN values for firm characteristics, and another with the inverse. Subsequently, each Compustat date was assigned to its corresponding quarter (e.g., March 4, 2014, was assigned to Q1 2014), which involved identifying the relevant quarter ('2014Q1') within the 'datacqtr' variable (Calendar Data Year and Quarter) and replacing all NaN values with the corresponding Compustat data. Finally, rows lacking complete director, stock, or firm information were removed. Consequently, the remaining data for each ticker encompassed all necessary variables for the subsequent regression analysis.

Then we calculated firm control variables for the second regression, containing leverage, firm size, liquidity, market to book ratio, debt to equity ratio, profitability, Return on Assets (abbreviated as ROA thereafter), and Return on Equity (abbreviated as ROE thereafter). Among them, we put lag (day t-1) on liquidity, debt to equity ratio, profitability, ROA and ROE (see 3.3 Ljung-Box Test). Table 3 presents the calculation of firm characters (latq means lagged atq and lceqq means lagged ceqq).

Table 3 Presents calculation of each firm variables

Control Variables	**Calculation**
Leverage	(dlttq + dlcq) / seqq
Firm Size	log(atq)
Liquidity	actq / lctq
Market to Book Ratio	(cshoq * prccq) / (atq - ltq)

Debt to Equity Ratio	ltq / teqq
profitability	oibdpq / atq
ROA	(saleq - cogsq - xsgaq) / latq
ROE	(saleq - cogsq - xsgaq) / lceqq

As previously outlined, the data processing steps were consistently applied to each time period. In addition to the comprehensive 2010-2020 period, we collected data from five consecutive three-year intervals: 2005-2007, 2008-2010, 2011-2013, 2014-2016, and 2017-2019. Employing the same established procedures, we conducted two separate panel regression analyses for each period, examining the impact of board composition, stratified by director gender (all, female-only, and male-only), on the dependent variable. The comprehensive results of these regressions, encompassing both long-term (2010-2020) analysis and inter-period comparisons, are presented in detail in the tables within Section 4.

3.2 CAPM and Event Study

To start before, we employ the CAPM, which is a fundamental tool in finance for estimating asset expected returns and risks based on their covariance with the overall market portfolio (Elbannan, 2014), to calculate CARs. The CAPM establishes a relationship between the asset's beta, the risk-free rate, and the equity risk premium (the expected market return minus the risk-free rate) (Kenton, 2024; Rocciolo et al., 2022).

$$R_{i,t} - r_{f,t} = \beta_i(R_{m,t} - r_{f,t}) + \varepsilon_{i,t} \quad (1)$$

The equation of CAPM, as shown in (1), is the relationship between the excess return of an individual asset, $R_{i,t} - r_{f,t}$, and the excess return on the market, $R_{m,t} - r_{f,t}$ (Sanford & Tremblay-Boire, 2023).

The formula helps investors assess if a stock is fairly priced by considering its risk and the time value of money (risk-free rate). The β_i we calculated here is the stock's volatility or systematic risk, and we compare it to the market, with a beta greater than one indicating higher risk. Each stock beta can be multiplied by the market risk premium, which is the excess return on the marker over the risk-free rate. Adding the risk-free rate to this product yields the required return or discount rate, used to

determine an asset's value (Kenton, 2024; Rocciolo et al., 2022).

While the calculation of abnormal return (abbreviated as AR hereafter) shows in equation (2):

$$AR_{i,t} = R_{i,t} - \widehat{\alpha_i} - \widehat{\beta_i} R_{m,t} \quad (2)$$

Inside, $AR_{i,t}$ is the AR for firm i at time t, $R_{i,t}$ is the realized return of asset i at time t, and $\widehat{\beta_i} R_{m,t}$ is the expected return from the asset (Sanford & Tremblay-Boire, 2023). Alpha measures the excess return of a stock above the benchmark, while beta measures its risk. By calculating AR, we can identify the difference between an investment's actual and expected return. The CAR sums these ARs, typically over a short timeframe, to evaluate the impact of an event on stock prices (Rocciolo et al., 2022).

The CAR of each event is defined as the sum of AR from T1 to T2, as showed in equation (3):

$$CAR_i(T1, T2) = \sum_{t=T1}^{T2} AR_{i,t} \quad (3)$$

Then, as mentioned in 3.1, the empirical measures of this paper are analyzed in two main stages. The first stage employs an event study methodology to investigate the potential influence of director gender and other characters on a firm's CAR surrounding the announcement of a new director appointment (see 3.3 for the equations). To put it simply, this stage examines whether the investor in market reacts positively or negatively to the announcement, considering the gender and other attributes of the new director. The event study methodology was implemented using the merged dataset of BoardEX and CRSP data, as detailed in Section 3.1. After eliminating duplicate entries within the BoardEX data, we designated the date of each new director appointment as 'event date 0'. Leveraging the daily frequency of the CRSP data, we used event date 0 as an index to establish the event date for each day relative to the appointment, creating an event window of (-5, 5) and an estimation window of (-40, -5).

To calculate the CAR in the event study, we first ensured that the returns (RET) in the estimation window were in numeric format. Subsequently, we employed the custom regress function of equation (2), leveraging ordinary least squares (OLS) regression, to estimate the intercept (alpha) and slope (beta) for each stock by

regressing individual stock returns (RET) on the market return (vwretd). By applying this function to the estimation window data grouped by each stock ticker, we obtained alpha and beta estimates for each stock. These regression results were then transformed into a data frame and merged with the event window data. Finally, the AR was calculated by subtracting the expected return (following equation (2)) from the actual return. The CAR was then computed as the cumulative sum of ARs within the event window for each TICKER, providing a measure of the total ARs over the event window (following equation (3)). This process allows us to understand the impact of a new director appointment on stock returns by comparing actual returns to those expected based on historical data and market trends.

3.3 Regression models

To examine our hypotheses (H1a, H1b, H1c, and H2), we estimated two separate panel regression models, as specified in Equations (4) and (5) hereafter. Our choice of Panel Regression, which is preferred over Ordinary Least Squares (abbreviated as OLS hereafter) in various fields, provides us with better ways to address fixed effects and robust estimations, the abilities to analyze dynamic relationships and lagged effects, and help us account for heterogeneity among subjects (Beyaztas and Bandyopadhyay, 2020). Panel Regression models, as discussed by many previous scholars (Beyaztas and Bandyopadhyay, 2020; Bassiouni et al.,2016; Eugenio-Martin and Patuellii, 2022), offer advantages such as overcoming multicollinearity and omitted-variable bias. It also allows for the consideration of both spatial and temporal variability, leading to more reliable model coefficients and reduced standard errors compared to OLS (Bassiouni et al.,2016).

Additionally, to account for unobserved time-invariant heterogeneity across firms, a time effect was incorporated into each model.

$$CAR_{i,t} = \alpha + \beta_1 Age_{i,t} + \beta_2 TimeBrd_{i,t} + \beta_3 Graduate_{i,t} + \beta_4 Certification_{i,t} + \beta_5 GenderRatio_{i,t} + \beta_6 GenderDummy_{i,t} + \gamma_t + \varepsilon_{i,t} \quad (4)$$

$$CAR_{i,t} = \alpha + \beta_1 GenderRatio_{i,t} + \beta_2 GenderDummy_{i,t} + \beta_3 Leverage_{i,t} + \beta_4 Firm_Size_{i,t} + \beta_5 Liquidity_{i,t-1} + \beta_6 MtoB_{i,t} + \beta_7 D/E_{i,t-1} + \beta_8 Profitability_{i,t-1} + \beta_9 ROA_{i,t-1} + \beta_{10} ROE_{i,t-1} + \gamma_t + \varepsilon_{i,t}$$

(5)

Equation (4) investigates how individual director characteristics influence CARs around their appointment. The coefficients β_1 to β_6 quantify the impact of each director attribute - age, tenure, education, certification, gender ratio, and a gender dummy - on CARs. In this equation, γ_t represents the time-fixed effect, controlling for unobserved time-specific factors that might influence CARs. Note that 'TimeBrd' can be replaced with 'TimeRole' or 'TimeInCo' as needed, and for female-only or male-only data frames, the *GenderDummy* is excluded from the regression.

For example, a positive and significant coefficient for Age would support H1a, suggesting that appointing older female directors is associated with positive investor reactions. The *GenderDummy* allows for a direct comparison between female and male directors' impact in the full sample, while *GenderRatio* reflects the overall proportion of male directors on the board. Hypothesis testing will be based on the statistical significance and signs of the coefficients related to the personal characteristics of the newly appointed directors.

Equation (5) focuses on firm-level characteristics, exploring how BGD influences factors like leverage, firm size, liquidity, market to book ratio, debt to book ratio, profitability, ROA, and ROE. In this equation, γ_t represents the time-fixed effect. Note that for female-only and male-only dataframes, *GenderDummy* is excluded from the regression. Coefficients β_1 to β_{10} quantify the impact of each characteristic on CARs, measuring how these firm features vary when CAR increases a unit. A positive and significant coefficient for CARs on each firm character would support H2. Hypothesis testing will involve assessing the significance and signs of coefficients related to firm items.

We expect positive signs for Age, tenure variables, Graduate, and Certification in

Equation (4), suggesting positive associations with CARs which separately support our H1a, H1b, and H1c. The sign for *GenderRatio* and *GenderDummy* is exploratory. In Equation (5), we would also like to anticipate a positive relationship between CARs and each favorable firm character.

3.4 Fixed Effect and Ljung Box Test

3.4.1 Fixed Effect

In the testing phase of the data processing code designed to handle mixed-frequency data, we initially employed a three-year dataset spanning 2017 to 2020. Preliminary analyses revealed issues such as autocorrelation and multicollinearity. To mitigate these challenges and ensure the robustness of our empirical approach, we conducted a series of diagnostic tests.

During the panel regression testing, we generated results under four different scenarios: no fixed effects, firm-fixed effects only, time-fixed effects only, and both firm and time-fixed effects. Notably, models without fixed effects and those with only time-fixed effects exhibited higher R-squared values, larger regression coefficients, and more significant p-values compared to the other two scenarios. Based on the definition of fixed effects (Millimet & Bellemare, 2023) and these empirical observations, we opted to include only time-fixed effects in our final panel regression model. This choice allows us to capture the influence of time-specific factors that may affect all firms uniformly, such as macroeconomic conditions or regulatory changes, while avoiding potential biases associated with firm-specific unobserved heterogeneity.

3.4.2 Ljung-Box Test

In light of the differing frequencies of the Compustat (quarterly) and CRSP (daily) datasets, we employed a merging strategy that involved replicating each quarterly record for all dates within the corresponding quarter. To account for potential lags in certain firm characteristics, we conducted a Ljung-Box test, a well-established method for assessing the goodness-of-fit of time series models (Ljung & Box, 1978). The absence of statistically significant autocorrelation in the model residuals signifies an adequate fit, as indicated by Burns (2003).

We subsequently introduced lags for various Compustat variables, encompassing liquidity, debt-to-equity ratio, profitability, ROA, and ROE. Within the Ljung-Box test

framework, we compared the results of two separate regressions utilizing the 2017-2020 data: one incorporating the original variables and the other incorporating lagged versions of these variables. This comparative approach aimed to assess the impact of incorporating lagged explanatory variables on the presence of autocorrelation in the model residuals.

Table 4 Ljung-Box test results

Ljung-Box test for model without lag:	
lb_stat	lb_pvalue
16.36275	0.089709
Ljung-Box test for model with lags:	
lb_stat	lb_pvalue
5.684932	0.841003

Table 4 reveals that the model incorporating lagged explanatory variables exhibits a considerably larger p-value (0.841003) compared to the model without lagged variables (0.089709). This disparity in p-values suggests a potential presence of autocorrelation in the residuals of the non-lagged model. While the p-value of 0.089709 indicates a degree of autocorrelation, it may not be statistically significant at the conventional 5% level (larger than 0.05). Conversely, the significantly higher p-value of 0.841003 in the lagged model implies that the residuals exhibit minimal autocorrelation and possess characteristics more akin to white noise. Consequently, in the regression analysis of firm characteristics, we opted to incorporate lags for the aforementioned variables.

4. Empirical Results

4.1. Descriptive statistics

4.1.1 2010-2020 Summary

Table 5 presents descriptive statistics for the 2010-2020 data, encompassing all variables in Panel A and Panel B. The descriptive statistics include the number of observations (N), mean, median, standard deviation (Std. Dev), minimum (Min), and maximum (Max) values for each variable. The variables are grouped into three categories. First, director characteristics include age, tenure (TimeBrd, TimeRole and TimeInCo), graduate degree attainment (dummy variable), and certification status (dummy variable). Second, firm characteristics encompass leverage, firm size, lagged liquidity, market-to-book ratio, lagged debt-to-equity ratio, lagged profitability, lagged ROA, and lagged ROE (calculation see 3.1). Finally, the overall analysis includes the CAR, gender ratio, and a gender dummy variable (absent in the female-only and male-only tables).

The dataset comprises 67,970 firm-year observations of CARs, with 11,559 (17.1%) corresponding to female directors and 56,411 (82.9%) corresponding to male directors. The average gender ratio across all firms during this period is 82.2% (ranging from 28.6% to 100%). Female directors exhibit lower average age (64.02 years) and board tenure (TimeBrd: 4.74 years; TimeRole: 4.24 years; TimeInCo: 5.10 years) compared to their male counterparts (67.02 years, 6.70 years, 4.80 years, and 7.51 years respectively), while possessing a slightly higher incidence of graduate degrees (67.1% vs. 64.8%) and certifications (7.3% vs. 5.9%). Notably, the average CAR for female directors (-0.0087) is significantly lower than that of male directors (0.0010), with the minimum CAR for female directors also being more negative (-3.42 vs. -2.36). This initial observation suggests a potential negative association between the presence of female directors and CARs, a relationship that will be further explored in subsequent regression analyses.

Regarding firm characteristics, several noteworthy points emerge. Notably, firms appointing new female directors exhibit higher average leverage compared to those with new male directors or the overall sample, implying a potential inclination towards debt financing in such companies. Additionally, firm size, measured by the natural

logarithm of total assets, is consistently larger for firms with new female directors, implying their more frequent appointment to boards of larger corporations. While the average lagged liquidity is slightly lower for firms with new female directors, their lagged debt-to-equity ratio is slightly higher, possibly reflecting a focus on long-term investments or varying working capital management practices, alongside a potential inclination towards risk-taking or a strategic preference for debt financing. The remaining firm characteristics demonstrate relatively minor differences across the three director appointment categories. However, it is crucial to acknowledge that these observed differences may also be influenced by factors beyond board gender diversity, such as industry composition, firm size, or unobserved firm-specific characteristics. Therefore, further research is necessary to unravel the complex interplay between BGD and its impact on overall firm performance.

Table 5 Descriptive Statistics of 2010-2020

	Summary Statistics 2010-2020						Summary Statistics 2010-2020						Summary Statistics 2010-2020					
	Entry of all directors						Entry of female directors						Entry of male directors					
Variable	**N**	**Mean**	**Median**	**Std. dev.**	**Maximum**	**Minimum**	**N**	**Mean**	**Median**	**Std. dev.**	**Maximum**	**Minimum**	**N**	**Mean**	**Median**	**Std. dev.**	**Maximum**	**Minimum**
CAR	67970	-0.0007	-0.0023	1.0007	4.0601	-4.3632	11559	-0.0087	-0.0021	0.9985	3.7788	-3.4236	56411	0.0010	-0.0023	1.0011	4.0601	-4.3632
Age	67970	66.5132	67.0000	8.9901	103.0000	28.0000	11559	64.0174	65.0000	7.0297	92.0000	36.0000	56411	67.0246	67.0000	9.2585	103.0000	28.0000
TimeBrd	67970	6.3672	4.6000	6.1068	61.9000	0.0000	11559	4.7419	3.3000	4.7056	42.3000	0.0000	56411	6.7003	4.8000	6.3044	61.9000	0.0000
(TimeRole)	67970	4.7075	3.3000	4.6268	51.9000	0.0000	11559	4.2372	3.0000	4.0926	30.9000	0.0000	56411	4.8039	3.4000	4.7231	51.9000	0.0000
(TimeInCo)	67970	7.0964	4.9000	6.9741	67.8000	0.0000	11559	5.0962	3.5000	5.2237	42.9000	0.0000	56411	7.5062	5.4000	7.2129	67.8000	0.0000
Graduate	61960	0.6523	1.0000	0.4763	1.0000	0.0000	10842	0.6705	1.0000	0.4700	1.0000	0.0000	51118	0.6484	1.0000	0.4775	1.0000	0.0000
Certification	61960	0.0617	0.0000	0.2405	1.0000	0.0000	10842	0.0726	0.0000	0.2595	1.0000	0.0000	51118	0.0593	0.0000	0.2362	1.0000	0.0000
Gender Ratio	67970	82.2433	83.3000	12.3253	100.0000	28.6000	11559	73.5850	75.0000	10.9859	94.7000	28.6000	56411	84.0175	84.6000	11.8238	100.0000	28.6000
Gender Dummy	67970	0.1701	0.0000	0.3757	1.0000	0.0000	11559	1.0000	1.0000	0.0000	1.0000	1.0000	56411	0.0000	0.0000	0.0000	0.0000	0.0000
Leverage	52872	0.9740	0.5349	20.0356	1368.0000	-1579.4545	9486	1.2106	0.5551	14.0868	968.3088	-287.9057	43386	0.9223	0.5296	21.1139	1368.0000	-1579.4545
Firm Size	56656	7.7750	7.8080	2.3829	14.7949	-1.4188	10190	8.0953	8.0442	2.3170	14.7019	-0.2231	46466	7.7047	7.7543	2.3914	14.7949	-1.4188
Lagged Liquidity	44584	2.9777	1.8775	4.2159	120.6949	0.0151	8101	2.7388	1.7183	3.8450	120.6949	0.1501	36483	3.0308	1.9165	4.2922	120.6949	0.0151
Market to Book Ratio	56534	3.6565	2.0415	182.2265	32692.8000	-12929.6429	10166	3.9035	2.2554	74.5079	1933.7316	-6149.3290	46368	3.6023	1.9953	198.1666	32692.8000	-12929.6429
Lagged Debt to Equity	55069	2.1998	1.2992	44.1159	1201.3639	-2817.6818	9961	2.7744	1.3877	41.8020	1201.3639	-2593.0097	45108	2.0729	1.2816	44.6101	1201.3639	-2817.6818
Lagged profitability	51917	0.0106	0.0231	0.0742	1.6064	-3.2608	9401	0.0156	0.0250	0.0648	1.6064	-1.5570	42516	0.0095	0.0227	0.0761	1.6064	-3.2608
Lagged ROA	43015	0.0156	0.0255	0.0719	0.4167	-3.1747	7830	0.0209	0.0275	0.0554	0.3792	-0.8805	35185	0.0144	0.0249	0.0751	0.4167	-3.1747
Lagged ROE	42957	0.0468	0.0607	1.3565	106.6667	-83.9091	7823	0.0922	0.0640	1.1553	27.4105	-12.7039	35134	0.0366	0.0599	1.3971	106.6667	-83.9091

Table 5 presents descriptive statistics for the variables included in Panel A and Panel B, covering the period from 2010 to 2020.

4.1.2 Periods Summary

Table 6 presents descriptive statistics for various firm-level and director-level variables used in the subsequent Panel A and Panel B analyses, covering the period from 2005 to 2020 and segmented into five 3-year periods. Detailed definitions of descriptive statistics and variables are provided below.

In total, the table provides a comprehensive overview of the descriptive statistics, allowing for comparison across different time periods and facilitating the identification of potential trends. Notably, the number of observations exceeds 40,000 for all periods except 2008-2011, likely due to the impact of the 2008 financial crisis. However, the number of newly appointed female directors steadily increases across the selected time periods, while the number of male directors fluctuates, with a notable decrease between the first and second periods. This observation aligns with a study by Papangkorn et al. (2019), which found that boards with female directors significantly enhanced firm performance during the 2008 Great Recession, although such advantages were not observed outside of crisis periods.

The average age and gender ratio (proportion of male directors) for all directors exhibit a declining trend across the periods, while the average tenure increases until the third period before subsequently decreasing. The average values for the "Graduate" and 'Certification' dummy variables fluctuate throughout the five periods. Notably, the average GenderRatio decreases across all director types, indicating that companies are increasingly appointing more female directors to their boards.

As for the firm characters, the period comparison reveals intriguing trends. Leverage, a measure of a firm's debt relative to its equity, is consistently higher for firms appointing male directors compared to those with new female directors, particularly after the initial 2005-2008 period. This indicates a potential shift in the relationship between BGD and firms' propensity for debt financing, with male director appointments becoming associated with higher leverage over time. In contrast, firm size, consistently favors firms with female entrants, especially in earlier periods, indicating their more frequent appointment to the boards of larger companies. The lagged debt-to-equity ratio, initially lower for firms with new male directors, gradually converges with that of firms appointing female directors, suggesting a gradual alignment in capital structures. Notably, firms with male entrants, initially exhibit a markedly higher

market-to-book ratio (22.8217), and experience a sharp decline during the 2008-2011 financial crisis before recovering. This pattern could imply that investor sentiment towards firms with male board appointments was adversely affected during the crisis but subsequently rebounded. The remaining firm characteristics demonstrate relatively minor fluctuations across the analyzed periods.

The evolving trends observed in various items across different time periods, particularly the shifting dynamics in leverage, the consistent size differential between firms appointing female and male directors, and the decreasing trend in GenderRatio over time, underscore the complex and time-dependent relationship between BGD and firm financial strategies and investor perceptions.

Table 6 Descriptive Statistics of All Directors: Period Comparison (2005-2020)

Entry of all directors	2005-2008						2008-2011					
Variable	N	Mean	Median	Std. dev.	Maximum	Minimum	N	Mean	Median	Std. dev.	Maximum	Minimum
CAR	40657	-6.6547	-9.3700	9.7000	8.5149	-24.2772	38100	-11.7349	-10.8420	8.7131	4.4369	-31.5109
Age	40657	73.8395	74.0000	8.4872	104.0000	37.0000	38100	72.1388	73.0000	8.6191	101.0000	39.0000
TimeBrd	40657	5.3319	3.2000	5.9406	65.9000	0.0000	38100	5.6177	3.5000	5.9571	56.8000	0.0000
(TimeRole)	40657	3.6575	2.3000	4.2074	50.9000	0.0000	38100	3.9251	2.4000	4.2589	43.9000	0.0000
(TimeInCo)	40657	6.2269	3.7000	7.0111	65.9000	0.0000	38100	6.3594	4.0000	6.8136	80.8000	0.0000
Graduate	37106	0.6590	1.0000	0.4741	1.0000	0.0000	35130	0.6726	1.0000	0.4693	1.0000	0.0000
Certification	37106	0.0467	0.0000	0.2109	1.0000	0.0000	35130	0.0479	0.0000	0.2136	1.0000	0.0000
GenderRatio	40657	0.9017	0.9000	0.0967	1.0000	0.3750	38100	0.8888	0.8890	0.1035	1.0000	0.3330
GenderDummy	40657	0.0916	0.0000	0.2884	1.0000	0.0000	38100	0.1005	0.0000	0.3007	1.0000	0.0000
Leverage	28633	0.6683	0.3396	34.0220	732.2752	-2995.9457	26934	1.2641	0.3993	20.0687	1684.1278	-530.3778
Firm Size	30412	7.0204	6.9187	2.2402	14.6734	-1.2448	28670	7.2686	7.2036	2.3310	14.6758	-3.7723
Lagged Liquidity	22655	3.1301	1.9831	4.4596	121.0257	0.0152	21089	2.8380	1.9470	3.5840	152.6829	0.0078
Market to Book Ratio	30255	21.1665	2.3288	3008.6000	523074.7500	-5757.9021	28590	2.7383	1.6146	28.6424	2127.0000	-693.8864
Lagged Debt to Equity	4836	3.4139	1.3789	15.8803	471.0000	-167.1000	18278	3.2450	1.1610	32.3379	2532.1618	-611.8963
Lagged profitability	25161	0.0175	0.0262	0.0583	1.0224	-1.5903	24192	0.0111	0.0230	0.3542	1.6064	-53.8696
Lagged ROA	19537	0.0222	0.0281	0.0632	2.0934	-2.1662	18351	0.0184	0.0250	0.0644	0.3886	-2.3915
Lagged ROE	19532	0.0466	0.0651	2.7970	128.2188	-228.8913	18348	0.1094	0.0558	2.4482	211.6481	-45.0763

Entry of all directors	2011-2014						2014-2017					
Variable	N	Mean	Median	Std. dev.	Maximum	Minimum	N	Mean	Median	Std. dev.	Maximum	Minimum
CAR	43095	-4.6202	-5.3130	5.5866	6.4367	-13.5890	42884	-4.7349	-5.5276	4.3642	7.0394	-14.0832
Age	43095	70.5094	71.0000	8.6751	103.0000	38.0000	42884	67.1848	67.0000	8.7479	100.0000	34.0000
TimeBrd	43095	6.2232	4.4000	6.0416	61.9000	0.0000	42884	5.2470	2.9000	5.8276	67.9000	0.0000
(TimeRole)	43095	4.6010	2.8000	4.6893	47.9000	0.0000	42884	3.7542	2.2000	4.2575	42.9000	0.0000
(TimeInCo)	43095	6.9169	4.9000	6.7751	61.9000	0.0000	42884	5.9323	3.3000	6.6460	68.9000	0.0000
Graduate	39838	0.6766	1.0000	0.4678	1.0000	0.0000	39236	0.6578	1.0000	0.4745	1.0000	0.0000
Certification	39838	0.0355	0.0000	0.1850	1.0000	0.0000	39236	0.0459	0.0000	0.2092	1.0000	0.0000
GenderRatio	43095	0.8555	0.8570	0.1125	1.0000	0.2500	42882	0.8467	0.8570	0.1180	1.0000	0.2500
GenderDummy	43095	0.1441	0.0000	0.3512	1.0000	0.0000	42884	0.1601	0.0000	0.3667	1.0000	0.0000
Leverage	28212	1.0548	0.4552	11.4750	863.8941	-403.7612	33658	0.7527	0.5059	25.0116	1368.0000	-1864.0482
Firm Size	30144	7.5577	7.5557	2.2613	14.7170	-3.2702	36039	7.5630	7.6049	2.2856	14.7622	-6.2146
Lagged Liquidity	22198	2.8219	1.9153	3.7159	120.6949	0.0253	27053	3.3886	1.9923	5.9986	334.8934	0.0000
Market to Book Ratio	30035	3.1160	1.8870	30.6182	3379.2141	-1324.2931	35956	8.8240	2.2412	223.2115	11529.2298	-7894.5177
Lagged Debt to Equity	27103	2.8354	1.2088	25.7508	1763.2552	-502.0572	32649	2.0552	1.2250	36.5675	1201.3639	-2646.9099
Lagged profitability	25558	0.0095	0.0251	0.8302	0.8444	-123.8421	31015	0.0087	0.0214	0.0717	0.8623	-1.8927
Lagged ROA	19731	0.0170	0.0269	0.3581	0.4534	-42.2105	23819	0.0152	0.0236	0.0717	6.0334	-1.4069
Lagged ROE	19710	0.0634	0.0635	1.0006	78.6106	-52.1727	23763	0.0627	0.0548	2.7003	220.0330	-143.4109

Entry of all directors			2017-2020			
Variable	N	Mean	Median	Std. dev.	Maximum	Minimum
CAR	46356	0.0057	0.0057	1.0026	3.9207	-3.8979
Age	46356	63.3634	64.0000	8.6795	100.0000	27.0000
TimeBrd	46356	4.8620	2.8000	5.5531	72.9000	0.0000
(TimeRole)	46356	3.4998	2.1000	3.9831	43.9000	0.0000
(TimeInCo)	46356	5.4974	3.3000	6.4037	72.9000	0.0000
Graduate	42475	0.6568	1.0000	0.4748	1.0000	0.0000
Certification	42475	0.0614	0.0000	0.2400	1.0000	0.0000
GenderRatio	46356	0.8003	0.8000	0.1222	1.0000	0.2000
GenderDummy	46356	0.2314	0.0000	0.4218	1.0000	0.0000
Leverage	38786	0.9158	0.5526	22.0971	1092.1475	-1579.4545
Firm Size	41389	7.5591	7.6368	2.3487	14.8324	-1.4872
Lagged Liquidity	31883	3.5746	1.8650	7.9543	327.3763	0.0121
Market to Book Ratio	41329	3.7416	2.2622	255.7532	30584.4000	-15852.5857
Lagged Debt to Equity	37882	1.6242	1.2504	60.4078	4142.0000	-3033.2373
Lagged profitability	35778	-0.0041	0.0195	0.1199	2.5667	-8.9381
Lagged ROA	27558	0.0056	0.0221	0.1258	0.5063	-8.9381
Lagged ROE	27505	-0.0014	0.0543	2.2235	142.3333	-162.3333

Table 6 presents descriptive statistics for the variables included in Panel A and Panel B for all directors, covering the period from 2005 to 2020 and separating into five 3-year periods. Descriptive statistics for female directors and male directors are tabulated in Appendix.

4.2 Director characters Analysis

4.2.1 2010-2020 Panel A analysis

Table 7 presents the results of the 10-year Panel A regression analysis employing time-fixed effects to examine the relationship between new director characteristics and CARs around board appointments. The analysis focuses on the influence of new directors' gender and personal attributes on firm stock returns, specifically examining the effects of three different measures of director experience: TimeBrd, TimeRole and TimeInCo. The results are presented in the table of Panel A, which is divided into three subsets: the entry of all directors, the entry of female directors, and the entry of male directors. Each subset is organized into three separate columns, each corresponding to a different measure of experience. Within each column, the coefficient estimates and associated p-values for all other variables in the model (including gender and control variables) are displayed, allowing for a comparative analysis of the impact of these variables on CARs across different measures of director experience and director gender.

However, except for the p-values for the variable *Certification*, the p-values for other variables are insignificant under a 95% confidence interval ($p > 0.05$). This suggests that, overall, the market reaction to the gender of new entrants is relatively muted, with individual director characteristics having a limited impact on CARs. This could be attributed to investors prioritizing other factors, such as firm-specific fundamentals or broader market trends when evaluating director appointments. Alternatively, it is possible that North America, being a relatively mature market with established BGD practices, exhibits less investor sensitivity to the gender of new directors.

Consistent with H1a, we found that the appointment of a female director with a higher age is associated with a negative impact on the firm's stock return, with a relatively significant p-value (smaller) compared to male directors. This negative association between female directors' age and CAR is stronger than that observed for male directors, whose age coefficients are positive, albeit weakly, associated with CAR. For instance, when considering the coefficient and p-value under TimeBrd, each additional year of age for male directors corresponds to a mere 0.0007 increase in CAR, and this relationship is not statistically significant ($p = 0.1924$). Therefore, the results

offer limited support for H1a. This finding does not match our expectations, as we assumed older female directors' experience and wisdom to be valued by investors. It is possible that the market perceives age as a potential disadvantage, perhaps associating it with less adaptability or innovation, or even reacting subtly towards it. Alternatively, the lack of significance could be due to the presence of other confounding factors.

Contrary to H1b, which hypothesized that the entry of more experienced female directors would positively impact stock returns, our findings provide limited support for this assertion. While the relationship between CAR and tenure demonstrates nuanced differences across gender groups, the effects of TimeBrd, TimeRole, and TimeInCo on CAR are not statistically significant for either male or female directors. Lacking of significance for tenure might suggest that investors do not strongly differentiate between experienced and less-experienced directors when assessing the impact of their appointments on stock return. Likely, the market might also view tenure as less critical for female directors compared to other attributes, such as expertise or industry connections.

For female directors, we observed a positive association between longer tenure and CAR. For instance, a one-year increase in time on board is associated with a 0.0028 increase in CAR, albeit not statistically significant. This trend, while not definitive, suggests that female directors may require extended periods to accumulate experience and exert influence. Conversely, for male directors, the relationship between tenure and CAR appears to be negligible, with a one-year increase in time on board corresponding to a mere -0.0005 increase in CAR. This suggests that the effect of tenure on CAR for male directors is minimal, if not nonexistent.

As for H1c, the results presented in Panel A of the table offer mixed evidence, which posits a positive association between the appointment of female directors with higher education and CARs, and a negative relationship of female directors with certification. While the coefficients for the 'Graduate' variable are not statistically significant across all three tenure measures for female directors, suggesting that holding a graduate degree does not significantly influence CAR, the results for the 'Certification' variable warrant attention. The coefficients for 'Certification' are negative and statistically significant across all tenure measures for female directors, indicating that the presence of certified female directors is associated with a decrease in CAR.

Therefore, we can reject the certification hypothesis in H1c. The negative relationship between certification and CARs for female directors is intriguing. It could indicate that investors perceive these certifications as less relevant or not that valuable for female board members, potentially reflecting unconscious biases. Further research is needed to explore this phenomenon.

We also found a negative and insignificant relationship between 'graduated' male directors and CARs, and a negative and significant relationship between 'certified' male directors and CARs, indicating that no matter the gender, the entry of a director with certification could bring adverse impact on stock return. However, the results do not provide strong support for the graduation hypothesis in H1c. The coefficient for 'Graduate' is not statistically significant for any of the director groups, suggesting that graduate education does not have a significant impact on CARs, regardless of gender.

This consistent negative association with certification, regardless of gender, suggests that investors might be skeptical about the value added by 'certified' directors, perhaps viewing it as a signal of overqualification or a lack of practical experience. However, the lack of significance for the 'Graduate' variable indicates that a graduate degree, also does not appear to influence investor perceptions as a single item.

The observed negative association between certification and CAR for female directors may be attributed to several factors, including potential investor biases or perceptions regarding the relevance of certain certifications for female board members. Alternatively, it could reflect unobserved firm-specific characteristics that correlate with both the appointment of certified female directors and lower stock returns. Further research is needed to disentangle these potential explanations and fully understand the underlying mechanisms driving this relationship.

On the whole, the findings in Panel A suggest a weak relationship between female director characteristics and stock returns, showing that investors react slightly towards new entrants' genders. While there is some evidence of a positive association between age and CARs for female directors, the results are not statistically significant. The findings do not support the hypotheses that board tenure or graduate education of female directors have a significant impact on firm performance, suggesting a complex and multifaceted attitude of investors to new director appointments. While gender itself appears to have a limited impact on CARs, other director characteristics, such as

certification, can elicit nuanced market responses. Our results highlight the importance of considering a broader range of factors beyond gender when evaluating the impact of board appointments on firm value.

Table 7 Panel A results of 2010-2020

Panel A: Panel OLS Regression of CAR on Director Information				
	Control Variables	**Time on Board (TimeBrd)**	**Time in Role (TimeRole)**	**Time in Company (TimeInCo)**
2010-2020 Entry of all directors	Age	0.0004	0.0003	0.0005
		(0.4613)	(0.5962)	(0.3587)
	TimeBrd/TimeRole/TimeInCo	0.0001	0.0006	0.0005
		(0.8648)	(0.5549)	(0.4306)
	Graduate	0.0002	0.0003	0.0003
		(0.9836)	(0.9745)	(0.9729)
	Certification	0.0546	0.0544	0.0546
		(0.0030)	(0.0031)	(0.0030)
	GenderRatio	0.0003	0.0003	0.0002
		(0.4617)	(0.4270)	(0.4967)
	GenderDummy	0.0020	0.0016	0.0029
		(0.8648)	(0.8895)	(0.8068)
	Firm FE	No	No	No
	Time FE	Yes	Yes	Yes

	No. Observations	61690	61690	61690
	Control Variables	**Time on Board (TimeBrd)**	**Time in Role (TimeRole)**	**Time in Company (TimeInCo)**
2010-2020 Entry of female directors	Age	0.0029	0.0030	0.0027
		(0.0977)	(0.0814)	(0.1196)
	TimeBrd/TimeRole/TimeInCo	0.0028	0.0042	0.002
		(0.2817)	(0.1526)	(0.3729)
	Graduate	0.0011	0.0006	0.0016
		(0.9681)	(0.9809)	(0.9519)
	Certification	0.0920	0.0915	0.0918
		(0.0561)	(0.0574)	(0.0567)
	GenderRatio	0.0006	0.0006	0.0006
		(0.5831)	(0.5792)	(0.5809)
	Firm FE	No	No	No
	Time FE	Yes	Yes	Yes
	No. Observations	10842	10842	10842
2010-2020	**Control Variables**	**Time on Board (TimeBrd)**	**Time in Role (TimeRole)**	**Time in Company (TimeInCo)**

Entry of male directors	Age	0.0007	0.0006	0.0008
		(0.1924)	(0.2911)	(0.1572)
	TimeBrd/TimeRole/TimeInCo	0.0005	0.0001	0.0008
		(0.503)	(0.8993)	(0.2567)
	Graduate	0.0048	0.0047	0.005
		(0.6406)	(0.6469)	(0.628)
	Certification	0.0450	0.0447	0.0448
		(0.0299)	(0.031)	(0.0305)
	GenderRatio	0.0002	0.0002	0.0001
		(0.6722)	(0.6276)	(0.7122)
	Firm FE	No	No	No
	Time FE	Yes	Yes	Yes
	No. Observations	51118	51118	51118

Table 7 presents the Panel A results of the analysis for the period 2010-2020, examining the impact of director characteristics on CARs. The table displays results for the full sample of directors, as well as subsamples of female and male directors separately.

4.2.2 Periods Panel A Analysis

Tables 8, 9, and 10 present the Panel A results, following the same procedure as in Table 7, but extending the time period to 2005-2020 and dividing it into five 3-year intervals to examine the temporal evolution of regression results and empirical evidence. These tables respectively display the results for all directors, female directors only, and male directors only, each considering three measures of experience (TimeBrd, TimeRole, and TimeInCo).

Consistent with the findings in Table 7, the trends observed in the coefficients and p-values, including their statistical significance, remain largely consistent across different measures of experience in Tables 8, 9 and 10. This suggests the robustness of the relationships between other variables and CAR, as well as the direction and magnitude of their effects, regardless of the specific experience measure used. To streamline the presentation and avoid redundancy, we focus our analysis on TimeBrd as the primary measure of experience in subsequent sections.

Unlike the 2010-2020 Panel A results, when comes into periods comparison, we found something different. While considering the positive association proposed in H1a, the effect of directors' ages on CARs varied across gender and time.

The results for female directors reveal a nuanced relationship between age and CAR. While the coefficients are generally positive, statistical significance is only observed in the early periods of 2005-2008 and 2008-2011. For male directors, the relationship is also not consistently significant, with p-values indicating significance only in the 2005-2008 and 2011-2014 periods.

Notably, the entry of elder female directors during the 2008-2011 financial crisis period is associated with a positive impact on CARs, with a 0.0530 increase in CAR for each additional year of age. Conversely, the entry of male directors during this same crisis period demonstrates a negative impact on CARs, with a -0.0037 decrease in CAR for each additional year of age. However, it is important to note that this negative relationship for male directors during the crisis period is not statistically significant.

Overall, these findings suggest a complex interplay between age, gender, and economic context in influencing CARs. While we cannot fully accept H1a, the empirical evidence highlights that the entry of elder female directors during crisis periods can bring a positive impact on CARs, underscoring the importance of

considering contextual factors when examining the relationship between board composition and firm performance.

The results for H1b are also non-fixed, as the p-values for TimeBrd are consistently significant for male directors but vary for female directors. However, the p-values for TimeBrd are significant for all directors, suggesting that female directors' experience may have less explanatory power for CARs than that of their male counterparts. In the early two periods (2005-2008 and 2008-2011), the entry of a director with more experience had a positive impact on CARs. However, after 2011, this trend reversed, indicating that over time, the increase in leadership experience negatively impacted stock returns.

The results for H1c reveal a complex and nuanced relationship between educational qualifications, certification, gender, and CARs. For female directors, the p-values for the 'Graduate' variable are mostly insignificant, except for the 2008-2011 and 2014-2017 periods, while the p-values for the 'Certification' variable remain insignificant across all periods. This suggests that, for female directors, possessing higher education or certification does not consistently or significantly impact CARs. Notably, while appointing a female director with a graduate degree during the early period (2005-2008) yielded a substantial positive impact on CARs, this effect diminished in subsequent periods.

In contrast, the results for male directors are more complex. The 2008-2011 and 2011-2014 periods stand out, as both graduate degrees and certifications for male directors are associated with negative impacts on CARs. This suggests that during times of crisis, male directors' educational qualifications and certifications may be perceived negatively by investors or may not translate into effective decision-making that benefits firm performance. Moreover, this negative effect appears to persist beyond the immediate crisis period.

Turning to the results for all directors, the focus shifts to the GenderRatio variable, which measures the proportion of female directors on the board. The coefficients for GenderRatio transition from negative to positive over time, remaining statistically significant in most periods except the last (2017-2020). This trend indicates that initially, a higher proportion of male directors was associated with positive CARs. However, this relationship reversed over time, suggesting that as the proportion of female directors

increased, so did the positive impact on CARs. The insignificant coefficient in the final period may reflect a saturation effect, where further increases in female representation do not yield additional benefits for CARs.

In conclusion, the analysis of periods Panel A reveals a complex and nuanced relationship between female director characteristics (age, experience, education, certification) and firm stock returns (CAR), aiming to test how investors react to the appointment of new female directors compared to their male counterparts. While the results do not provide consistent support for the positive associations proposed in H1a, H1b, and H1c, they highlight potential differences in the effects of age and experience between female and male directors, as well as potential shifts in investor attitudes towards these characteristics over time. The findings suggest that education and certification may not play a significant role in influencing CAR for female directors, and that the impact of age and experience may vary depending on the economic context.

Table 8 Panel A results of All Directors: Period Comparison (2005-2020)

Panel A: PanelOLS regression of CAR on director information (entry of all directors)						
	Control Variables	**2005-2008**	**2008-2011**	**2011-2014**	**2014-2017**	**2017-2020**
Time on Board (TimeBrd)	Age	0.0847	-0.0006	-0.0100	0.0004	0.0029
		(0.0920)	(0.9220)	(0.0944)	(0.5039)	(0.3012)
	TimeBrd	0.1833	0.1146	-0.0659	-0.1265	-0.0023
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0179)
	Graduate	-0.0727	-0.2713	-0.0903	0.0930	0.0243
		(0.5120)	(0.0102)	(0.1430)	(0.0568)	(0.0306)
	Certification	0.3137	-0.4751	-0.6174	-0.1333	0.0038
		(0.2046)	(0.0366)	(0.0001)	(0.2242)	(0.8619)
	GenderRatio	-0.1535	-0.0382	0.0550	0.0212	-0.0006
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.1774)
	GenderDummy	0.1524	0.4214	-0.1079	-0.2695	-0.0025
		(0.4030)	(0.0081)	(0.1995)	(0.0000)	(0.8383)
	Firm FE	No	No	No	No	No
	Time FE	Yes	Yes	Yes	Yes	Yes
	No. Observations	37106	35130	39838	39234	42475

	Control Variables	2005-2008	2008-2011	2011-2014	2014-2017	2017-2020
Time in Role (TimeRole)	Age	0.0989	0.0103	-0.0156	-0.0093	0.0002
		(0.0000)	(0.0804)	(0.0000)	(0.0007)	(0.8053)
	TimeRole	0.1907	0.1235	-0.0747	-0.1261	-0.0019
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.1385)
	Graduate	-0.1536	-0.3219	-0.0811	0.1171	0.0249
		(0.1669)	(0.0023)	(0.1888)	(0.0168)	(0.0263)
	Certification	0.2090	-0.5368	-0.6081	-0.1313	0.0047
		(0.3988)	(0.0180)	(0.0001)	(0.2367)	(0.8332)
	GenderRatio	-0.1524	-0.0377	0.0544	0.0218	-0.0006
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.1911)
	GenderDummy	0.0290	0.3295	-0.0263	-0.1412	-0.0001
		(0.8733)	(0.0386)	(0.7541)	(0.0179)	(0.9961)
	Firm FE	No	No	No	No	No
	Time FE	Yes	Yes	Yes	Yes	Yes
	No. Observations	37106	35130	39838	39234	42475
Time in Company (TimeInCo)	**Control Variables**	**2005-2008**	**2008-2011**	**2011-2014**	**2014-2017**	**2017-2020**
	Age	0.0869	0.0059	-0.0107	-0.0033	0.0003

	(0.0000)	(0.3154)	(0.0018)	(0.2245)	(0.6508)
TimeInCo	0.2167	0.1035	-0.0713	-0.1134	-0.0019
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0209)
Graduate	0.0190	-0.2394	-0.1133	0.0709	0.0240
	(0.8629)	(0.0236)	(0.0653)	(0.1460)	(0.0327)
Certification	0.3459	-0.4991	-0.6246	-0.1027	0.0042
	(0.1610)	(0.0278)	(0.0000)	(0.3500)	(0.8502)
GenderRatio	-0.1464	-0.0359	0.0535	0.0191	-0.0006
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.1562)
GenderDummy	0.3539	0.4781	-0.1506	-0.3133	-0.0032
	(0.0513)	(0.0027)	(0.0738)	(0.0000)	(0.7956)
Firm FE	No	No	No	No	No
Time FE	Yes	Yes	Yes	Yes	Yes
No. Observations	37106	35130	39838	39234	42475

Table 8 presents the Panel A results of the analysis in the duration of 2005-2020, separating into five 3-year periods, and examining the impact of all director characteristics on CARs.

Table 9 Panel A results of Female Directors: Period Comparison (2005-2020)

Panel A: PanelOLS regression of CAR on director information (entry of female directors)						
	Control Variables	**2005-2008**	**2008-2011**	**2011-2014**	**2014-2017**	**2017-2020**
Time on Board (TimeBrd)	Age	0.0703	0.0530	-0.0206	0.0077	0.0025
		(0.0234)	(0.0526)	(0.1263)	(0.3914)	(0.1294)
	TimeBrd	0.2189	0.0560	-0.0867	-0.1061	-0.0005
		(0.0000)	(0.1070)	(0.0000)	(0.0000)	(0.8581)
	Graduate	1.2474	0.0531	0.3920	0.0134	0.0555
		(0.0062)	(0.8941)	(0.0361)	(0.9173)	(0.0273)
	Certification	0.0356	0.3540	0.6287	-0.0805	0.0361
		(0.9750)	(0.6959)	(0.2532)	(0.7911)	(0.4293)
	GenderRatio	-0.0494	0.0184	0.0591	0.0125	0.0004
		(0.0226)	(0.3235)	(0.0000)	(0.0208)	(0.6758)
	Firm FE	No	No	No	No	No
	Time FE	Yes	Yes	Yes	Yes	Yes
	No. Observations	3505	3654	5970	6467	10083
Time in Role (TimeRole)	**Control Variables**	**2005-2008**	**2008-2011**	**2011-2014**	**2014-2017**	**2017-2020**
	Age	0.0703	0.0608	-0.0221	0.0042	0.0029

		(0.0210)	(0.0236)	(0.0945)	(0.636)	(0.0791)
	Time Role	0.2993	0.0285	-0.1129	-0.1138	-0.0032
		(0.0000)	(0.4669)	(0.0000)	(0.0000)	(0.2888)
	Graduate	1.1528	0.0540	0.5012	0.0193	0.0561
		(0.0113)	(0.8924)	(0.0069)	(0.8815)	(0.0258)
	Certification	-0.1440	0.3228	0.6776	-0.0876	0.0358
		(0.900)	(0.7206)	(0.2182)	(0.7744)	(0.4324)
	GenderRatio	-0.0523	0.0173	0.0596	0.0137	0.0004
		(0.0154)	(0.3532)	(0.0000)	(0.0112)	(0.6949)
	Firm FE	No	No	No	No	No
	Time FE	Yes	Yes	Yes	Yes	Yes
	No. Observations	3505	3654	5970	6467	10083
	Control Variables	**2005-2008**	**2008-2011**	**2011-2014**	**2014-2017**	**2017-2020**
	Age	0.0755	0.0542	-0.0267	0.0016	0.0026
Time in Company		(0.0124)	(0.0417)	(0.0453)	(0.8540)	(0.1165)
(TimeInCo)	TimeInCo	0.2311	0.0628	-0.0616	-0.0924	-0.0008
		(0.0000)	(0.0339)	(0.0000)	(0.0000)	(0.7417)
	Graduate	1.3568	0.0791	0.2642	-0.0363	0.0554

		(0.0028)	(0.8428)	(0.1560)	(0.7776)	(0.0278)
	Certification	0.0458	0.3752	0.5402	-0.1382	0.0358
		(0.9680)	(0.6784)	(0.3268)	(0.6496)	(0.4327)
	GenderRatio	-0.0465	0.0197	0.0589	0.0117	0.0004
		(0.0317)	(0.2905)	(0.0000)	(0.0302)	(0.6856)
	Firm FE	No	No	No	No	No
	Time FE	Yes	Yes	Yes	Yes	Yes
	No. Observations	3505	3654	5970	6467	10083

Table 9 presents the Panel A results of the analysis in the duration of 2005-2020, separating into 5 3-year periods, and examining the impact of female director characteristics on CARs.

Table 10 Panel A results of Male Directors: Period Comparison (2005-2020)

Panel A: PanelOLS regression of CAR on director information (entry of male directors)						
	Control Variables	**2005-2008**	**2008-2011**	**2011-2014**	**2014-2017**	**2017-2020**
Time on Board (TimeBrd)	Age	0.0829	-0.0037	-0.0080	0.0024	-0.0001
		(0.0000)	(0.5618)	(0.0314)	(0.4215)	(0.8699)
	TimeBrd	0.1775	0.1204	-0.0652	-0.1283	-0.0025
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0187)

	Graduate	-0.1992	-0.3501	-0.1988	0.1149	0.0096
		(0.0870)	(0.0018)	(0.0035)	(0.0344)	(0.4510)
	Certification	0.3178	-0.5896	-0.7539	-0.1086	-0.0010
		(0.2181)	(0.0149)	(0.0000)	(0.3684)	(0.9706)
	GenderRatio	-0.1626	-0.0431	0.0550	0.0226	-0.0010
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0332)
	Firm FE	No	No	No	No	No
	Time FE	Yes	Yes	Yes	Yes	Yes
	No. Observations	33601	31476	33868	32767	32392
	Control Variables	**2005-2008**	**2008-2011**	**2011-2014**	**2014-2017**	**2017-2020**
Time in Role (TimeRole)	Age	0.0976	0.0078	-0.0147	-0.0109	-0.0005
		(0.0000)	(0.2043)	(0.0001)	(0.0002)	(0.4622)
	Time Role	0.1782	0.1336	-0.0698	-0.1280	-0.0015
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.3093)
	Graduate	-0.2795	-0.4074	-0.1822	0.1487	0.0105
		(0.0166)	(0.0003)	(0.0075)	(0.0064)	(0.4130)
	Certification	0.2096	-0.6611	-0.7371	-0.0991	0.0001
		(0.4175)	(0.0063)	(0.0000)	(0.4176)	(0.9984)

	GenderRatio	-0.1612	-0.0420	0.0542	0.0229	-0.0010
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0374)
	Firm FE	No	No	No	No	No
	Time FE	Yes	Yes	Yes	Yes	Yes
	No. Observations	33601	31476	32767	32392	33868
	Control Variables	**2005-2008**	**2008-2011**	**2011-2014**	**2014-2017**	**2017-2020**
Time in Company (TimeInCo)	Age	0.0847	0.0032	-0.0080	-0.0038	-0.0003
		(0.0271)	(0.5970)	(0.1980)	(0.0271)	(0.6908)
	TimeInCo	0.2128	0.1079	-0.0734	-0.1156	-0.0021
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0182)
	Graduate	-0.1089	-0.3176	-0.2276	0.1003	0.0093
		(0.3469)	(0.0047)	(0.0008)	(0.0643)	(0.4650)
	Certification	0.3586	-0.6220	-0.7653	-0.0562	-0.0004
		(0.1637)	(0.0101)	(0.0000)	(0.6422)	(0.9864)
	GenderRatio	-0.1554	-0.0405	0.0534	0.0203	-0.0011
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.027)
	Firm FE	No	No	No	No	No
	Time FE	Yes	Yes	Yes	Yes	Yes

	No. Observations	33601	31476	33868	32767	32392

Table 10 presents the Panel A results of the analysis in the duration of 2005-2020, separating into 5 3-year periods, and examining the impact of male director characteristics on CARs.

4.3 Firm characters Analysis

4.3.1 2010-2020 Panel B Analysis

Table 11 Panel B results of 2010-2020

Panel B: PanelOLS regression of CAR on firm characters				
	Control Variables	**All Directors**	**Female Directors**	**Male Directors**
2010-2020	GenderRatio	0.0003	0.0000	0.0002
		(0.5676)	(0.9860)	(0.6714)
	GenderDummy	0.0031		
		(0.8403)		
	Leverage	0.0000	-0.0013	0.0000
		(0.9123)	(0.1266)	(0.9230)
	Firm Size	0.0021	-0.0021	0.0038
		(0.5055)	(0.8097)	(0.2789)
	Lagged Liquidity	-0.0011	-0.0062	-0.0001
		(0.5269)	(0.2291)	(0.9399)
	Market to Book Ratio	0.0000	-0.0001	0.0000
		(0.5548)	(0.6116)	(0.7423)
	Lagged Debt to Equity	-0.0003	0.0005	-0.0003
		(0.0426)	(0.3064)	(0.0231)
	Lagged Profitability	-0.2142	1.4493	-0.2954
		(0.2756)	(0.1217)	(0.1429)
	Lagged ROA	0.1611	-1.7666	0.2644
		(0.4050)	(0.0559)	(0.1845)
	Lagged ROE	0.0036	-0.0043	0.0036
		(0.3771)	(0.7650)	(0.4403)
	Firm FE	No	No	No
	Time FE	Yes	Yes	Yes
	No. Observations	35329	6323	29006

Table 11 presents the Panel B results of the analysis for the period 2010-2020, examining the impact of firm characteristics on CARs. The table displays results for the full sample of directors,

as well as sub-samples of female and male directors separately.

Table 11 presents the results of the 10-year Panel B regression analysis employing time-fixed effects to examine the relationship between firm characteristics after the entry of new directors and CARs around board appointments. The analysis examines the relationship between BGD and firm characteristics, specifically focusing on the proportion of male directors (GenderRatio) and its association with various financial and accounting measures, including leverage, firm size, liquidity, market-to-book ratio, debt-to-equity ratio, profitability, ROA and ROE.

The results are also divided into three subsets: the entry of all directors, the entry of female directors, and the entry of male directors. Each subset is listed in a separate column, within each column, the coefficient estimates and associated p-values for all other variables in the model are displayed, allowing for a comparative analysis of the impact of these variables on CARs across different measures of director experience and director gender.

Considering our H2 hypothesis, which postulated that firms with a higher proportion of female directors would exhibit more favorable firm characteristics, the results presented in Table 4.3.1 offer limited empirical support.

The coefficient for GenderRatio, representing the proportion of female directors on the board, is not statistically significant across all three columns, suggesting that a higher female representation on the board does not translate to significant differences in the examined firm characteristics.

Moreover, the p-values for most variables in Table 11 are insignificant ($p>0.05$), which substantially diminish the empirical interpretability of the corresponding coefficients.

Therefore, although some coefficients between female and male exhibit a big difference (e.g., the lagged profitability and lagged ROA), and some individual coefficients for specific firm characteristics reach statistical significance within particular sub-samples (e.g., the p-value for lagged ROA for female directors), it is still unable to accept H2. For these findings should be interpreted cautiously due to the overall lack of significance for the GenderRatio variable.

Several factors could account for the lack of robust evidence supporting H2,

including the specific firm characteristics included in the analysis, the sample composition, or the potential influence of unobserved confounding variables. The low adjusted R-squared value further suggests that the model' s explanatory power is limited.

4.3.2 Periods Panel B Analysis

Table 12 Panel B results: Period Comparison (2005-2020)

Panel B: PanelOLS regression of CAR on frim characters						
	Control Variables	**2005-2008**	**2008-2011**	**2011-2014**	**2014-2017**	**2017-2020**
Period Comparison: Entry of all directors	GenderRatio	-0.2482	-0.0119	0.0406	0.0130	-0.0007
		(0.0000)	(0.1974)	(0.0000)	(0.0000)	(0.2867)
	GenderDummy	-0.7835	0.7544	0.1309	0.1195	0.0270
		(0.1879)	(0.0098)	(0.3025)	(0.1543)	(0.1027)
	Leverage	-0.0356	-0.0275	-0.0097	-0.0013	-0.0002
		(0.5421)	(0.0001)	(0.0214)	(0.3894)	(0.3762)
	Firm Size	1.3549	0.4456	-0.2961	-0.0951	-0.0027
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.4492)
	Lagged Liquidity	0.2450	-0.1143	-0.0156	0.0296	0.0014
		(0.0000)	(0.0030)	(0.3272)	(0.0050)	(0.1488)
	Market to Book Ratio	0.0136	0.0147	0.0029	0.0009	0.0000
		(0.0423)	(0.0796)	(0.0404)	(0.0917)	(0.1106)
	Lagged Debt to Equity	-0.0593	-0.0089	0.0004	-0.0009	-0.0002
		(0.0000)	(0.0021)	(0.6861)	(0.3707)	(0.0073)

	Lagged Profitability	-21.4910	-4.2901	-0.0145	-4.5142	-0.0097
		(0.0073)	(0.0975)	(0.2021)	(0.0002)	(0.9314)
	Lagged ROA	0.4390	1.8116	-0.0487	-0.5514	-0.0492
		(0.9376)	(0.5388)	(0.3179)	(0.5593)	(0.6203)
	Lagged ROE	-0.0353	-0.0070	-0.0112	0.0039	-0.0032
		(0.8590)	(0.9236)	(0.6233)	(0.7162)	(0.1226)
	Firm FE	No	No	No	No	No
	Time FE	Yes	Yes	Yes	Yes	Yes
	No. Observations	2961	11729	16390	20002	23344
	Control Variables	**2005-2008**	**2008-2011**	**2011-2014**	**2014-2017**	**2017-2020**
Period Comparison: Entry of female directors	GenderRatio	-0.4793	-0.0014	0.0523	0.0245	0.0004
		(0.0001)	(0.9716)	(0.0009)	(0.0026)	(0.7607)
	Leverage	1.3758	-0.0542	-0.0709	-0.0018	-0.0024
		(0.3259)	(0.0054)	(0.0142)	(0.6494)	(0.0440)
	Firm Size	2.1160	0.5746	-0.4634	0.0625	-0.0099
		(0.0028)	(0.0043)	(0.0000)	(0.1819)	(0.2495)
	Lagged Liquidity	0.7557	-0.2139	-0.2430	0.0716	-0.0012
		(0.1793)	(0.3382)	(0.0019)	(0.1451)	(0.3464)

	Market to Book Ratio	0.0438	0.0424	0.0472	0.0015	0.0002
		(0.7339)	(0.2782)	(0.0022)	(0.3143)	(0.0005)
	Lagged Debt to Equity	-0.9733	-0.0020	-0.0003	-0.0017	-0.0002
		(0.2455)	(0.8772)	(0.9846)	(0.3327)	(0.1815)
	Lagged Profitability	8.5285	45.777	-5.7119	1.4728	0.6256
		(0.8238)	(0.4962)	(0.7249)	(0.7473)	(0.4916)
	Lagged ROA	1.5178	-52.1340	-2.8656	-9.7918	-0.4250
		(0.9571)	(0.4459)	(0.8540)	(0.0701)	(0.6561)
	Lagged ROE	-0.5604	0.4067	-0.4920	0.0511	-0.0009
		(0.0367)	(0.0004)	(0.2199)	(0.0008)	(0.8412)
	Firm FE	No	No	No	No	No
	Time FE	Yes	Yes	Yes	Yes	Yes
	No. Observations	311	1128	1924	3252	5570
	Control Variables	**2005-2008**	**2008-2011**	**2011-2014**	**2014-2017**	**2017-2020**
Period Comparison: Entry of male directors	GenderRatio	-0.2462	-0.0136	0.0420	0.0100	-0.0011
		(0.0000)	(0.1633)	(0.0000)	(0.0018)	(0.1224)
	Leverage	-0.0217	-0.0232	-0.0081	-0.0005	0.0000
		(0.7518)	(0.0005)	(0.0527)	(0.7282)	(0.9921)

Firm Size	1.2772	0.4117	-0.2681	-0.1241	-0.0007
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.8624)
Lagged Liquidity	0.2243	-0.1521	-0.0111	0.0264	0.0021
	(0.0000)	(0.0000)	(0.4942)	(0.0110)	(0.0562)
Market to Book Ratio	0.0307	0.0140	0.0018	0.0008	0.0000
	(0.0605)	(0.1047)	(0.1550)	(0.1365)	(0.4381)
Lagged Debt to Equity	-0.0362	-0.0099	0.0004	-0.0009	-0.0002
	(0.0913)	(0.0007)	(0.6369)	(0.3603)	(0.0275)
Lagged Profitability	31.007	-3.9196	-0.0137	-4.2831	-0.0391
	(0.0003)	(0.1267)	(0.2748)	(0.0002)	(0.7215)
Lagged ROA	4.1915	1.7305	-0.0559	-0.4089	-0.0419
	(0.4614)	(0.5580)	(0.2991)	(0.6029)	(0.6687)
Lagged ROE	-0.4220	-0.0815	0.0024	-0.0018	-0.0050
	(0.3336)	(0.3262)	(0.9195)	(0.8336)	(0.0205)
Firm FE	No	No	No	No	No
Time FE	Yes	Yes	Yes	Yes	Yes
No. Observations	2650	10601	14466	16750	17774

Table 12 presents the Panel B results of the analysis for the period 2010-2020, examining the impact of firm characteristics on CARs. The table displays results for the full sample of directors, as well as subsamples of female and male directors separately.

Contrary to the expectation of H2, which postulated that firms with a higher representation of female directors (lower GenderRatio, as it represents the proportion of male directors) would exhibit more favorable firm characteristics, the results presented in Table 12 offer limited empirical support. The coefficient for GenderRatio is not consistently statistically significant across all periods and director entry types, suggesting that a higher male representation on the board (lower GenderRatio) does not consistently translate to significant differences in the examined firm characteristics. These characteristics include leverage, firm size, liquidity, market-to-book ratio, debt-to-equity ratio, and profitability (proxied by ROA and ROE).

While some coefficients for GenderRatio are statistically significant, the direction and magnitude of the effects vary across different periods and director entry types. For instance, in the 2005-2008 period, the coefficient for GenderRatio is negative and significant for the entry of all directors and female directors, suggesting that a higher proportion of male directors is associated with less favorable firm characteristics. However, this relationship is not observed in other periods or for the entry of male directors.

The p-values for firm size are significant for female entrants in the first three periods and for male entrants in the first four periods. Interestingly, while the p-value for female entrants is initially higher than that for male entrants, they converge over time. This indicates that in the early stages, firm size was a more critical factor in appointing female directors, possibly due to their relative scarcity at the time. As BGD became more common, the influence of firm size on appointments may have diminished, giving way to other considerations.

Regarding lagged profitability, a stark contrast emerges between male and female directors. In spite of male directors initially exhibit extremely high lagged profitability, this metric plummets after the Financial Crisis. Conversely, lagged profitability for female directors increases distinctly during the financial crisis. Though these observations lack strong statistical significance, they nonetheless underline potential gender-based differences in the association between prior firm performance and subsequent board appointments. This pattern could suggest that firms may be more inclined to appoint female directors during periods of financial distress, perhaps

recognizing their potential to contribute to recovery and improved performance.

The evidence presented in Panel B offers limited and mixed support for H2. Despite a higher proportion of female directors is associated with larger firm size, other characteristics show inconsistent or even contrary relationships. The lack of robust evidence supporting H2 could be attributed to several factors, including the specific firm characteristics examined, the time periods analyzed, and the potential influence of unobserved confounding variables. The results suggest that the relationship between board gender diversity (specifically, the proportion of male directors) and firm characteristics is complex and may not be as straightforward as initially hypothesized. Further research is needed to explore this relationship in more detail and to identify the specific conditions under which board gender diversity may lead to more favorable firm characteristics.

5. Conclusion

By creating an event study and several empirical analysis evolving two panel regressions, we aimed to find out the investors' reactions towards the entry of female directors. To reach our target, we mainly examined the relationship between BGD, firm stock returns, director information and firm characteristics, using two comprehensive dataset, one spanning from 2010 to 2020 while another separating 2005-2020 into five 3-year periods, with each dataset employing event study and panel regression methodologies. The results offer nuanced insights into the relationship between female director representation and firm outcomes.

While the hypothesized positive association between female director appointments and stock returns (H1a, H1b, H1c) was not consistently supported, the findings reveal a complex interplay between age, experience, education, certification, and firm performance. Notably, the entry of elder female directors during times of crisis was associated with positive CARs, suggesting that their experience and expertise may be particularly valuable in challenging economic environments. However, the impact of other female director characteristics was less clear-cut, emphasizing the need for further research to disentangle the specific mechanisms through which gender diversity influences firm performance.

Considering hypothesis H2, which supposed a positive association between higher female representation on boards and more favorable firm characteristics, the empirical evidence presented offers limited support. While some associations were observed, these relationships lacked consistent statistical significance across different time periods and types of director appointments. This suggests that the interplay between BGD and firm characteristics is more complex than initially hypothesized, likely influenced by various contextual factors and firm-specific attributes that warrant further investigation.

Generally, this study contributes to the ongoing debate on the role of gender diversity in corporate governance by providing a comprehensive analysis of its impact on investors reactions and firm outcomes. The findings highlight the importance of considering the specific characteristics of female directors and the broader economic context when examining the relationship between BGD and firm performance. Future

research could delve deeper into the underlying mechanisms driving these relationships to inform effective policies and practices aimed at promoting gender diversity in the boardroom and enhancing firm performance.

Appendix

Table 13 Descriptive Statistics of Female Directors: Period Comparison (2005-2020)

Entry of female directors	2005-2008						2008-2011					
Variable	N	Mean	Median	Std. dev.	Maximum	Minimum	N	Mean	Median	Std. dev.	Maximum	Minimum
CAR	3723	-5.4568	-5.0191	9.6704	8.3176	-24.0508	3829	-11.1766	-10.1960	8.4728	4.2274	-31.0083
Age	3723	70.9554	71.0000	6.5450	99.0000	42.0000	3829	70.2891	70.0000	6.9067	96.0000	46.0000
TimeBrd	3723	4.0331	2.5000	4.3880	41.8000	0.0000	3829	4.8632	3.2000	4.8187	40.0000	0.0000
(TimeRole)	3723	3.3667	2.2000	3.6781	30.9000	0.0000	3829	4.1921	2.7000	4.1967	31.9000	0.0000
(TimeInCo)	3723	4.5661	2.7000	5.1519	41.8000	0.0000	3829	5.3575	3.4000	5.4987	40.0000	0.0000
Graduate	3505	0.6899	1.0000	0.4626	1.0000	0.0000	3654	0.6538	1.0000	0.4758	1.0000	0.0000
Certification	3505	0.0374	0.0000	0.1897	1.0000	0.0000	3654	0.0435	0.0000	0.2040	1.0000	0.0000
GenderRatio	3723	0.8100	0.8330	0.0864	1.0000	0.3750	3829	0.7892	0.8000	0.0913	1.0000	0.3750
GenderDummy	3723	1.0000	1.0000	0.0000	1.0000	1.0000	3829	1.0000	1.0000	0.0000	1.0000	1.0000
Leverage	2744	0.9038	0.3866	15.5213	255.0000	-477.3636	2625	1.0345	0.4671	11.3063	217.4610	-195.9333
Firm Size	2904	7.6661	7.5600	2.2349	14.5983	-0.8164	2788	7.9058	7.8200	2.3684	14.6758	0.7046
Lagged Liquidity	2155	2.6238	1.8369	2.7815	36.3296	0.2753	2026	2.5284	1.7734	4.4313	152.6829	0.1306
Market to Book Ratio	2892	5.5061	2.4894	92.5936	3125.7000	-1453.8790	2785	3.2142	1.6991	21.8581	898.0035	-313.5569
Lagged Debt to Equity	538	6.4375	1.4762	36.5013	471.0000	-143.8402	1814	5.2147	1.3353	63.5654	2532.1618	-267.9959
Lagged profitability	2415	0.0237	0.0287	0.0549	0.2109	-1.5558	2369	0.0193	0.0243	0.0628	0.4109	-0.8753
Lagged ROA	1876	0.0279	0.0319	0.0457	0.2077	-0.4770	1793	0.0242	0.0263	0.0520	0.3573	-0.8443
Lagged ROE	1875	0.1362	0.0731	1.2116	33.5000	-6.6061	1793	0.0735	0.0612	1.0464	21.9248	-23.2550

Entry of female directors	2011-2014						2014-2017					
Variable	N	Mean	Median	Std. dev.	Maximum	Minimum	N	Mean	Median	Std. dev.	Maximum	Minimum
CAR	6210	-5.4188	-6.5060	5.7214	6.4367	-13.5641	6866	-5.0174	-5.6333	4.0936	7.0394	-13.8565
Age	6210	70.5415	72.0000	7.2978	90.0000	40.0000	6866	65.6660	66.0000	6.9642	95.0000	38.0000
TimeBrd	6210	5.6448	3.5000	5.3377	36.9000	0.0000	6866	4.0344	2.4000	4.5554	47.9000	0.0000
(TimeRole)	6210	5.1829	2.8000	5.0231	24.9000	0.0000	6866	3.5496	2.1000	4.0333	27.9000	0.0000
(TimeInCo)	6210	5.9679	3.7000	5.7274	42.9000	0.0000	6866	4.4726	2.5000	5.1940	47.9000	0.0000
Graduate	5970	0.5737	1.0000	0.4946	1.0000	0.0000	6469	0.6703	1.0000	0.4702	1.0000	0.0000
Certification	5970	0.0209	0.0000	0.1432	1.0000	0.0000	6469	0.0488	0.0000	0.2156	1.0000	0.0000
GenderRatio	6210	0.7701	0.7690	0.0855	0.9520	0.2500	6864	0.7574	0.7690	0.1001	0.9470	0.2500
GenderDummy	6210	1.0000	1.0000	0.0000	1.0000	1.0000	6866	1.0000	1.0000	0.0000	1.0000	1.0000
Leverage	3446	0.9582	0.5135	7.0657	290.3324	-93.7546	5480	0.7863	0.5463	20.8745	968.3088	-795.5484
Firm Size	3708	8.0884	8.0128	2.2725	14.7170	1.3392	5832	8.0677	8.0931	2.2624	14.7114	-0.3243
Lagged Liquidity	2717	2.4614	1.8041	3.1398	120.6949	0.1432	4392	2.9466	1.8388	4.2890	158.9546	0.0996
Market to Book Ratio	3688	3.0457	2.0003	18.0238	759.6177	-484.7599	5827	6.7921	2.3815	166.9722	11529.2298	-2080.3799
Lagged Debt to Equity	3341	2.4983	1.3757	10.5279	194.1099	-310.6180	5339	2.0937	1.3542	52.6083	1201.3639	-2593.0097
Lagged profitability	3138	0.0222	0.0272	0.0504	0.2614	-0.5552	5072	0.0166	0.0243	0.0633	0.6095	-1.1517
Lagged ROA	2366	0.0260	0.0294	0.0429	0.1972	-0.4383	3926	0.0212	0.0265	0.0554	0.3792	-1.1517
Lagged ROE	2365	0.0793	0.0693	0.3854	6.8484	-11.1801	3923	0.0345	0.0614	2.5804	18.9630	-143.4109

Entry of female directors			2017-2020			
Variable	N	Mean	Median	Std. dev.	Maximum	Minimum
CAR	10729	0.0143	0.0076	1.0082	3.8631	-3.8979
Age	10729	61.9294	63.0000	7.0104	85.0000	29.0000
TimeBrd	10729	3.5685	2.0000	4.2683	39.0000	0.0000
(TimeRole)	10729	3.1456	1.8000	3.7128	30.9000	0.0000
(TimeInCo)	10729	3.8516	2.2000	4.6958	42.9000	0.0000
Graduate	10083	0.6783	1.0000	0.4672	1.0000	0.0000
Certification	10083	0.0720	0.0000	0.2585	1.0000	0.0000
GenderRatio	10729	0.7317	0.7500	0.1073	1.0000	0.2000
GenderDummy	10729	1.0000	1.0000	0.0000	1.0000	1.0000
Leverage	9132	0.7725	0.5955	16.3483	620.0417	-787.9286
Firm Size	9851	7.9006	7.9071	2.2391	14.8324	-0.2231
Lagged Liquidity	7594	3.2849	1.8060	6.6683	327.3763	0.0277
Market to Book Ratio	9833	1.0195	2.3462	208.5326	2183.6095	-15852.5857
Lagged Debt to Equity	9127	1.9337	1.2912	68.4770	4142.0000	-3033.2373
Lagged profitability	8559	0.0045	0.0218	0.0769	0.9421	-1.3621
Lagged ROA	6659	0.0141	0.0243	0.0591	0.4640	-0.8805
Lagged ROE	6649	0.0127	0.0568	1.9785	27.4105	-134.7857

Table 13 presents descriptive statistics for the variables included in Panel A and Panel B for female directors, covering the period from 2005 to 2020 and separating into five 3-year periods.

Table 14 Descriptive Statistics of Male Directors: Period Comparison (2005-2020)

Entry of male directors	2005-2008						2008-2011					
Variable	N	Mean	Median	Std. dev.	Maximum	Minimum	N	Mean	Median	Std. dev.	Maximum	Minimum
CAR	36934	-6.7754	-9.4851	9.6949	8.5149	-24.2772	34271	-11.7972	-10.8894	8.7374	4.4369	-31.5109
Age	36934	74.1303	75.0000	8.6054	104.0000	37.0000	34271	72.3455	73.0000	8.7656	101.0000	39.0000
TimeBrd	36934	5.4628	3.3000	6.0598	65.9000	0.0000	34271	5.7020	3.6000	6.0653	56.8000	0.0000
(TimeRole)	36934	3.6868	2.3000	4.2561	50.9000	0.0000	34271	3.8953	2.4000	4.2648	43.9000	0.0000
(TimeInCo)	36934	6.3943	3.8000	7.1505	65.9000	0.0000	34271	6.4713	4.2000	6.9361	80.8000	0.0000
Graduate	33601	0.6558	1.0000	0.4751	1.0000	0.0000	31476	0.6748	1.0000	0.4685	1.0000	0.0000
Certification	33601	0.0476	0.0000	0.2130	1.0000	0.0000	31476	0.0484	0.0000	0.2147	1.0000	0.0000
GenderRatio	36934	0.9110	0.9090	0.0928	1.0000	0.3750	34271	0.8999	0.9000	0.0987	1.0000	0.3330
GenderDummy	36934	0.0000	0.0000	0.0000	0.0000	0.0000	34271	0.0000	0.0000	0.0000	0.0000	0.0000
Leverage	25889	0.6434	0.3331	35.4210	732.2752	-2995.9457	24309	1.2889	0.3934	20.7952	1684.1278	-530.3778
Firm Size	27508	6.9522	6.8457	2.2299	14.6734	-1.2448	25882	7.2000	7.1351	2.3166	14.6758	-3.7723
Lagged Liquidity	20500	3.1834	2.0027	4.5974	121.0257	0.0152	19063	2.8709	1.9661	3.4803	73.1544	0.0078
Market to Book Ratio	27363	22.8217	2.3131	3163.4550	523074.7500	-5757.9021	25805	2.6869	1.6002	29.2807	2127.0000	-693.8864
Lagged Debt to Equity	4298	3.0354	1.3631	10.7688	235.2588	-167.1000	16464	3.0280	1.1445	26.7493	949.8101	-611.8963
Lagged profitability	22746	0.0169	0.0258	0.0586	1.0224	-1.5903	21823	0.0102	0.0228	0.3723	1.6064	-53.8696
Lagged ROA	17661	0.0215	0.0278	0.0647	2.0934	-2.1662	16558	0.0177	0.0248	0.0656	0.3886	-2.3915
Lagged ROE	17657	0.0370	0.0640	2.9151	128.2188	-228.8913	16555	0.1133	0.0549	2.5542	211.6481	-45.0763

Entry of male directors	2011-2014						2014-2017			
Variable	N	Mean	Median	Std. dev.	Maximum	Minimum	N	Mean	Median	Std. dev.	Maximum
CAR	36885	-4.4857	-5.1345	5.5524	6.4210	-13.5890	36018	-4.6811	-5.4965	4.4119	7.0060
Age	36885	70.5040	71.0000	8.8861	103.0000	38.0000	36018	67.4743	68.0000	9.0192	100.0000
TimeBrd	36885	6.3206	4.6000	6.1469	61.9000	0.0000	36018	5.4781	3.2000	6.0122	67.9000
(TimeRole)	36885	4.5031	2.8000	4.6236	47.9000	0.0000	36018	3.7932	2.3000	4.2979	42.9000
(TimeInCo)	36885	7.0767	5.0000	6.9232	61.9000	0.0000	36018	6.2106	3.6000	6.8530	68.9000
Graduate	33868	0.6947	1.0000	0.4605	1.0000	0.0000	32767	0.6553	1.0000	0.4753	1.0000
Certification	33868	0.0381	0.0000	0.1913	1.0000	0.0000	32767	0.0453	0.0000	0.2079	1.0000
GenderRatio	36885	0.8699	0.8750	0.1101	1.0000	0.2500	36018	0.8637	0.8750	0.1134	1.0000
GenderDummy	36885	0.0000	0.0000	0.0000	0.0000	0.0000	36018	0.0000	0.0000	0.0000	0.0000
Leverage	24766	1.0683	0.4443	11.9604	863.8941	-403.7612	28079	0.7483	0.4981	25.7835	1368.0000
Firm Size	26436	7.4832	7.4892	2.2497	14.7170	-3.2702	30075	7.4811	7.5092	2.2623	14.7622
Lagged Liquidity	19481	2.8722	1.9354	3.7866	120.6949	0.0253	22585	3.4731	2.0228	6.2730	334.8934
Market to Book Ratio	26347	3.1258	1.8685	31.9881	3379.2141	-1324.2931	30035	9.1665	2.2070	229.7845	11529.2298
Lagged Debt to Equity	23762	2.8829	1.1839	27.2166	1763.2552	-502.0572	27249	2.0571	1.2054	32.5105	1201.3639
Lagged profitability	22420	0.0077	0.0248	0.8861	0.8444	-123.8421	25870	0.0076	0.0209	0.0717	0.8623
Lagged ROA	17365	0.0158	0.0266	0.3814	0.4534	-42.2105	19850	0.0141	0.0229	0.0742	6.0334
Lagged ROE	17345	0.0612	0.0629	1.0571	78.6106	-52.1727	19797	0.0620	0.0535	2.5613	220.0330

Entry of male directors			2017-2020			
Variable	N	Mean	Median	Std. dev.	Maximum	Minimum
CAR	35627	0.0032	0.0045	1.0009	3.9207	-3.7305
Age	35627	63.7953	64.0000	9.0783	100.0000	27.0000
TimeBrd	35627	5.2516	3.3000	5.8294	72.9000	0.0000
(TimeRole)	35627	3.6064	2.3000	4.0550	43.9000	0.0000
(TimeInCo)	35627	5.9930	3.7000	6.7569	72.9000	0.0000
Graduate	32392	0.6501	1.0000	0.4770	1.0000	0.0000
Certification	32392	0.0580	0.0000	0.2338	1.0000	0.0000
GenderRatio	35627	0.8209	0.8330	0.1188	1.0000	0.2000
GenderDummy	35627	0.0000	0.0000	0.0000	0.0000	0.0000
Leverage	29654	0.9600	0.5366	23.5869	1092.1475	-1579.4545
Firm Size	31538	7.4524	7.5349	2.3718	14.8224	-1.4872
Lagged Liquidity	24289	3.6651	1.8881	8.3137	327.3763	0.0121
Market to Book Ratio	31496	4.5915	2.2394	268.7989	30584.4000	-12929.6429
Lagged Debt to Equity	28755	1.5260	1.2338	57.6118	2691.6667	-3033.2373
Lagged profitability	27219	-0.0068	0.0186	0.1304	2.5667	-8.9381
Lagged ROA	20899	0.0029	0.0215	0.1405	0.5063	-8.9381
Lagged ROE	20856	-0.0059	0.0533	2.2962	142.3333	-162.3333

Table 14 presents descriptive statistics for the variables included in Panel A and Panel B for male directors, covering the period from 2005 to 2020 and separating into five 3-year periods.

Bibliography

Ahern, K. R., & Dittmar, A. K. (2012). The changing of the boards: The impact on firm valuation of mandated female board representation *. The Quarterly Journal of Economics, 127(1), 137–197. https://doi.org/10.1093/qje/qjr049

Allen, R.S. et al., (2008), "Perceived diversity and organizational performance", Employee Relations, Vol. 30 No. 1, pp. 20-33.

Amorelli, M., & García-Sánchez, I. (2020). Trends in the dynamic evolution of board gender diversity and corporate social responsibility. Corporate Social Responsibility and Environmental Management, 28(2), 537–554. https://doi.org/10.1002/csr.2079

Atif, M., Hossain, M., Alam, M. S., & Goergen, M. (2021). Does board gender diversity affect renewable energy consumption? Journal of Corporate Finance, 66, 101665. https://doi.org/10.1016/j.jcorpfin.2020.101665

Bartholdy, J., & Peare, P. (2005). Estimation of expected return: CAPM vs. Fama and French. International Review of Financial Analysis, 14(4), 407–427. https://doi.org/10.1016/j.irfa.2004.10.009

Bassiouni, M., Vogel, R. M., & Archfield, S. A. (2016). Panel regressions to estimate low-flow response to rainfall variability in ungaged basins. Water Resources Research, 52(12), 9470–9494. https://doi.org/10.1002/2016wr018718

Bergman, M. M., Leisinger, K. M., Bergman, Z., & Berger, L. (2015). An Analysis of the Conceptual Landscape of Corporate Responsibility in Academia. Business & Professional Ethics Journal, 34(2), 165 – 193. http://www.jstor.org/stable/44074850

Beyaztas, B. H., & Bandyopadhyay, S. (2020). Robust estimation for linear panel data models. Statistics in Medicine, 39(29), 4421–4438. https://doi.org/10.1002/sim.8732

BoardEx. (n.d.). Home - BoardEx. https://boardex.com/

Boulouta, I. (2012). Hidden Connections: The Link Between Board Gender Diversity and Corporate Social Performance. Journal of Business Ethics, 113(2), 185–197. https://doi.org/10.1007/s10551-012-1293-7

Brahma, S., Nwafor, C., & Boateng, A. (2020). Board gender diversity and firm performance: The UK evidence. International Journal of Finance & Economics, 26(4), 5704–5719. https://doi.org/10.1002/ijfe.2089

Brieger, S. A., Francoeur, C., Welzel, C., & Ben-Amar, W. (2017). Empowering Women: The role of Emancipative Forces in Board Gender Diversity. Journal of Business Ethics, 155(2), 495–511. https://doi.org/10.1007/s10551-017-3489-3

Burns, P. (2003). Robustness of the Ljung-Box Test and its Rank Equivalent. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.443560

California State Senate. (2018). Senate Bill No. 826 - Chapter 954: An act to add Sections 301.3 and 2115.5 to the Corporations Code, relating to corporations.

Campbell, J. Y. (2013). Chapter 1 The Constant Expected Return Model. https://faculty.washington.edu/ezivot/econ424/constantexpectedreturn.pdf

Center for Research in Security Prices. (n.d.). CRSP. https://www.crsp.org/

Chen, J., Leung, W. S., & Goergen, M. (2017). The impact of board gender composition on dividend payouts. Journal of Corporate Finance, 43, 86–105. https://doi.org/10.1016/j.jcorpfin.2017.01.001

D'amato, A., Henderson, S., & Florence, S. (2009). Corporate social responsibility and sustainable business. A Guide to Leadership tasks and functions, 102.

Datta, S., Doan, T., & Toscano, F. (2021). Top executive gender, board gender diversity, and financing decisions: Evidence from debt structure choice. Journal of Banking & Finance, 125, 106070. https://doi.org/10.1016/j.jbankfin.2021.106070

Dezsö, C. L., & Ross, D. G. (2012). Does female representation in top management improve firm performance? A panel data investigation. Strategic Management Journal, 33(9), 1072–1089. https://doi.org/10.1002/smj.1955

Elbannan, M. A. (2014). The Capital Asset Pricing Model: An Overview of the Theory. International Journal of Economics and Finance, 7(1). https://doi.org/10.5539/ijef.v7n1p216

Eugenio-Martin, J. L., & Patuelli, R. (2022). Panel data models in tourism research: Innovative applications and methods. Tourism Economics, 28(5), 1348–1354. https://doi.org/10.1177/13548166221115784

Fama, E., & French, K. (1992). The cross-section of expected stock returns. Journal of Finance, 47, 427 – 465.

Farrell, K. A., & Hersch, P. L. (2005). Additions to corporate boards: the effect of gender. Journal of Corporate Finance, 11(1–2), 85–106. https://doi.org/10.1016/j.jcorpfin.2003.12.001

Fernandez-Feijoo, B., Romero, S., Ruiz, S., & Marcosende, L. (2012). Does Board Gender Composition affect Corporate Social Responsibility Reporting? 1. http://www.ijbssnet.com/journals/Vol_3_No_1_January_2012/4.pdf

Galbreath, J. (2016). Is board gender diversity linked to financial performance? the mediating mechanism of CSR. Business & Society, 57(5), 863–889. https://doi.org/10.1177/0007650316647967

Galletta, S., Mazzù, S., Naciti, V., & Vermiglio, C. (2021). Gender diversity and sustainability performance in the banking industry. Corporate Social Responsibility and Environmental Management, 29(1), 161–174. https://doi.org/10.1002/csr.2191

Galloway, B. J. (2012). The Glass Ceiling: Examining the Advancement of Women in the Domain of Athletic Administration. McNair Scholars Research Journal, 5(1), 6. https://commons.emich.edu/cgi/viewcontent.cgi?article=1052&context=mcnair

García-Meca, E., García-Sánchez, I., & Martínez-Ferrero, J. (2015). Board diversity and its effects on bank performance: An international analysis. Journal of Banking & Finance, 53, 202–214. https://doi.org/10.1016/j.jbankfin.2014.12.002

Greene, D., Intintoli, V. J., & Kahle, K. M. (2020). Do board gender quotas affect firm value? Evidence from California Senate Bill No. 826. Journal of Corporate Finance, 60, 101526. https://doi.org/10.1016/j.jcorpfin.2019.101526

Groening, C. (2019). When do investors value board gender diversity? Corporate Governance, 19(1), 60–79. https://doi.org/10.1108/cg-01-2018-0012

Gul, F. A., Srinidhi, B., & Ng, A. C. (2011). Does board gender diversity improve the informativeness of stock prices? Journal of Accounting and Economics, 51(3), 314–338. https://doi.org/10.1016/j.jacceco.2011.01.005

Kenton, W. (2024). Capital Asset Pricing Model (CAPM): Definition, formula, and assumptions. Investopedia. https://www.investopedia.com/terms/c/capm.asp

Kılıç, M., & Kuzey, C. (2016). The effect of board gender diversity on firm performance: evidence from Turkey. Gender in Management an International Journal, 31(7), 434–455. https://doi.org/10.1108/gm-10-2015-0088

Lenard, M. J., Yu, B., York, E. A., & Wu, S. (2014). Impact of board gender diversity on firm risk. Managerial Finance, 40(8), 787–803. https://doi.org/10.1108/mf-06-2013-

0164

Levine, L., Bogle, J., & Chesley, B. (2023). Gender diversity in the Canadian boardroom: Where are the women leaders? BLG. https://www.blg.com/en/insights/2023/10/gender-diversity-in-the-canadian-boardroom-where-are-the-women-leaders

Liu, C. (2018). Are women greener? Corporate gender diversity and environmental violations. Journal of Corporate Finance, 52, 118–142. https://doi.org/10.1016/j.jcorpfin.2018.08.004

Ljung, G. M., & Box, G. E. P. (1978). On a measure of lack of fit in time series models. Biometrika, 65(2), 297–303. https://doi.org/10.1093/biomet/65.2.297

Lu, J., & Herremans, I. M. (2019). Board gender diversity and environmental performance: An industries perspective. Business Strategy and the Environment, 28(7), 1449–1464. https://doi.org/10.1002/bse.2326

Maillé, C. (2022). Improving Democracy: gender quotas and diversity in Canada. International Conference on Gender Research, 5(1), pp123-129. https://doi.org/10.34190/icgr.5.1.298

Matsa, D.A. and Miller, A.R. (2013), A female style in corporate leadership? Evidence from quotas",American Economic Journal: Applied Economics, Vol. 5 No. 3, pp. 136-169.

Maulana, Y., & Gunawan, W. H. (2021). Financial Market Integration Between Stock Market From North American Free Trade Agreement (NAFTA) Member. JURNAL AKUNTANSI DAN PAJAK, 21(02). https://doi.org/10.29040/jap.v21i02.1518

Millimet, D., & Bellemare, M. F. (2023). Fixed effects and causal inference (IZA Discussion Paper No. 16202). IZA Institute of Labor Economic.

Momin, T. T., Singh, S., & Sharma, T. (2022). Glass Ceiling: Existing Position and Future Directions. 2022 IEEE Delhi Section Conference (DELCON). https://doi.org/10.1109/delcon54057.2022.9753116

Nasdaq.com. (n.d.). Cumulative abnormal return (CAR) Definition. Retrieved August 24, 2024, from https://www.nasdaq.com/glossary/a/abnormal-return

Papangkorn, S., Chatjuthamard, P., Jiraporn, P., & Chueykamhang, S. (2019b). The effect of female directors on firm performance: Evidence from the Great Recession. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.3375702

Post, C., & Byron, K. (2015). Women on Boards and Firm Financial Performance: A Meta-Analysis. Academy of Management Journal, 58(5), 1546–1571. https://doi.org/10.5465/amj.2013.0319

Rahayu, Y. S., & Wardana, G. K. (2021). THE EFFECT OF FINANCIAL PERFORMANCE AND DIVIDEND POLICY ON CUMULATIVE ABNORMAL RETURN. El Dinar Jurnal Keuangan Dan Perbankan Syariah, 9(1), 62–76. https://doi.org/10.18860/ed.v9i1.11453

Reddy, S., Jadhav, A. M., & Pai P, Y. (2019). Gender diversity in boardrooms – A literature review. Cogent Economics & Finance, 7(1). https://doi.org/10.1080/23322039.2019.1644703

Reguera-Alvarado, N., De Fuentes, P., & Laffarga, J. (2015). Does Board Gender Diversity Influence Financial Performance? Evidence from Spain. Journal of Business Ethics, 141(2), 337–350. https://doi.org/10.1007/s10551-015-2735-9

Rocciolo, F., Gheno, A., & Brooks, C. (2022). Explaining abnormal returns in stock markets: An alpha-neutral version of the CAPM. International Review of Financial Analysis, 82, 102143. https://doi.org/10.1016/j.irfa.2022.102143

Samsuar, T. (2017). Pengaruh Faktor Fundamental dan Teknikal Terhadap Harga Saham Industri Perhotelan yang Terdaftar di Bursa Efek Indonesia. Jurnal Ekonomi, Keuangan Dan Perbankan Syariah, 1(1), 116– 131.

Sarah, C., & Mona, L. K. (2008). Critical mass theory and women's political representation. Political Studies, 56(3), 725–736. https://doi.org/10.1111/j.1467-9248.2007.00712.x

Sanford, A., & Tremblay-Boire, J. (2023). Investor reactions to board changes: does gender matter? Applied Economics Letters, 1–4. https://doi.org/10.1080/13504851.2023.2288024

Tandelilin, E. (2010). Investasi dan Manajemen Portofolio. Kanisius

Terjesen, S., & Sealy, R. (2016). Board Gender Quotas: Exploring Ethical Tensions From a Multi-Theoretical Perspective. Business Ethics Quarterly, 26(1), 23–65. https://doi.org/10.1017/beq.2016.7

Tyrowicz, J., Terjesen, S., & Mazurek, J. (2020). All on board? New evidence on board gender diversity from a large panel of European firms. European Management Journal, 38(4), 634–645. https://doi.org/10.1016/j.emj.2020.01.001

Wahid, A. S. (2018). The Effects and the Mechanisms of Board Gender Diversity: Evidence from Financial Manipulation. Journal of Business Ethics, 159(3), 705–725. https://doi.org/10.1007/s10551-018-3785-6

Wang, K., Ma, J., Xue, C., & Zhang, J. (2024). Board Gender Diversity and Firm Performance: Recent Evidence from Japan. Journal of Risk and Financial Management, 17(1), 20. https://doi.org/10.3390/jrfm17010020

Wharton Research Data Services. (n.d.). WRDS. https://wrds-

www.wharton.upenn.edu/

Wolfers, J. (2006). Diagnosing discrimination: stock returns and CEO gender. Journal of the European Economic Association, 4(2–3), 531–541. https://doi.org/10.1162/jeea.2006.4.2-3.531