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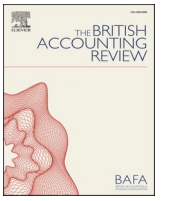

# The moderating role of board gender diversity on the relationship between firm opacity and stock returns☆

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ABSTRACT

In this study, we examine the impact of board gender diversity on the association between firm opacity and stock price crash. We utilize the negative shock of the 2007–2008 financial crisis to capital markets to examine whether firms with gender-diverse boards witnessed lower stock price crashes due to their lower opacity *ex ante*. Using a sample of S&P 1500 firms spanning the period 2005–2008, we employ a difference-in-differences research design and find that firms with high opacity *ex ante* witness more negative returns *ex post*. We also find that gender-diverse firms *ex ante* witness less negative returns *ex post*. Finally, our analysis reveals the moderating role that board gender diversity plays in the association between firm opacity and stock returns around the financial crisis. We subject our results to a range of robustness checks, including instrumental variable regressions, matched-sample analyses, and a set of falsification and placebo tests. Overall, we provide evidence that board gender diversity is associated with increased transparency in financial reporting, which pays off in times of crisis.

> *"… financial stability depends upon market confidence; and investor confidence, in turn, depends upon the transparency of financial statements." Kathleen L. Casey, SEC commissioner.*

## 1. Introduction

At the heart of the lessons learned from the 2007–2008 global financial crisis is that transparency in financial reporting is vital for economic stability (Leventis, Dimitropoulos, & Owusu-Ansah, 2013; Melé, Rosanas, & Fontrodona, 2017) and can have significant capital market benefits, since investors reward high-quality reporting (Leuz & Wysocki, 2016). Several prior studies highlight the importance of the financial reporting environment as a determinant of stock price crash risk, especially during periods of high

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uncertainty (e.g., DeFond, Hung, Li, & Li, 2015; Lang & Maffett, 2011). Another stream of research shows that the presence of female directors in corporate boardrooms is linked to financial reporting transparency (e.g., Francis, Hasan, Park, & Wu, 2015; Garcia Lara, Garcia Osma, Mora, & Scapin, 2017), which is found to pay off during crisis periods (Sun, Zhu, & Ye, 2015). Since board gender diversity is associated with decreased opacity in financial reporting, and firm opacity determines stock price crash (Hutton, Marcus, & Tehranian, 2009), we expect board gender diversity to impact the channel through which firm opacity affects stock returns.

We study the interplay between board gender diversity, firm opacity, and stock returns in light of the 2007–2008 financial crisis that initiated in the US. The financial crisis forms a negative shock to the supply of external financing, which in turn weakens the financing of investments and, thus, curbs firm operations (Barth & Landsman, 2010). As a result, corporate economic activity is disrupted and stock returns decline sharply (Balakrishnan, Watts, & Zuo, 2016). Firms with high opacity in financial reporting pre-crisis suffer from high information asymmetry and are thus less likely to raise funds during the crisis, as investors are uncertain about their fundamental value (Duchin, Ozbas, & Sensoy, 2010). Accordingly, such firms face a greater decline in their stock price and struggle to survive.

In line with prior research, we anticipate a negative association between board gender diversity and firm opacity in financial reporting (e.g., Gull, Nekhili, Nagati, & Chtioui, 2018; Srinidhi, Gul, & Tsui, 2011) to develop our hypotheses. Consistent with an agency theory perspective, our first hypothesis posits that companies with more opaque financial reporting in the pre-crisis period witness a greater decline in their stock returns during the crisis due to higher uncertainty and lower investor confidence, which both increase the difficulty of raising funds for the firm. To form our second hypothesis, we draw upon critical mass theory (Kanter, 1977a) and the relevant empirical literature, which suggest that the presence of female directors in corporate boardrooms reduces information asymmetry and improves stock price informativeness (e.g., Gul, Srinidhi, & Ng, 2011). We predict that firms with gender-diverse boards pre-crisis are likely to experience a softer decline in stock returns during the crisis as a result of higher transparency and lower risk-taking, which pacify investors and make external financing less costly (Fauver, Loureiro, & Taboada, 2017; Hong, Hung, & Lobo, 2014). Finally, we hypothesize that board gender diversity moderates the association between opacity in financial reporting and stock returns around the financial crisis. We expect that companies with a greater female presence on their boards exhibit more transparency in financial reporting and are thus less prone to stock price crash.

Against this background, we examine S&P 1500 firms between 2005 and 2008 and employ a difference-in-differences research methodology to test our hypotheses. Our results validate prior research by showing that board gender diversity is negatively associated with firm opacity in financial reporting in the period before the financial crisis. We then document that firms with higher opacity before the crisis witness a greater decline in their stock returns during the crisis. Further, we find that firms with gender-diverse boards pre-crisis witness a significantly softer decline in stock returns during the crisis compared with their non-diverse counterparts. Importantly, we demonstrate that female participation on corporate boards ameliorates the negative impact of firm opacity prior to the crisis on stock returns during the crisis. Our findings highlight the importance of board gender diversity in increasing financial reporting transparency and maintaining investor confidence, especially in periods of crisis.

We employ an instrumental variable approach to mitigate endogeneity concerns arising from omitted variable bias and reverse causality. Omitted variable bias is a potential concern since it is possible that omitted variables may influence the association between board gender diversity and stock returns, while reverse causality arises due to the fact that firm performance may influence female board representation (Adams & Ferreira, 2009). Following prior literature, we instrument board gender diversity using the fraction of male directors on the board who sit on other boards on which there are female directors (Adams & Ferreira, 2009), and find that our primary results remain the same. In addition, we show that our inferences remain unchanged in matched samples using two different matching approaches, that is, propensity score matching (PSM) and coarsened exact matching (CEM). This allows us to mitigate endogeneity concerns related to selection on observable characteristics (Shipman, Swanquist, & Whited, 2017). We note here that, throughout our analysis, we control for industry fixed effects to capture unobservable time invariant industry heterogeneity. Moreover, we conduct robustness and sensitivity tests, and show that our findings are robust when employing: (i) alternative proxies for firm performance and board gender diversity, (ii) a longer estimation window, and (iii) an alternative control group. We also perform placebo tests and provide evidence that our primary results disappear when using a placebo crisis year, placebo dependent variables, and a placebo treatment group. Although we acknowledge that we cannot rule out the impact of unobservable variables on our findings, we argue that these robustness tests increase our confidence that the results capture the moderating role of board gender diversity, rather than the influence of an omitted variable.

Our study contributes to the literatures of corporate governance and financial reporting by demonstrating that board gender diversity brings about significant economic benefits to shareholders, especially during turbulent times, through the channel of transparency in financial reporting. Specifically, our findings suggest that the composition of corporate boards has a significant effect on investor perception of a firm's economic prospects. This effect is more profound around periods of high uncertainty, when board gender diversity plays a greater role in determining financial disclosure policies and valuation decisions, which are crucial for maintaining investor confidence.

The rest of the paper is structured as follows. Section 2 reviews the literature and states our hypotheses. Section 3 describes the methodology, sample selection and data. Section 4 presents the main results and robustness analyses. Section 5 concludes.

## 2. Related research and hypotheses development

### 2.1. Board gender diversity and financial reporting

#### 2.1.1. Gender differences in corporate risk-taking behavior

Gender differences in corporate risk-taking have received increasing attention in recent years. Several studies support a stereotypical view on financial decision-making that women are more risk-averse than men (e.g., Bruce & Johnson, 1994; Dong, Girardone, & Kuo, 2017; Faccio, Marchica, & Mura, 2016; Johnson & Powell, 1994). For example, Khan and Vieito (2013) suggest that companies run by female CEOs are more likely to perform better compared to companies run by male CEOs, a finding they partially attribute to female CEOs exhibiting greater risk-aversion. In addition, Huang and Kisgen (2013) argue that male managers demonstrate overconfidence in significant corporate decision-making compared with their female counterparts; while Levi, Li, and Zhang (2014) provide evidence that firms with female CEOs and more women on their boards are less likely to undertake acquisitions and, when they do, they pay less in bid premia, thus concluding that women are less likely to destroy shareholder value. In a recent study, Adhikari, Agrawal, and Malm (2019) show that companies with a more dominant presence of female directors on their boards are less likely to face lawsuits because of their lower risk-taking behavior. Overall, several prior studies examining the relation between firm risk-taking and female board representation find that variation in corporate risk-taking behavior may be attributed to differences in risk tolerance between the genders and, by extension, to the presence of women on corporate boards.

Nonetheless, an emerging literature in finance and economics offers mixed evidence as to whether gender differences exist in leadership roles, and it documents that women in top management positions do not differ substantially from their male counterparts (Adams & Funk, 2012; Bugeja, Matolcsy, & Spiropoulos, 2012; Deaves, Lüders, & Luo, 2009; Garcia Lara et al., 2017; Sila, Gonzalez, & Hagendroff, 2017). For example, Sila, Gonzalez, and Hagendorff (2016) study the relationship between board gender diversity and equity risk, and conclude that a board with more female directors does not engage in higher or lower corporate risk-taking activities than a male-dominated board. To the extent that corporate risk-taking is reflected in financial reporting practices (Carter, Franco, & Gine, 2017; Francis et al., 2015), we next review the literature on the relation between board gender diversity and financial reporting quality.

#### 2.1.2. Board gender diversity and firm opacity in financial reporting

There is ample literature to suggest that board gender diversity decreases information asymmetry and enhances financial reporting quality (Gul et al., 2011; Gul, Hutchinson, & Lai, 2013; Srinidhi et al., 2011). Peni and Vähämaa (2010) claim that executive gender differences in conservatism and ethical behavior affect the quality of financial reporting by showing that female CFOs follow more conservative financial reporting practices. Notably, Gul et al. (2013) find that companies with gender-diverse boards are linked to higher accuracy (lower dispersion) of analysts' earnings forecasts, thus inferring that gender-diverse boards add to the transparency and accuracy of financial reports. In a more recent study, Francis et al. (2015) examine the impact of CFO gender on financial reporting practices and further document a positive association between female CFOs and accounting conservatism. Al-Shaer and Harakeh (2020) draw upon Francis et al. (2015) and show that female directors moderate executive incentive compensation through more conservative financial reporting. Similarly, Gull et al. (2018) provide evidence that female CEOs and CFOs are less likely to engage in earnings management. Taken together, prior literature tends to support that board gender diversity is positively (negatively) associated with financial reporting quality (firm opacity); this is a view that we build upon whilst developing our hypotheses and we attempt to further validate prior research findings in Section 4.2 of the paper.

### 2.2. Firm opacity and stock returns following the financial crisis

The link between firm opacity and stock return distributions has received much attention in the literature. From an agency theory perspective (Jensen & Meckling, 1976), managers possess superior information relative to outside investors and face various incentives, such as career concerns and compensation contracts, that encourage them to disclose or withhold their private information (Healy & Palepu, 2001). In fact, Kothari, Shu, and Wysocki (2009) provide evidence that, on average, firm managers are more likely to postpone the disclosure of negative news to investors, in contrast to positive news.

In line with agency theory arguments, Jin and Myers (2006) show that information asymmetry between management and outside investors leads to a greater decline in stock returns (i.e., stock crash). They document a positive association between opacity and crash risk and find that, in more opaque markets, insiders can delay the release of information about firms, thus reducing stock price informativeness. In the same vein, Hutton et al. (2009) further show that opacity in financial statements, as proxied by discretionary accruals, is linked to higher crash risk. Several other studies find supportive evidence and link the accumulation of negative news to crash risk (e.g., Kim, Li, & Zhang, 2011a; 2011b; Callen & Fang, 2015; Chang, Chen, & Zolotoy, 2017). Overall, prior literature reports a positive association between financial reporting opacity (i.e., lack of transparency) and stock-price crash risk.

Another strand of literature examines the effect of accounting conservatism on corporate investment. LaFond and Watts (2008) and Kim, Li, Pan, and Zuo (2013) find that accounting conservatism plays an important role in alleviating adverse consequences arising from information asymmetry. More recently, Balakrishnan et al. (2016) investigate the effect of financial reporting on investment during the 2007–2008 global financial crisis and show that companies with more conservative financial reporting practices before the crisis witnessed a lesser decline in investment activity throughout the crisis; in fact, they provide evidence that this relationship is stronger for companies with high information asymmetry. In addition, given that the financial crisis forms a negative shock to the supply of capital (Ivashina & Scharfstein, 2010), firms with more opaque financial reporting practices prior to the crisis are more likely to face greater difficulty in obtaining financing during the crisis. Consequently, drawing upon prior research, we predict that firms with more opaque financial reporting before the global financial crisis witness, on average, a steeper decline in stock returns during the financial crisis as a result of high information asymmetry and loss of investor confidence. This discussion leads us to our first hypothesis:

**H1a**. Firms with higher opacity prior to the crisis witness a sharper decline in stock returns during the crisis.

### *2.3. Board gender diversity and stock returns following the financial crisis*

Consistent with prior literature proposing that the presence of female directors on boards reduces information asymmetry and enhances financial reporting quality (e.g., Gul et al., 2011), we argue that board gender diversity improves the informativeness of stock prices during crisis, when funding ability is significantly weakened (Ivashina & Scharfstein, 2010) and firms witness underinvestment (Balakrishnan et al., 2016). Extending the first hypothesis, we argue that board gender diversity mitigates the deterioration in stock returns during the crisis. We expect that firms with gender-diverse boards reduce information asymmetry and increase the transparency of financial reporting, thus making external financing less costly.

We build upon critical mass theory (Kanter, 1977a), which introduces the notion of "tokenism" (the practice of recruiting only a few people from underrepresented groups) and discusses the consequences associated with being a "token" (i.e., a numerical minority). Thus, when few women serve on corporate boards, male directors are the dominant group who control the agenda and practices of the group, while female directors are treated as tokens that tend to be representative of their group, rather than individuals (Kanter, 1977a; 1977b).[1] Tokenism is still relevant today in terms of gender diversity. For example, only 6.6% of *Fortune 500* companies have women as CEOs, while women account for just 25.5% of board seats in the *Fortune 500*; the corresponding statistics fifteen years ago were 1.6% and 15.7% respectively (Fortune, 2019). Therefore, despite this substantial increase over the past decades, on average women are still numerically underrepresented within an organization, and prior literature still tends to view female directors as tokens (e.g., Daily, Certo, & Dalton, 1999; Torchia, Calabrò, & Huse, 2011). Being one of a small number of female directors relative to their male counterparts may often result in the experience of discomfort, isolation and self-doubt for female directors. In fact, in an attempt to seek approval, the former may be more likely to agree with the majority of a male-dominated board, due to the perceived hurdles to overcome in exercising influence on board decisions (Eagly & Carli, 2003; Torchia et al., 2011). However, at the same time, tokens might face strong incentives to put in extra effort and work hard to prove their competence and have their achievements noticed (Kanter, 1977b). In fact, as female directors increase their relative proportion in male-dominated groups, they may have a greater chance of exerting influence on board decisions (Torchia et al., 2011). For example, Strydom, Au Yong, and Rankin (2017) demonstrate that gender diversity is linked to higher earnings quality when the proportion of women on the board is more than 20%. Similarly, Joecks, Pull, and Vetter (2013) observe that gender diversity is positively related to corporate performance when there is a critical mass of about 30% women on German boards.

Lee and James (2007) suggest that, as the percentage of female to male executives continues to increase, women in top management roles will no longer be perceived differently from men. Notably, Lee and James (2007) find that, for women, token status is associated with unfavorable consequences, such as enhanced scrutiny and performance pressure, which could motivate them to act as better monitors because of the extra effort they need to make to enter the boardroom. Furthermore, Garcia Lara et al. (2017) study the monitoring role of female directors on accounting quality, and show that the presence of women on boards is significantly linked to lower earnings management practices. However, to the extent that gender biases are more likely to take place in situations where companies have no women on the board, while having a high *ex ante* likelihood of having women directors, or instances where companies have only one woman on board while having a low *ex ante* probability of having women directors (i.e., tokenism), the findings by Garcia Lara et al. (2017) propose that discrimination in directorial appointment methods may lead to suboptimal monitoring.

Overall, consistent with prior literature (e.g., Adams & Ferreira, 2009; Srinidhi et al., 2011) and in line with critical mass theory (Kanter, 1977a), we expect that gender-diverse boards expend more effort on monitoring and enhanced earnings quality. Therefore, we hypothesize that companies with a higher percentage of women on the board before the financial crisis witness a smaller decline in stock returns during the crisis, since such firms have the potential to reduce information asymmetry (e.g., Gul et al., 2013), enjoy lower stock price volatility (e.g., Strydom et al., 2017), and are less expected to engage in fraudulent reporting (e.g., Gull et al., 2018). Moreover, recent evidence suggests that companies with a higher level of conservatism experience lower declines in stock performance during the financial crisis (Balakrishnan et al., 2016). Thus, we construct the following hypothesis:

[1] Watkins, Simmons, and Umphress (2019) review and synthesize the literature on the consequences of being a token for gender and racial minorities.

**H1b**. Firms with gender-diverse boards prior to the crisis witness a smaller decline in stock returns during the crisis.

### 2.4. Moderating role of board gender diversity

We further hypothesize that gender-diverse boards have a moderating effect on the relationship between firm opacity prior to the crisis and the drop in stock returns during the crisis. We follow relevant literature that suggests that companies with less financial reporting transparency are more prone to stock price crash (e.g., Hutton et al., 2009; Jin & Myers, 2006), and companies with a higher proportion of women on their boards exhibit higher financial reporting quality (e.g., Gul et al., 2013; Srinidhi et al., 2011) and are less susceptible to stock price crash. We predict that board gender diversity plays a moderating role, i.e., the presence of women directors on the board ameliorates the negative impact of firm opacity before the crisis on stock returns during the crisis. As such, we formulate the following hypothesis:

**H2**. Gender-diverse boards play a moderating role on the association between firm opacity prior to the crisis and the decline in stock returns during the crisis.

## 3. Data and methodology

We employ a difference-in-differences methodology to examine whether firm opacity in the pre-crisis period explains the magnitude of negative stock returns following the crisis, and whether board gender diversity moderates this association. Financial reporting quality is a long-run equilibrium that is determined by several firm characteristics and institutional factors. The financial crisis constitutes a shock to this equilibrium and, consequently, we can empirically examine the impact of firm opacity in financial reporting on stock returns. More specifically, in this setting, the importance of the difference-in-differences methodology stems from the fact that the financial crisis forms an external shock to investor confidence in the firm's fundamental value; accordingly, this entails a shock to the corporate financing capacity, where investor confidence is a function of the financial reporting quality (Balakrishnan, Core, & Verdi, 2014). Opaque financial statements result in reduced confidence in the firm's fundamental value; hence, a sharp drop in the stock price is expected to follow the crisis. Prior literature documents a negative relationship between board gender diversity and firm opacity, while our analysis focuses on an unexpected negative shock to the real economic activity of firms in order to examine the mechanism through which firm opacity *ex ante* affects stock returns *ex post,* and how this effect is influenced by gender diversity in the boardroom.

### 3.1. Sample selection

In selecting our sample, we follow Balakrishnan et al. (2016) whose research setting is similar to ours. We focus our analysis on the recent financial crisis, which began in the middle of the third quarter of 2007 when the US capital market started suffering a severe credit crisis (Duchin et al., 2010). The financial crisis was triggered by the collapse of the subprime mortgages and their associated securitized products. The high rate of loan defaults hampered the ability of banks to provide capital, which consequently affected the corporate sector significantly. By the end of 2007, the debt market, including private and public lending, suffered a sharp decline in lending activity (Marshall, McCann, & McColgan, 2019). This in turn disrupted real economic activity and, accordingly, caused a sharp decline in stock prices. Therefore, the financial crisis represents an unexpected negative shock to individual firms' investment opportunities (Francis, Hasan, & Wu, 2013) and to the supply of external finance (Balakrishnan et al., 2016); thus providing an appropriate setting to test our hypotheses.

Our sample spans the period 2005–2008, where 2007 and 2008 are the crisis years. We examine S&P 1500 firms as they comprise about 90% of the US equity market by capitalization (Chang, Milkman, Chugh, & Akinola, 2019). In addition, the ExecuComp database, which is used to retrieve data on board characteristics, covers only S&P 1500 firms. We download accounting data from Compustat and stock returns from CRSP. Table 1 Panel A summarizes our sample construction, where we exclude financial and utility firms because such firms are subject to unique regulations by the SEC (LaFond & Watts, 2008).[2] We then delete observations with insufficient data to compute our variables. Lastly, we require each firm to appear a minimum of one time before and one time after the financial crisis to meet the requirements of the difference-in-differences research method (Roberts & Whited, 2013). Our final sample comprises 3027 firm-year observations. Table 1 Panel B reports the sample distribution by industry and year. Our sample is balanced across years and is dominated by firms operating in the manufacturing industry.

### 3.2. Modelling firm opacity

Prior literature documents a positive relationship between the presence of female directors on corporate boards and financial reporting quality (e.g., Gull et al., 2018; Harakeh, El-Gammal, & Matar, 2019; Srinidhi et al., 2011). Nevertheless, we test this association in our sample, since it forms the basis of our hypotheses. In doing so, we examine the effect of board gender diversity on the level of opacity in the firm's financial statements in the pre-crisis period, i.e., the period when the capital market is broadly expected to function normally.

[2] Given that sub-prime mortgages are considered as the origin of the financial crisis, the exclusion of financial firms from the analysis also mitigates the concern that the financial crisis may not represent an exogenous shock to these firms (Francis et al., 2013).

**Table 1**
Sample distribution.

| Panel A: Sample construction | |
|---|---|
| All firm-years (S&P 1500 firms between 2005 and 2008) | 6401 |
| *Less:* | |
| Firm-years operating in the financial industry | (1213) |
| Firm-years operating in the utilities industry | (331) |
| Firm-years with missing financial variables or insufficient variables to compute discretionary accruals | (694) |
| Firm-years with missing board characteristics | (511) |
| Firm-years with missing returns, beta, or bid-ask spread | (392) |
| Firm-years for firms that do not appear at least once before and once after the financial crisis | (233) |
| Final sample (firm-years) | 3027 |

**Panel B: Sample distribution by industry and year**

| *General Industry Classification* | 2005 | 2006 | 2007 | 2008 | Total |
|---|---|---|---|---|---|
| Mining and construction | 39 | 42 | 41 | 42 | 164 |
| Manufacturing | 404 | 436 | 421 | 416 | 1677 |
| Transportation | 37 | 42 | 41 | 39 | 159 |
| Retail | 110 | 121 | 116 | 112 | 459 |
| Services | 130 | 150 | 144 | 144 | 568 |
| Total | 720 | 791 | 763 | 753 | 3027 |

Notes: Panel A reports the steps followed when constructing the sample. Panel B provides the sample distribution by industry and year according to the Standard Industrial Classification (SIC).

We use two measures of firm opacity, an accounting-based measure and a market-based measure, which however are positively associated (Warfield, Wild, & Wild, 1995). The accounting-based measure is the absolute value of discretionary accruals, which is a widely-used measure in the accounting and finance literature (Dechow, Ge, & Schrand, 2010; Hutton et al., 2009; Iliev, 2010). We calculate discretionary accruals following Dechow, Sloan, and Sweeney (1995) and in light of Kothari, Leone, and Wasley (2005) and Owens, Wu, and Zimmerman (2017), who control for firm performance and idiosyncratic economic shocks respectively.[3] The market-based measure is the bid-ask spread in stock prices, which is a proxy for the level of asymmetric information between managers and investors (Daske, Hail, Leuz, & Verdi, 2008; Muller, Riedl, & Sellhorn, 2011).

We follow Hutton et al. (2009) to empirically model firm opacity in financial reporting. The dependent variable in the regression equation below is the average of the firm opacity metrics in the pre-crisis period (2005 and 2006).

$$OPAC_i = \alpha_0 + \alpha_1 BGD_i + \sum \alpha_i CONTROLS_{it} + \sum \alpha_j Industry\_FE_j \quad (1)$$

Where: *OPAC* is either the accounting-based measure (*OPAC_DA*) or the market-based measure (*OPAC_IA*) of firm opacity. The variable *BGD* captures board gender diversity, which is measured using either the Blau Index of diversity (Harrison & Klein, 2007) or an indicator variable that takes the value 1 if at least one of the directors is a female (Adams & Ferreira, 2009) (*BGD_BLAU* and *BGD_DUM* respectively).[4] Board gender diversity is calculated at the firm level as the average in the pre-crisis period. The coefficient of interest is $\alpha_1$ because it captures the effect of board gender diversity on corporate opacity and is expected to be significantly negative.

Next, we follow prior literature in including a vector of control variables. When *OPAC* is measured using discretionary accruals (*OPAC_DA*), we follow Iliev (2010) and Lobo and Zhou (2010) and control for variables that capture the firm's economic characteristics that determine earnings management. Specifically, we control for: company size using *SIZE* (Burgstahler & Dichev, 1997); investment opportunities using the market-to-book ratio *MTB* (Ahmed, Neel, & Wang, 2013); change in income using *ΔINCDUM* (Lobo & Zhou, 2006); financial leverage using *LEV* (DeFond & Jiambalvo, 1994; Sweeney, 1994); operating cash flow using *OCF* (Becker, Defond, Jiambalvo, & Subramanyam, 1998); dividend-paying status using *DIVIDEND* (He, Ng, Zaiats, & Zhang, 2017); and the quality of external auditing using *BIG4* (Becker et al., 1998). We also control for a set of board attributes that determine the firm's corporate governance mechanism and can affect earnings quality (Al-Shaer & Harakeh, 2020; Srinidhi et al., 2011). Such attributes include: board size (*BODSIZE*); board independence (*INDEP*); number of board meetings (*MEETINGS*); CEO gender (*CEOFEM*); CEO duality (*DUALITY*); and average tenure of directors (*TENURE*).

When *OPAC* is measured using the bid-ask spread (*OPAC_IA*), we include a set of control variables that determine information asymmetry. Specifically, we include controls for the market-maker's inventory-holding and order-processing costs using: the log of the stock price *PRICE* (Lin, Sanger, & Booth, 1995; Muller et al., 2011); idiosyncratic risk using return volatility *VOLAT*; firm size using *SIZE* (Smith & Watts, 1992); investment opportunity set using *MTB* (Daske et al., 2008; Fama & French, 2002); financial leverage using *LEV* (LaFond & Watts, 2008); and audit quality using *BIG4* (Krishnan & Visvanathan, 2008). Finally, similar to modelling the accounting-based measure of firm opacity, we include *BODSIZE, INDEP, MEETINGS, CEOFEM, DUALITY,* and *TENURE* to capture firms' corporate governance mechanisms (Gull et al., 2018).

[3] We provide more details on the calculation of discretionary accruals in Appendix 2.

[4] Specifically, similar to prior research, we estimate the Blau index of diversity as: $1 - [(\text{FEM}\%)^2 + (1 - \text{FEM}\%)^2]$, where *FEM%* is the percentage of female directors on the board. We define *BGD_BLAU* as the average of the firm's Blau index in 2005 and 2006.

### 3.3. Modelling stock returns

In line with prior literature (e.g., Adams & Ferreira, 2009; Green & Homroy, 2018; Hutton et al., 2009), we argue that the presence of female directors on corporate boards, as well as the level of opacity in financial reporting, are associated with firm and board characteristics, which we need to control for in order to mitigate omitted variable bias concerns. We control for firm size (*SIZE*) and board size (*BODSIZE*) because larger firms typically have larger boards that are more gender-diverse (Adams & Ferreira, 2009), and both *SIZE* and *BODSIZE* are associated with stock returns. For example, small companies tend to outperform their larger counterparts (Fama & French, 1993), while a larger board may improve (deteriorate) firm performance because of the greater collective information it possesses (because of higher coordination costs and free riding) (Guest, 2009). We also control for the market-to-book ratio (*MTB*) because *MTB* is associated with firm size and also affects stock returns (Griffin & Lemmon, 2002). For example, Fama and French (1993) show that value stocks tend to outperform growth stocks. In addition, we control for the correlation between stock returns and market returns (*BETA*), as stock returns are affected by firm risk (Fama & French, 1993), while firms with gender-diverse boards assume on average less risk (e.g., Adhikari et al., 2019). We further control for the momentum effect (*MOMENT*), that is, the tendency of past winner stocks to outperform past loser stocks over the next several months (Jegadeesh & Titman, 1993). Audit quality is an important determinant of financial reporting quality. In particular, high audit quality reduces information asymmetry and agency conflicts between management and outside investors, while financial reporting quality is associated with board gender diversity (e.g., Francis et al., 2015) and helps explain stock returns (Hutton et al., 2009); thus, we control for audit quality using *BIG4*. Furthermore, we control for the number of board meetings (*MEETINGS*), as board meeting frequency is a value-relevant board attribute related to firm performance (Vafeas, 1999) and female directors tend to attend more board meetings compared to male directors (Adams & Ferreira, 2009). Controlling for board independence (*INDEP*) is equally significant in this context since outside directors bring in more skills and knowledge to the firm (Wan & Ong, 2005) and can influence firm performance. Adams and Ferreira (2009) further argue that director attendance behaviour improves with greater board independence, as independent directors improve governance. We also control for CEO gender (*CEOFEM*) and CEO duality (*DUALITY*). The gender of top executives is associated with the level of the firm's risk taking (e.g., Francis et al., 2015), which in turn influences stock returns (Fama & French, 1993). Similarly, CEO duality is associated with firm performance. On the one hand, CEO duality can enhance firm performance, as it provides the CEO with more power to adapt to hostile challenges in the environment, or it could serve as a reward for the CEO's good performance (Kang & Zardkoohi, 2005). On the other hand, CEO duality can lower firm performance (e.g., Wan & Ong, 2005); in fact, Kang and Zardkoohi (2005) describe the conditions under which duality can deteriorate firm performance, such as "*mimicking other firms that adopt duality, adopting duality out of social exchange reciprocity, or imposing duality by a powerful CEO*" (p. 794). Lastly, we control for the average tenure of directors (*TENURE*), as the length of director service on the boards is related to firm performance. On the one hand, longer board tenure may indicate that shareholders are satisfied with directors' performance and as a result the firm is perceived as being more stable and less likely to face operational and strategic problems (Livnat, Smith, Suslava, & Tarlie, 2021); in fact, Livnat et al. (2021) provide evidence that longer board tenure is significantly positively associated with firms' stock returns. On the other hand, longer-tenured board members are more likely to develop a fiduciary relation to the firm (Vafeas, 2003); thus, longer-tenured board members may be less effective at monitoring management and this can impact firm performance negatively. The aforementioned control variables are denoted as *CONTROLS* in all equations in this Section.[5]

We employ the difference-in-differences regression equation below to test hypothesis H1a and identify whether firm opacity before the financial crisis is related to a steeper decrease in stock returns during the crisis.

$$RET_{it} = \beta_0 + \beta_1 OPAC_i + \beta_2 POST_t + \beta_3 OPAC_i \times POST_t + \sum \beta_i CONTROLS_{it} + \sum \beta_j Industry\_FE_j \quad (2)$$

Where: *RET* is the annual stock returns, compounded monthly. The variable *OPAC* is measured using either the accounting-based measure (*OPAC_DA*) or the market-based measure (*OPAC_IA*) of firm opacity described in Section 3.2. The variable *POST* is an indicator variable that takes the value 1 for the financial crisis years (2007 and 2008) and 0 for the pre-crisis period (2005 and 2006). We predict a negative coefficient for *POST*, suggesting a decline in stock returns following the financial crisis. The interaction term *OPAC* × *POST* captures the difference-in-differences estimator. We anticipate a negative coefficient for $\beta_3$, meaning that companies with greater opacity before the financial crisis witness a greater decline in stock returns during the crisis.

Regarding hypothesis H1b, we estimate the following model to study whether firms with gender-diverse boards prior to the financial crisis witness a smaller decline in stock returns during the crisis.

$$RET_{it} = \lambda_0 + \lambda_1 BGD_i + \lambda_2 POST_t + \lambda_3 BGD_i \times POST_t + \sum \lambda_i CONTROLS_{it} + \sum \lambda_j Industry\_FE_j \quad (3)$$

All variables are defined in this Section and in Appendix 1. As mentioned previously, we expect a negative coefficient for *POST*, which captures the effect of the crisis on stock returns. The interaction term *BGD* × *POST* is the difference-in-differences estimator; thus, the view that companies with more gender-diverse boards *ex ante* witness a smaller decrease in their stock returns *ex post* is supported if the coefficient for $\lambda_3$ is significantly positive.

Finally, we test hypothesis H2, which explores the role that board gender diversity plays in moderating the association between

[5] We note here that the control variables we employ are measured for firm *i* at year *t*. In untabulated analyses, we verify that our primary results remain the same when (i) using one-year lagged values for the control variables (i.e., year *t*−1 instead of year *t*), or (ii) assigning the average value of all years (i.e., 2005–2008) to each firm-year observation of the control variables.

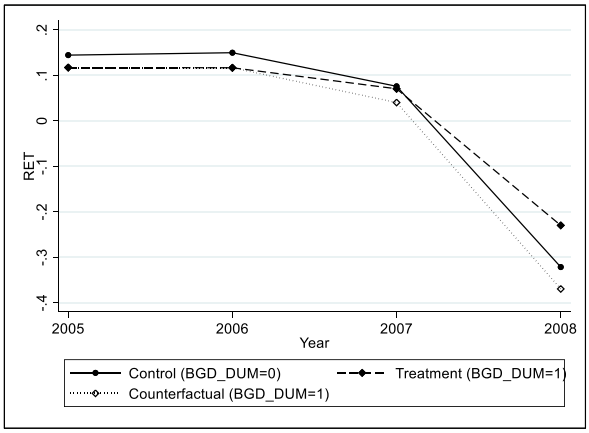


**Fig. 1.** Stock Returns for the Control and Treatment Groups around the Financial Crisis
Notes: This figure presents the average stock returns for firms in the control (all-male firms) and treatment (with-female firms) groups between 2005 and 2008. The dotted line depicts the counterfactual evolution of average stock returns for with-female firms, had everything evolved as it did for all-male firms. All variables are defined in Appendix 1.

firm opacity prior to the crisis and the change in stock returns during the crisis. Testing this hypothesis with a difference-in-differences research design requires a regression equation that models stock returns as a function of the crisis effect (*POST*); the level of firm opacity prior to the crisis (*OPAC*); board gender diversity prior to the crisis (*BGD*); the double interactions (*BGD* × *POST, OPAC* × *POST*, and *BGD* × *OPAC)*; and the triple interaction of the above variables (*BGD* × *OPAC* × *POST*). To simplify the empirical modelling of our analysis and, accordingly, the interpretation of our results, we replace the dependent variable *RET* with the change in *RET* following the financial crisis (*ΔRET*). This allows us to exclude the variable *POST* from regression Equation (4). In other words, the use of *ΔRET* instead of *RET* as the dependent variable in Equation (4) ensures that the difference-in-differences regression model reflects the effect of the financial crisis on stock returns (i.e., the effect of *POST*) while keeping the interpretation of the results simple and sharp (Bertrand, Duflo, & Mullainathan, 2004).[6] Consequently, we employ the following difference-in-differences regression equation to test hypothesis H2.

$$\Delta RET_i = \theta_0 + \theta_1 BGD_i + \theta_2 OPAC_i + \theta_3 BGD_i \times OPAC_i + \sum \theta_i CONTROLS_{it} + \sum \theta_j Industry\_FE_j \quad (4)$$

Where: *ΔRET* is the difference in stock returns following the financial crisis, measured at the firm level. Specifically, we compute *ΔRET* as the average of the firm's stock returns in 2007 and 2008 minus the average of the firm's stock returns in 2005 and 2006. All other variables are defined in this Section and in Appendix 1. We expect a negative coefficient for *OPAC*, suggesting that firms with higher opacity *ex ante* witness a more negative change in their stock returns *ex post*. Our variable of interest in Equation (4) is the interaction term *BGD* × *OPAC*, which captures the moderating role of board gender diversity on the association between firm opacity and the change in stock returns following the financial crisis. As such, we expect $\theta_3$ to be positive and significant; in other words, we anticipate board gender diversity to decrease the magnitude of the negative effect of *OPAC* on *ΔRET*.

## 4. Results

### 4.1. Descriptive statistics and the parallel trends assumption

Fig. 1 plots the average stock returns for firms in the control (all-male firms) and treatment (with-female firms) groups between 2005 and 2008; it also highlights the fact that while stock returns declined on average during the financial crisis for all firms, they declined much more sharply for all-male firms. Fig. 1 additionally provides evidence on the parallel trends assumption, namely that the average stock returns moved almost in parallel for the all-male and with-female firms in the pre-crisis period. Fig. 1 also presents the treatment group counterfactual, implied by extrapolating control group trends to the treatment group for the financial crisis years (Angrist & Pischke, 2014). Specifically, the dotted line in Fig. 1 depicts the counterfactual outcome, i.e., it shows what would have happened to the average stock returns of with-female firms had everything evolved as it did for the all-male firms. The fact that the dashed line for with-female firms declines much more gradually than the counterfactual (dotted) line lends support to our argument that gender-diverse firms *ex ante* witness lower negative returns *ex post*.

[6] It is worth noting that such transformations are not new to the accounting and finance literature (e.g., Ball, Robin, & Sadka, 2008). Nevertheless, our inferences remain unchanged when using the traditional difference-in-differences modelling, i.e., when we estimate the following regression equation to test hypothesis H2: $RET_{it} = \gamma_0 + \gamma_1 BGD_i + \gamma_2 OPAC_i + \gamma_3 POST_t + \gamma_4 BGD_i \times OPAC_i + \gamma_5 BGD_i \times POST_t + \gamma_6 OPAC_i \times POST_t + \gamma_7 BGD_i \times OPAC_i \times POST_t + \sum \gamma_i CONTROLS_{it} + \sum \gamma_j Industry\_FE_j$.

**Table 2**
Descriptive statistics and correlation matrix.

Panel A: Summary statistics for firm-level variables by board gender diversity

| Firm-level variables | *BGD_DUM* = 0 | | | | | | *BGD_DUM* = 1 | | | | | | Diff. in Mean | Diff. in Median |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | Mean | S.D. | Q1 | Median | Q3 | N | Mean | S.D. | Q1 | Median | Q3 | | |
| *ΔRET* | 828 | −0.265 | 0.256 | −0.428 | −0.270 | −0.092 | 2199 | −0.196 | 0.223 | −0.324 | −0.187 | −0.062 | −0.069*** | −0.084*** |
| *OPAC_DA* | 828 | 0.042 | 0.030 | 0.021 | 0.034 | 0.056 | 2199 | 0.035 | 0.026 | 0.017 | 0.029 | 0.046 | 0.007*** | 0.005*** |
| *OPAC_IA* | 828 | −3.516 | 0.220 | −3.662 | −3.505 | −3.364 | 2199 | −3.734 | 0.309 | −3.953 | −3.745 | −3.526 | 0.218*** | 0.239*** |
| *BGD_BLAU* | 828 | 0 | 0 | 0 | 0 | 0 | 2199 | 0.229 | 0.102 | 0.173 | 0.222 | 0.298 | −0.229*** | −0.221*** |

**Panel B: Summary statistics for firm-year variables by board gender diversity before the financial crisis**

| Firm-year variables | *BGD_DUM* = 0 | | | | | | *BGD_DUM* = 1 | | | | | | Diff. in Mean | Diff. in Median |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | Mean | S.D. | Q1 | Median | Q3 | N | Mean | S.D. | Q1 | Median | Q3 | | |
| *RET* | 411 | 0.147 | 0.329 | −0.096 | 0.112 | 0.308 | 1100 | 0.115 | 0.274 | −0.062 | 0.080 | 0.257 | 0.032* | 0.031 |
| *SIZE* | 411 | 6.599 | 1.027 | 5.848 | 6.534 | 7.310 | 1100 | 7.773 | 1.491 | 6.694 | 7.667 | 8.772 | −1.174*** | −1.132*** |
| *LEV* | 411 | 0.386 | 0.188 | 0.214 | 0.398 | 0.530 | 1100 | 0.499 | 0.187 | 0.371 | 0.507 | 0.622 | −0.113*** | −0.109*** |
| *OCF* | 411 | 0.110 | 0.077 | 0.060 | 0.105 | 0.161 | 1100 | 0.115 | 0.072 | 0.069 | 0.108 | 0.157 | −0.005 | −0.003 |
| *VOLAT* | 411 | −3.727 | 0.383 | −3.950 | −3.766 | −3.551 | 1100 | −3.835 | 0.775 | −4.227 | −3.974 | −3.697 | 0.108*** | 0.208*** |
| *PRICE* | 411 | 3.319 | 0.654 | 2.959 | 3.402 | 3.757 | 1100 | 3.476 | 0.623 | 3.135 | 3.559 | 3.909 | −0.157*** | −0.157*** |
| *MTB* | 411 | 3.007 | 1.624 | 1.860 | 2.577 | 3.733 | 1100 | 3.504 | 2.719 | 1.871 | 2.761 | 4.090 | −0.497*** | −0.184 |
| *BETA* | 411 | 1.512 | 0.450 | 1.195 | 1.495 | 1.783 | 1100 | 1.229 | 0.443 | 0.913 | 1.188 | 1.489 | 0.283*** | 0.307*** |
| *MOMENT* | 411 | 0.084 | 0.310 | −0.138 | 0.027 | 0.279 | 1100 | 0.066 | 0.292 | −0.111 | 0.047 | 0.224 | 0.018 | −0.020 |
| *BODSIZE* | 411 | 7.467 | 1.678 | 7.000 | 7.000 | 8.000 | 1100 | 9.424 | 2.364 | 8.000 | 9.000 | 11.000 | −1.956*** | −2.000*** |
| *INDEP* | 411 | 0.671 | 0.163 | 0.571 | 0.667 | 0.800 | 1100 | 0.717 | 0.173 | 0.625 | 0.750 | 0.846 | −0.046*** | −0.083*** |
| *MEETINGS* | 411 | 1.902 | 0.495 | 1.609 | 1.946 | 2.197 | 1100 | 1.921 | 0.507 | 1.609 | 1.946 | 2.197 | −0.019 | 0.000 |
| *TENURE* | 411 | 9.855 | 4.655 | 6.284 | 8.904 | 12.718 | 1100 | 8.657 | 3.597 | 6.262 | 8.260 | 10.804 | 1.198*** | 0.644** |

Panel C: Summary statistics for firm-year variables by board gender diversity after the financial crisis

| Firm-year variables | *BGD_DUM = 0* | | | | | | *BGD_DUM = 1* | | | | | | Diff. in Mean | Diff. in Median |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | Mean | S.D. | Q1 | Median | Q3 | N | Mean | S.D. | Q1 | Median | Q3 | | |
| *RET* | 417 | −0.123 | 0.363 | −0.411 | −0.199 | 0.080 | 1099 | −0.081 | 0.299 | −0.319 | −0.147 | 0.064 | −0.042** | −0.052** |
| *SIZE* | 417 | 6.873 | 1.082 | 6.121 | 6.794 | 7.619 | 1099 | 7.976 | 1.480 | 6.858 | 7.849 | 8.915 | −1.103*** | −1.056*** |
| *LEV* | 417 | 0.387 | 0.182 | 0.247 | 0.392 | 0.509 | 1099 | 0.512 | 0.183 | 0.394 | 0.521 | 0.628 | −0.125*** | −0.129*** |
| *OCF* | 417 | 0.118 | 0.072 | 0.068 | 0.113 | 0.165 | 1099 | 0.116 | 0.067 | 0.072 | 0.110 | 0.152 | 0.002 | 0.003 |
| *VOLAT* | 417 | −3.422 | 0.526 | −3.746 | −3.439 | −3.162 | 1099 | −3.429 | 0.847 | −3.902 | −3.528 | −3.204 | 0.008 | 0.089* |
| *PRICE* | 417 | 3.062 | 0.824 | 2.592 | 3.152 | 3.584 | 1099 | 3.198 | 0.845 | 2.748 | 3.315 | 3.780 | −0.136*** | −0.163*** |
| *MTB* | 417 | 2.949 | 1.894 | 1.709 | 2.565 | 3.592 | 1099 | 3.533 | 3.164 | 1.824 | 2.753 | 4.051 | −0.584*** | −0.188 |
| *BETA* | 417 | 1.130 | 0.311 | 0.914 | 1.115 | 1.334 | 1099 | 1.028 | 0.298 | 0.819 | 1.011 | 1.220 | 0.102*** | 0.104*** |
| *MOMENT* | 417 | −0.108 | 0.370 | −0.360 | −0.142 | 0.100 | 1099 | −0.132 | 0.337 | −0.369 | −0.141 | 0.078 | 0.024 | −0.001 |
| *BODSIZE* | 417 | 7.393 | 2.040 | 6.000 | 8.000 | 9.000 | 1099 | 8.897 | 3.057 | 8.000 | 9.000 | 11.000 | −1.504*** | −1.000*** |
| *INDEP* | 417 | 0.716 | 0.184 | 0.667 | 0.750 | 0.857 | 1099 | 0.728 | 0.238 | 0.700 | 0.800 | 0.875 | −0.013 | −0.050*** |
| *MEETINGS* | 417 | 1.902 | 0.494 | 1.609 | 1.946 | 2.197 | 1099 | 1.925 | 0.488 | 1.609 | 1.946 | 2.197 | −0.023 | 0.000 |
| *TENURE* | 417 | 9.974 | 4.781 | 6.775 | 9.370 | 12.779 | 1099 | 8.403 | 3.987 | 6.046 | 8.039 | 10.770 | 1.571*** | 1.331*** |

Panel D: Correlation matrix

| | *(1)* | *(2)* | *(3)* | *(4)* | *(5)* | *(6)* | *(7)* | *(8)* | *(9)* | *(10)* | *(11)* | *(12)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *BGD_BLAU (1)* | 1.000 | | | | | | | | | | | |
| *RET (2)* | **−0.066** | 1.000 | | | | | | | | | | |
| *OPAC_DA (3)* | **−0.103** | **0.059** | 1.000 | | | | | | | | | |
| *OPAC_IA (4)* | **−0.322** | **0.082** | **0.246** | 1.000 | | | | | | | | |
| *SIZE (5)* | **0.344** | 0.027 | **−0.208** | **−0.528** | 1.000 | | | | | | | |
| *MTB (6)* | 0.013 | **−0.142** | **0.234** | −0.027 | **−0.186** | 1.000 | | | | | | |
| *BETA (7)* | **−0.288** | **0.170** | **0.128** | **0.611** | **−0.318** | **−0.065** | 1.000 | | | | | |
| *MOMENT (8)* | **−0.068** | **0.609** | 0.014 | **0.090** | −0.029 | **−0.142** | **0.174** | 1.000 | | | | |
| *BODSIZE (9)* | **0.399** | −0.015 | **−0.121** | **−0.374** | **0.515** | **−0.138** | **−0.224** | −0.032 | 1.000 | | | |
| *INDEP (10)* | **0.240** | 0.016 | −0.025 | **−0.117** | **0.161** | −0.002 | **−0.091** | 0.020 | **0.365** | 1.000 | | |
| *MEETINGS (11)* | **0.067** | −0.008 | −0.023 | **−0.065** | **0.137** | **−0.100** | **−0.059** | 0.000 | **0.064** | **0.075** | 1.000 | |
| *TENURE (12)* | **−0.074** | −0.032 | −0.011 | −0.018 | **−0.056** | 0.048 | 0.005 | **−0.066** | **0.087** | **−0.111** | **−0.129** | 1.000 |

Notes: Panel A reports summary statistics of firm-level variables for all-male firms and with-female firms. Panel B (Panel C) reports summary statistics of firm-year variables for all-male firms and with-female firms before (after) the financial crisis. Two-sample t-tests (Wilcoxon two-sample rank-sum tests) are used to test differences in means (differences in medians) in Panels B and C. Panel D reports the Pearson correlation matrix of the main variables before the financial crisis. The correlation coefficients in bold indicate a statistical significance at the 5% level or better. All continuous variables are winsorized at 1% and 99%. All variables are defined in Appendix 1. The asterisks indicate a 1% (***), 5% (**), and 10% (*) level of significance.

**Table 3**
Board gender diversity and firm opacity before the financial crisis.

| Discretionary Accruals | | | Information Asymmetry | | |
|---|---|---|---|---|---|
| | Model 3.1 | Model 3.2 | | Model 3.3 | Model 3.4 |
| | *OPAC_DA* | *OPAC_DA* | | *OPAC_IA* | *OPAC_IA* |
| *BGD_BLAU* | −0.0189*** | | *BGD_BLAU* | −0.1581*** | |
| | (−2.89) | | | (−3.16) | |
| *BGD_DUM* | | −0.0048** | *BGD_DUM* | | −0.0586*** |
| | | (−2.47) | | | (−4.62) |
| *SIZE* | −0.0041*** | −0.0040*** | *VOLAT* | 0.1561*** | 0.1570*** |
| | (−3.80) | (−3.66) | | (7.91) | (8.00) |
| *MTB* | 0.0020*** | 0.0019*** | *PRICE* | −0.1221*** | −0.1209*** |
| | (4.93) | (4.75) | | (−11.45) | (−11.44) |
| *LEV* | −0.0118** | −0.0118** | *SIZE* | −0.0721*** | −0.0712*** |
| | (−2.48) | (−2.46) | | (−13.30) | (−13.23) |
| *ΔINCOME* | 0.0021 | 0.002 | *MTB* | −0.0053** | −0.0057** |
| | (1.34) | (1.26) | | (−2.11) | (−2.31) |
| *DIVIDEND* | −0.0049*** | −0.0049*** | *LEV* | −0.0226 | −0.02 |
| | (−3.03) | (−3.07) | | (−0.67) | (−0.59) |
| *OCF* | −0.0186 | −0.0209 | *BIG4* | −0.0272 | −0.0312 |
| | (−0.99) | (−1.12) | | (−1.40) | (−1.61) |
| *BIG4* | −0.0052 | −0.0059 | *BODSIZE* | −0.0106*** | −0.0097*** |
| | (−1.47) | (−1.64) | | (−3.41) | (−3.09) |
| *BODSIZE* | −0.0004 | −0.0004 | *INDEP* | 0.0514 | 0.0337 |
| | (−1.02) | (−1.08) | | (1.48) | (0.97) |
| *INDEP* | 0.0041 | 0.0023 | *MEETINGS* | −0.0181** | −0.0209** |
| | (0.95) | (0.55) | | (−2.03) | (−2.37) |
| *MEETINGS* | 0.0004 | 0.0001 | *CEOFEM* | −0.0016 | −0.0127 |
| | (0.23) | (0.07) | | (−0.03) | (−0.28) |
| *CEOFEM* | 0.001 | −0.0009 | *DUALITY* | −0.0086 | −0.0089 |
| | (0.22) | (−0.20) | | (−0.81) | (−0.84) |
| *DUALITY* | −0.0029** | −0.0029** | *TENURE* | −0.0027* | −0.0034** |
| | (−2.09) | (−2.09) | | (−1.95) | (−2.43) |
| *TENURE* | −0.0001 | −0.0001 | | | |
| | (−0.11) | (−0.35) | | | |
| *Intercept* | 0.0444*** | 0.0485*** | *Intercept* | −1.9220*** | −1.8925*** |
| | (6.65) | (7.61) | | (−27.09) | (−27.10) |
| Industry FE | Included | Included | Industry FE | Included | Included |
| Adj. $R^2$ | 0.0759 | 0.0745 | Adj. $R^2$ | 0.5735 | 0.5758 |
| N | 1511 | 1511 | N | 1511 | 1511 |

Notes: This table reports the OLS regression results which test the effect of board gender diversity on firm opacity in the period before the financial crisis. Models 3.1 and 3.2 use the accounting-based measure of firm opacity (*OPAC_DA*) as the dependent variable, while Models 3.3 and 3.4 use the market-based measure of firm opacity (*OPAC_IA*) as the dependent variable. The t-statistics in parentheses are calculated based on clustered standard errors at the firm level. All continuous variables are winsorized at 1% and 99%. All variables are defined in Appendix 1. The asterisks indicate a 1% (***), 5% (**), and 10% (*) level of significance.

Table 2 Panel A presents summary statistics for the firm-level variables of firms without gender-diverse boards (*BGD_DUM* = 0) and of firms that have at least one female director on the board (*BGD_DUM* = 1).[7] The measures of firm opacity are, on average, significantly higher for all-male firms, as inferred by comparing the averages of *OPAC_DA* and *OPAC_IA* between the two groups and the corresponding differences in means. In addition, the change in stock returns following the crisis is, on average, −26.5% for all-male firms compared to −19.6% for with-female firms; the difference in means is approximately 6.9% in absolute value and is statistically significant at the 1% level. Overall, the initial comparison of the main variable averages suggests that firms with gender-diverse boards exhibit a lower level of opacity in financial reporting *ex ante*, and a smaller reduction in stock returns around the crisis. Wilcoxon signed rank tests on the differences in medians yield results similar to those for differences in means. Moving to the summary statistics of the difference-in-differences methodology, Table 2 Panels B and C respectively summarize firm-year variables for the all-male and

[7] The percentage of female directors on corporate boards marginally increases throughout our sample period from 10.2% in 2005 and 10.3% in 2006 to 11.1% in 2007 and 11.3% in 2008. In addition, the percentage of S&P 1500 firms with at least one female director on the board slightly increases from 66.3% in 2005 and 64.6% in 2006 to 67.2% in 2007 and 69.5% in 2008. Therefore, the fact that female representation on corporate boards remains relatively stable throughout our sample period mitigates concerns relating to systematic changes in board structure driving our results.

**Table 4**
Firm opacity, board gender diversity, and stock returns around the financial crisis (H1a and H1b).

| Firm Opacity | | | Board Gender Diversity | | |
|---|---|---|---|---|---|
| | Model 4.1 | Model 4.2 | | Model 4.3 | Model 4.4 |
| | RET | RET | | RET | RET |
| *OPAC_DA* | 0.5557** | | *BGD_BLAU* | −0.0241 | |
| | (2.18) | | | (−0.46) | |
| *OPAC_IA* | | 0.0485 | *BGD_DUM* | | −0.0162 |
| | | (1.52) | | | (−1.05) |
| *POST* | −0.0629*** | −0.5024*** | *POST* | −0.1137*** | −0.1399*** |
| | (−4.36) | (−3.49) | | (−7.31) | (−7.78) |
| *OPAC_DA* × *POST* | −0.6725** | | *BGD_BLAU* × *POST* | 0.1588** | |
| | (−1.99) | | | (2.45) | |
| *OPAC_IA* × *POST* | | −0.0800** | *BGD_DUM* × *POST* | | 0.0721*** |
| | | (−2.13) | | | (3.72) |
| *SIZE* | 0.0124*** | 0.0103** | *SIZE* | 0.0104*** | 0.0100*** |
| | (3.72) | (2.09) | | (3.09) | (2.94) |
| *MTB* | 0.0009 | −0.0031 | *MTB* | 0.001 | 0.001 |
| | (0.70) | (−1.59) | | (0.75) | (0.80) |
| *BETA* | 0.0280** | 0.0441** | *BETA* | 0.0290** | 0.0278** |
| | (2.16) | (2.23) | | (2.24) | (2.17) |
| *MOMENT* | 0.6355*** | 0.6356*** | *MOMENT* | 0.6358*** | 0.6368*** |
| | (38.11) | (37.96) | | (38.08) | (38.19) |
| *BIG4* | −0.0301 | −0.0279 | *BIG4* | −0.0342 | −0.0333 |
| | (−1.45) | (−0.95) | | (−1.64) | (−1.62) |
| *BODSIZE* | −0.0006 | −0.0024 | *BODSIZE* | −0.0012 | −0.0015 |
| | (−0.29) | (−0.80) | | (−0.52) | (−0.66) |
| *INDEP* | −0.0063 | −0.0219 | *INDEP* | −0.0025 | 0.001 |
| | (−0.23) | (−0.62) | | (−0.09) | (0.04) |
| *MEETINGS* | −0.0047 | −0.0072 | *MEETINGS* | −0.0048 | −0.004 |
| | (−0.56) | (−0.64) | | (−0.57) | (−0.47) |
| *CEOFEM* | 0.0061 | −0.0503 | *CEOFEM* | −0.0043 | −0.0005 |
| | (0.25) | (−1.43) | | (−0.17) | (−0.02) |
| *DUALITY* | 0.0181** | 0.0329*** | *DUALITY* | 0.0173** | 0.0171** |
| | (2.13) | (2.87) | | (2.04) | (2.01) |
| *TENURE* | −0.0011 | −0.0030** | *TENURE* | −0.0009 | −0.0007 |
| | (−1.00) | (−2.15) | | (−0.80) | (−0.66) |
| *Intercept* | −0.0269 | 0.2646** | *Intercept* | 0.0162 | 0.0243 |
| | (−0.60) | (1.97) | | (0.37) | (0.56) |
| Industry FE | Included | Included | Industry FE | Included | Included |
| Adj. $R^2$ | 0.5255 | 0.5246 | Adj. $R^2$ | 0.5259 | 0.5274 |
| N | 3027 | 3027 | N | 3027 | 3027 |

Notes: Panel A (Panel B) reports the OLS difference-in-differences regression results which test the effect of firm opacity (board gender diversity) *ex ante* on stock returns during the financial crisis. Model 4.1 uses the accounting-based measure of firm opacity (*OPAC_DA*), while Model 4.2 uses the market-based measure of firm opacity (*OPAC_IA*). Model 4.3 uses the Blau measure of board gender diversity (*BGD_BLAU*), while Model 4.4 uses the indicator variable measure of board gender diversity (*BGD_DUM*). The t-statistics in parentheses are calculated based on clustered standard errors at the firm level. All continuous variables are winsorized at 1% and 99%. All variables are defined in Appendix 1. The asterisks indicate a 1% (***), 5% (**), and 10% (*) level of significance.

with-female firms before and following the crisis. The average of *RET* in Panel B (before the financial crisis) for all-male firms is 14.7%, compared with an average of 11.5% for with-female firms. In line with prior findings (e.g., Ahern & Dittmar, 2012), the difference of 3.2% is statistically significant at the 10% level and indicates that all-male firms perform better on average. Panel C shows that the average of *RET* in the post-crisis period is −12.3% for all-male firms compared with an average of −8.1% for with-female firms. The difference of −4.2% is statistically significant at the 5% level and is consistent with the idea that the negative impact of the crisis on stock prices is weaker for companies with gender-diverse boards. The summary statistics of the remaining key variables suggest that, on average, both groups have similar cash flow from operations and stock price momentum. However, on average, with-female firms are larger, they rely more on debt, and they exhibit a lower volatility in their stock prices compared to all-male firms, which potentially reflects a higher level of risk taking among all-male firms. Moreover, on average, boards with female directors are bigger in size, more independent, and have a shorter tenure of directors. Finally, Panel D reports the Pearson correlation matrix of the main variables. The

**Table 5**
The moderating role of board gender diversity (H2).

| Discretionary Accruals | | | Information Asymmetry | | |
|---|---|---|---|---|---|
| | Model 5.1 | Model 5.2 | | Model 5.3 | Model 5.4 |
| | *ΔRET* | *ΔRET* | | *ΔRET* | *ΔRET* |
| *BGD_BLAU* | 0.0838 | | *BGD_BLAU* | 1.5838*** | |
| | (1.47) | | | (4.51) | |
| *BGD_DUM* | | 0.0196 | *BGD_DUM* | | 0.4676*** |
| | | (1.08) | | | (3.16) |
| *OPAC_DA* | −1.2855*** | −1.4397*** | *OPAC_IA* | −0.1486*** | −0.1669*** |
| | (−5.17) | (−5.08) | | (−5.34) | (−4.26) |
| *BGD_BLAU × OPAC_DA* | 2.7537** | | *BGD_BLAU × OPAC_IA* | 0.3847*** | |
| | (2.39) | | | (4.07) | |
| *BGD_DUM × OPAC_DA* | | 0.8633** | *BGD_DUM × OPAC_IA* | | 0.1166*** |
| | | (2.48) | | | (2.84) |
| *SIZE* | −0.0134*** | −0.0130*** | *SIZE* | −0.0161*** | −0.0158*** |
| | (−3.98) | (−3.87) | | (−4.50) | (−4.49) |
| *MTB* | −0.0001 | 0.0001 | *MTB* | −0.0013 | −0.0012 |
| | (−0.06) | (0.09) | | (−0.80) | (−0.75) |
| *BETA* | −0.1111*** | −0.1110*** | *BETA* | −0.0942*** | −0.0952*** |
| | (−9.56) | (−9.50) | | (−7.62) | (−7.69) |
| *MOMENT* | 0.0264* | 0.0259* | *MOMENT* | 0.0263* | 0.0254* |
| | (1.82) | (1.79) | | (1.80) | (1.74) |
| *BIG4* | 0.0766*** | 0.0855*** | *BIG4* | 0.0692*** | 0.0797*** |
| | (3.65) | (4.12) | | (3.35) | (3.94) |
| *BODSIZE* | 0.0036* | 0.003 | *BODSIZE* | 0.0025 | 0.0023 |
| | (1.75) | (1.46) | | (1.24) | (1.11) |
| *INDEP* | −0.0366 | −0.0255 | *INDEP* | −0.0322 | −0.0209 |
| | (−1.46) | (−1.01) | | (−1.28) | (−0.83) |
| *MEETINGS* | −0.0028 | −0.0001 | *MEETINGS* | −0.0029 | −0.0003 |
| | (−0.36) | (−0.01) | | (−0.37) | (−0.04) |
| *CEOFEM* | 0.0119 | 0.0266 | *CEOFEM* | 0.0191 | 0.0323 |
| | (0.36) | (0.81) | | (0.58) | (0.99) |
| *DUALITY* | 0.0203** | 0.0205** | *DUALITY* | 0.0213** | 0.0210** |
| | (2.39) | (2.41) | | (2.50) | (2.46) |
| *TENURE* | 0.0013 | 0.0017 | *TENURE* | 0.001 | 0.0014 |
| | (1.28) | (1.64) | | (1.00) | (1.36) |
| *Intercept* | −0.0583 | −0.0847* | *Intercept* | −0.6260*** | −0.7202*** |
| | (−1.33) | (−1.92) | | (−5.94) | (−4.91) |
| Industry FE | Included | Included | Industry FE | Included | Included |
| Adj. $R^2$ | 0.1016 | 0.1014 | Adj. $R^2$ | 0.0991 | 0.0973 |
| N | 3027 | 3027 | N | 3027 | 3027 |

Notes: This table reports the OLS difference-in-differences regression results which test the moderating role of board gender diversity *ex ante* on the association between firm opacity *ex ante* and the change in stock returns around the financial crisis. Models 5.1 and 5.2 use the accounting-based measure of firm opacity (*OPAC_DA*), while Models 5.3 and 5.4 use the market-based measure of firm opacity (*OPAC_IA*). The t-statistics in parentheses are calculated based on clustered standard errors at the firm level. All continuous variables are winsorized at 1% and 99%. All variables are defined in Appendix 1. The asterisks indicate a 1% (***), 5% (**), and 10% (*) level of significance.

correlation coefficients between both measures of opacity in financial reporting and board gender diversity are negative and significant at the 1% level, a finding that is in line with our expectations and prior literature (Srinidhi et al., 2011). Consistent with Hutton et al. (2009), we also find that both measures of opacity in financial reporting yield a positive and significant association with stock returns. The correlation coefficients are broadly under 0.50, indicating that multicollinearity is not a serious concern.[8]

### 4.2. Effect of board gender diversity on firm opacity

In Table 3, we start our analysis by estimating Equation (1) to validate prior research findings on the negative effect board gender diversity has on firm opacity. As mentioned earlier, we examine the pre-crisis period to isolate the effect of the potential confounding impact of the crisis on measures of firm opacity and, accordingly, to better identify the effect of board gender diversity on firm opacity.

[8] Untabulated variance inflation factors (VIFs) are consistently below 3, further suggesting that multicollinearity is not present in the data (Greene, 2012).

The dependent variable in Models 3.1 and 3.2 is firm opacity, as measured by discretionary accruals (*OPAC_DA*), while the dependent variable in Models 3.3 and 3.4 is firm opacity as measured by the bid-ask spread (*OPAC_IA*).

As for the main variables of interest, Model 3.1 includes the Blau measure of board gender diversity (*BGD_BLAU*) and shows a negative and highly significant impact for board gender diversity on the level of discretionary accruals reported by the firm. Similarly, Model 3.2 uses the indicator variable measure of board gender diversity (*BGD_DUM*) and documents a negative and significant association with firm opacity. These findings suggest that the existence of female directors on the board has a significant impact on the financial reporting practices followed by the firm (Francis et al., 2015; Garcia Lara et al., 2017). In fact, these results are more pronounced when using the market-based measure of firm opacity (*OPAC_IA*) in Models 3.3 and 3.4. Overall, our results are consistent with the notion that market participants welcome higher financial reporting quality, and this is reflected in stock prices.

Regarding the control variables, the economic and statistical significance of the estimated coefficients is in line with prior research. For example, in Models 3.1 and 3.2 we show that firms with higher growth opportunities tend to have higher discretionary accruals, as indicated by the positive and significant coefficients of *MTB*. This positive relation can be attributed to the fact that firms with higher

**Table 6**
Critical mass theory and the moderating role of board gender diversity.

| | Discretionary Accruals | Information Asymmetry |
|---|---|---|
| | Model 6.1 | Model 6.2 |
| | *ΔRET* | *ΔRET* |
| *CMASS* | −0.0062 | 0.4298*** |
| | (−0.37) | (3.91) |
| *OPAC_DA* | −1.4121*** | |
| | (−7.07) | |
| *CMASS* × *OPAC_DA* | 0.7161** | |
| | (1.98) | |
| *OPAC_IA* | | −0.1198*** |
| | | (−5.90) |
| *CMASS* × *OPAC_IA* | | 0.1100*** |
| | | (3.86) |
| *SIZE* | −0.0083** | −0.0120*** |
| | (−2.41) | (−3.29) |
| *MTB* | −0.0002 | −0.0022 |
| | (−0.11) | (−1.38) |
| *BETA* | −0.0989*** | −0.0828*** |
| | (−7.83) | (−6.09) |
| *MOMENT* | 0.02 | 0.0192 |
| | (1.40) | (1.32) |
| *BIG4* | 0.0888*** | 0.0825*** |
| | (4.10) | (3.82) |
| *BODSIZE* | 0.0059*** | 0.0043** |
| | (2.90) | (2.09) |
| *INDEP* | −0.0462* | −0.0358 |
| | (−1.81) | (−1.40) |
| *MEETINGS* | 0.0009 | −0.0004 |
| | (0.11) | (−0.05) |
| *CEOFEM* | 0.0364 | 0.0454 |
| | (1.13) | (1.44) |
| *DUALITY* | 0.0235*** | 0.0253*** |
| | (2.83) | (3.01) |
| *TENURE* | 0.0006 | 0.0004 |
| | (0.60) | (0.44) |
| Intercept | 0.0353 | −0.4314*** |
| | (0.49) | (−4.17) |
| Industry FE | Included | Included |
| Adj. $R^2$ | 0.138 | 0.1288 |
| N | 3027 | 3027 |

Notes: This table reports the OLS difference-in-differences regression results which test the moderating role of board gender diversity *ex ante* on the association between firm opacity *ex ante* and the change in stock returns around the financial crisis. Model 6.1 uses the accounting-based measure of firm opacity (*OPAC_DA*), while Model 6.2 uses the market-based measure of firm opacity (*OPAC_IA*). The measure of board gender diversity is *CMASS*, which is an indicator variable that takes the value 1 if the percentage of female directors exceeds 20% of the total number of directors on the board, and 0 otherwise. The t-statistics in parentheses are calculated based on clustered standard errors at the firm level. All continuous variables are winsorized at 1% and 99%. All variables are defined in Appendix 1. The asterisks indicate a 1% (***), 5% (**), and 10% (*) level of significance.

growth opportunities typically have higher incentives to show better performance by inflating earnings (Kasznik, 1999). Further, bigger firms and firms that pay dividends tend to report lower discretionary accruals. Moving to Models 3.3 and 3.4, in which the dependent variable is a measure of information asymmetry, the coefficients of *BODSIZE* and *SIZE* indicate that bigger firms have lower levels of information asymmetry, while the coefficient of *VOLAT* suggests that stock return volatility is positively related to firms' bid-ask spread.

### 4.3. Effect of firm opacity on stock returns

In this Section, we first estimate Equation (2) to examine the effect of firm opacity in financial reporting prior to the crisis on stock returns following the crisis. In doing so, we use both measures of firm opacity in financial reporting as presented in Models 4.1 and 4.2 of Table 4. The results reported in Model 4.1 suggest that the coefficient of *OPAC_DA* is positive and significant at the 5% level, meaning that, prior to the financial crisis (*POST* = 0), firm opacity in financial reporting is positively related to stock returns. Thus, we find that managerial manipulation of earnings to disseminate a positive impression to market participants is positively linked to stock returns during the period before the global financial crisis. As for the effect of the financial crisis on stock returns, in line with our expectations, the coefficient of *POST* is negative and highly statistically significant, indicating a substantial decline in stock returns following the financial crisis. More interestingly, the estimated coefficient of the interaction term *OPAC_DA* × *POST* (−0.6725) is negative and significant at the 5% level (t-statistic = −1.99). The fact that the magnitude of the coefficient of the interaction term is greater, in absolute value, than that of *OPAC_DA* suggests that the level of discretionary accruals prior to the financial crisis is negatively associated with stock returns following the financial crisis. Similarly, in Model 4.2, we find that the coefficient of the interaction term *OPAC_IA* × *POST* (−0.08) is negative and significant at the 5% level (t-statistic = −2.13), indicating a greater deterioration in stock returns following the financial crisis when the degree of information asymmetry is higher prior to the crisis. Overall, the regression results in Models 4.1 and 4.2 of Table 4 are in line with hypothesis H1a.

### 4.4. Effect of board gender diversity on stock returns

Our previously reported findings provide evidence that firm opacity prior to the financial crisis is associated with a significant deterioration in stock returns following the financial crisis. In this Section, we estimate Equation (3) to test whether the participation of female directors on the board before the crisis mitigates the decline in stock returns following the crisis. The regressions in Models 4.3 and 4.4 of Table 4 are similar to the ones reported in Models 4.1 and 4.2; however, the measures of firm opacity are replaced with the measures of board gender diversity. The coefficients of *BGD_BLAU* and *BGD_DUM* in Models 4.3 and 4.4 respectively are statistically insignificant, which indicates that board gender diversity has no significant effect on stock returns in the period before the financial crisis. Consistent with our findings above, the coefficient of *POST* is negative and significant across both Models 4.3 and 4.4, meaning that firms experience a significant decline in their returns following the financial crisis. Still, our main interest lies in the interaction terms *BGD_BLAU* × *POST* and *BGD_DUM* × *POST*. The results in Model 4.3 show that the coefficient of *BGD_BLAU* × *POST* is positive and significant at the 5% level (coefficient = 0.1588; t-statistic = 2.45), suggesting that board gender diversity prior to the financial crisis is associated with lower negative returns following the financial crisis. In other words, given that the coefficient of *POST* is negative and significant, while that of *BGD_BLAU* × *POST* is positive and significant, we can infer that *BGD_BLAU* mitigates the negative impact of *POST* on *RET*. The results in Model 4.4 are more pronounced; in particular, the coefficient of *POST* is −0.1399 and is significant at the 1% level, which indicates a reduction in the average stock return by approximately 14% following the financial crisis. However, the coefficient of *BGD_DUM* × *POST* is positive and significant at the 1% level (coefficient = 0.0721; t-statistic = 3.72), suggesting that with-female firms witness, on average, just under half of the decline in stock returns experienced by all-male firms. Overall, our findings in Models 4.3 and 4.4 of Table 4 provide evidence that firms with gender-diverse boards prior to the financial crisis exhibit a lesser decline in stock returns following the financial crisis compared with firms with all-male boards.

### 4.5. Moderating role of board gender diversity

In Table 5, we estimate Equation (4) to examine whether board gender diversity plays a moderating role in the relation between firm opacity in financial reporting and the change in stock returns following the financial crisis. As mentioned in Section 3.3, the dependent variable across all models in Table 5 is the *change* in stock returns following the financial crisis (*ΔRET*), thus capturing the effect of the crisis. The coefficients of board gender diversity (*BGD_BLAU* and *BGD_DUM*) broadly indicate a positive and significant association with the change in stock returns around the financial crisis. Moreover, the coefficients of the measures of firm opacity in financial reporting (*OPAC_DA* and *OPAC_IA*) are negative and significant at the 1% level across all regression models in Table 5. This finding is in line with the view that companies with higher opacity in financial reporting are more prone to stock price crash during the financial crisis. More importantly, Models 5.1 and 5.2 respectively demonstrate that the coefficients of the interaction terms *BGD_BLAU* × *OPAC_DA* and *BGD_DUM* × *OPAC_DA* are significantly positive. Therefore, we conclude that board gender diversity moderates the negative effect of firm opacity in financial reporting, as measured by discretionary accruals, on the change in stock returns around the financial crisis. Similarly, when measuring firm opacity using a proxy for information asymmetry in Models 5.3 and 5.4, we provide evidence consistent with board gender diversity playing a moderating role on the negative relation between firm opacity and stock price crash during the financial crisis, as inferred by the positive and significant coefficients on *BGD_BLAU* × *OPAC_IA* and *BGD_DUM* × *OPAC_IA*. Overall, our results in Table 5 suggest that the participation of female directors on corporate boards is linked to higher transparency in financial reporting, which in turn ameliorates the negative impact of firm opacity prior to the

**Table 7**
Matched regressions.

| Panel A: Propensity Score Matching | | | | | |
|---|---|---|---|---|---|
| Discretionary Accruals | | | Information Asymmetry | | |
| | Model 7.1a | Model 7.2a | | Model 7.3a | Model 7.4a |
| | *ΔRET* | *ΔRET* | | *ΔRET* | *ΔRET* |
| *BGD_BLAU* | 0.0569 | | *BGD_BLAU* | 1.7836*** | |
| | (0.93) | | | (4.49) | |
| *BGD_DUM* | | 0.0227 | *BGD_DUM* | | 0.4379*** |
| | | (1.21) | | | (2.92) |
| *OPAC_DA* | −1.4433*** | −1.4841*** | *OPAC_IA* | −0.1581*** | −0.1586*** |
| | (−5.76) | (−5.17) | | (−5.38) | (−4.07) |
| *BGD_BLAU* × *OPAC_DA* | 2.9006** | | *BGD_BLAU* × *OPAC_IA* | 0.4491*** | |
| | (2.34) | | | (4.17) | |
| *BGD_DUM* × *OPAC_DA* | | 0.7365** | *BGD_DUM* × *OPAC_IA* | | 0.1088*** |
| | | (2.01) | | | (2.63) |
| Control Variables | Included | Included | Control Variables | Included | Included |
| Industry FE | Included | Included | Industry FE | Included | Included |
| Adj. R2 | 0.0764 | 0.0767 | Adj. R2 | 0.0704 | 0.0689 |
| N | 2773 | 2773 | N | 2773 | 2773 |
| **Panel B: Coarsened Exact Matching** | | | | | |
| Discretionary Accruals | | | Information Asymmetry | | |
| | Model 7.1b | Model 7.2b | | Model 7.3b | Model 7.4b |
| | *ΔRET* | *ΔRET* | | *ΔRET* | *ΔRET* |
| *BGD_BLAU* | 0.1292 | | *BGD_BLAU* | 2.2604*** | |
| | (1.55) | | | (3.71) | |
| *BGD_DUM* | | 0.0036 | *BGD_DUM* | | 0.3874** |
| | | (0.15) | | | (1.98) |
| *OPAC_DA* | −1.6889*** | −1.9475*** | *OPAC_IA* | −0.2582*** | −0.2341*** |
| | (−5.09) | (−5.60) | | (−6.11) | (−4.92) |
| *BGD_BLAU* × *OPAC_DA* | 3.4895** | | *BGD_BLAU* × *OPAC_IA* | 0.5635*** | |
| | (2.04) | | | (3.32) | |
| *BGD_DUM* × *OPAC_DA* | | 1.2335** | *BGD_DUM* × *OPAC_IA* | | 0.0958* |
| | | (2.53) | | | (1.76) |
| Control Variables | Included | Included | Control Variables | Included | Included |
| Industry FE | Included | Included | Industry FE | Included | Included |
| Adj. $R^2$ | 0.126 | 0.1199 | Adj. $R^2$ | 0.1323 | 0.1199 |
| N | 1457 | 1457 | N | 1457 | 1457 |

Notes: Panel A replicates the results of regression analyses that test hypothesis H2 based on a matched sample using Propensity Score Matching (PSM). Panel B replicates the results of regression analyses that test hypothesis H2 based on a matched sample using Coarsened Exact Matching (CEM). The t-statistics in parentheses are calculated based on clustered standard errors at the firm level. All continuous variables are winsorized at 1% and 99%. All variables are defined in Appendix 1. The asterisks indicate a 1% (***), 5% (**), and 10% (*) level of significance.

crisis on stock returns during the crisis.

Lastly, as for the coefficients of the control variables, our findings in Table 5 indicate that larger firms (*SIZE*) and ones that are highly affected by the market performance (*BETA*) witness a greater decline in stock returns in the post-crisis period. However, firms that have higher momentum (*MOMENT*) are likely to experience a softer decline in stock returns. Interestingly, the positive and significant coefficient of *BIG4* suggests that audit quality is positively associated with *ΔRET*, a finding that is in line with our supposition that companies with a higher quality of financial reporting pre-crisis are likely to witness a better stock performance during the crisis.

### *4.6. Robustness tests*

In this Section, we perform a set a robustness tests to examine whether our findings are indeed aligned with the theory and whether our primary results are immune to potential endogeneity concerns. Our first robustness test examines the validity of Kanter's (1977a) critical mass theory in the context of this study. Specifically, we first create the indicator variable *CMASS* that takes the value 1 if the

**Table 8**
Using alternative proxy variables to measure firm performance and gender diversity.

| Panel A: Using return on assets to measure firm performance | | | | | |
|---|---|---|---|---|---|
| Discretionary Accruals | | | Information Asymmetry | | |
| | Model 8.1a | Model 8.2a | | Model 8.3a | Model 8.4a |
| | *ΔROA* | *ΔROA* | | *ΔROA* | *ΔROA* |
| *BGD_BLAU* | 0.0061 | | *BGD_BLAU* | 0.5554*** | |
| | (0.37) | | | (5.07) | |
| *BGD_DUM* | | 0.0091* | *BGD_DUM* | | 0.2375*** |
| | | (1.83) | | | (5.15) |
| *OPAC_DA* | −0.0636 | −0.0288 | *OPAC_IA* | −0.0254*** | −0.0480*** |
| | (−0.75) | (−0.37) | | (−3.31) | (−3.96) |
| *BGD_BLAU* × *OPAC_DA* | 1.1441*** | | *BGD_BLAU* × *OPAC_IA* | 0.1395*** | |
| | (3.06) | | | (4.79) | |
| *BGD_DUM* × *OPAC_DA* | | 0.2149** | *BGD_DUM* × *OPAC_IA* | | 0.0620*** |
| | | (2.26) | | | (4.85) |
| Control Variables | Included | Included | Control Variables | Included | Included |
| Industry FE | Included | Included | Industry FE | Included | Included |
| Adj. $R^2$ | 0.0928 | 0.0936 | Adj. $R^2$ | 0.0937 | 0.0991 |
| N | 3027 | 3027 | N | 3027 | 3027 |
| **Panel B: Using the percentage of female members on the audit committee to measure gender diversity** | | | | | |
| Discretionary Accruals | | | Information Asymmetry | | |
| | Model 8.1b | Model 8.2b | | Model 8.3b | Model 8.4b |
| | *ΔRET* | *ΔRET* | | *ΔRET* | *ΔRET* |
| *ACGD_BLAU* | −0.055 | | *ACGD_BLAU* | 0.6860*** | |
| | (−1.33) | | | (2.95) | |
| *ACGD_DUM* | | −0.0006 | *ACGD_DUM* | | 0.2299*** |
| | | (−0.04) | | | (2.76) |
| *OPAC_DA* | −1.3180*** | −1.2845*** | *OPAC_IA* | −0.1149*** | −0.1086*** |
| | (−5.96) | (−5.82) | | (−5.04) | (−4.73) |
| *ACGD_BLAU* × *OPAC_DA* | 2.8737*** | | *ACGD_BLAU* × *OPAC_IA* | 0.1737*** | |
| | (2.93) | | | (2.84) | |
| *ACGD_DUM* × *OPAC_DA* | | 0.9187*** | *ACGD_DUM* × *OPAC_IA* | | 0.0541** |
| | | (2.77) | | | (2.47) |
| Control Variables | Included | Included | Control Variables | Included | Included |
| Industry FE | Included | Included | Industry FE | Included | Included |
| Adj. $R^2$ | 0.0927 | 0.0981 | Adj. $R^2$ | 0.0863 | 0.0915 |
| N | 3027 | 3027 | N | 3027 | 3027 |

Notes: Panel A reports the OLS difference-in-differences regression results which test the moderating role of board gender diversity *ex ante* on the association between firm opacity *ex ante* and the change in return on assets (instead of the change in stock returns) around the financial crisis. Panel B reports the OLS difference-in-differences regression results which test the moderating role of audit committee gender diversity (instead of board gender diversity) *ex ante* on the association between firm opacity *ex ante* and the change in stock returns around the financial crisis. The t-statistics in parentheses are calculated based on clustered standard errors at the firm level. All continuous variables are winsorized at 1% and 99%. All variables are defined in Appendix 1. The asterisks indicate a 1% (***), 5% (**), and 10% (*) level of significance.

percentage of female directors on board is equal to, or greater than, 20% and 0 otherwise. Consequently, in Table 6, we replicate our main findings in Table 5 on the moderating role of female directors using *CMASS* as the measure of board gender diversity. According to Models 6.1 and 6.2 of Table 6, the coefficients of *OPAC_DA* and *OPAC_IA* respectively are significantly negative, which indicates a greater decline in stock returns during the financial crisis for companies with higher opacity in financial reporting in the period prior to the crisis. More importantly, the coefficients of the interaction terms *CMASS* × *OPAC_DA* and *CMASS* × *OPAC_IA* in Models 6.1 and 6.2 respectively are positive and significant, indicating that firms with gender-diverse boards exceeding the 20% threshold witness a softer decrease in their stock returns during the financial crisis. Therefore, the findings in Table 6 are in line with Kanter's (1977a) critical

mass theory and extant research (e.g., Strydom et al., 2017), which proposes that female directors allocate more resources to monitoring and enhancing earnings quality when their proportion on the board exceeds token status (i.e., when female directors achieve a critical mass of at least 20%).[9] This finding is in line with recent research on the relation between board gender diversity and firm outcomes (Joecks et al., 2013; Strydom et al., 2017; Torchia et al., 2011).

To mitigate potential concerns relating to bias from observable characteristics, we conduct a matched sample analysis using (i) propensity score matching (PSM), and (ii) coarsened-exact matching (CEM). In Table 7 Panel A, we create groups of firms according to whether they have non-gender-diverse boards (*BGD_DUM* = 0) or have at least one female director serving on the board (*BGD_DUM* = 1). Using PSM, we identify a set of firm-year observations of firms that have gender-diverse boards (i.e., treatment group) but are similar across several dimensions to firm-year observations of firms with non-gender-diverse boards (i.e., control group). More specifically, we first employ a probit model in which the dependent variable is *BGD_DUM* (untabulated). Following Shipman et al. (2017), the regressors include all variables from the second-stage regression where *ΔRET* is the dependent variable, that is: *SIZE*, *MTB*, *BETA*, *MOMENT*, *BIG4*, *BODSIZE, INDEP, MEETINGS, CEOFEM, DUALITY, TENURE* and industry fixed effects. We estimate the propensity scores based on the above characteristics and use a nearest neighbor matching approach with common support and a caliper constraint of 1%. Specifically, we match (without replacement) each firm from the *BGD_DUM* = 1 group with another firm in the same industry from the *BGD_DUM* = 0 group that has the closest propensity score within a maximum distance of 1%. Our findings show that the means of the covariates across the two groups are not significantly different (untabulated), suggesting that PSM successfully corrects for bias from observable characteristics. Furthermore, in Table 7 Panel A, we re-estimate Equation (4) and replicate all models reported in Table 5 using the matched sample. We provide evidence that our findings remain unchanged.

Table 7 Panel B reports results from Coarsened Exact Matching (CEM), which can overcome the limitations of PSM (DeFond, Erkens, & Zhang, 2017; Iacus, King, & Porro, 2012). More specifically, CEM relies on coarsening each observed variable into substantively meaningful groups and matching firms on the coarsened range (or strata) of covariates, rather than on propensity score values. As a result, CEM considers higher moments of the distributions of the covariates without relying on the functional form and discriminative ability of a first-stage PSM model, such as a logit or probit model (DeFond et al., 2017). In Table 7 Panel B, we employ a matched sample obtained through CEM, where the first stage of CEM (untabulated) matched treated (*BGD_DUM* = 1) to control (*BGD_DUM* = 0) firm-year observations on the following variables: *SIZE*, *MTB*, *BETA*, *MOMENT*, *BIG4*, *BODSIZE, INDEP, MEETINGS, CEOFEM, DUALITY* and *TENURE*. Using the Sturges algorithm (Sturges, 1926), we estimate the bin size for coarsening these variables. In the second stage reported in Table 7 Panel B, we show that our results support and strengthen our main inferences.

In Table 8, we use alternative proxies to measure firm performance and gender diversity, and we replicate our main results. First, we re-estimate Equation (4), but this time we replace the dependent variable *ΔRET* (i.e., the change in *RET* following the financial crisis) with *ΔROA* (i.e., the change in *ROA* following the financial crisis). The potentially endogenous nature of the relationship between board gender diversity and stock market performance provides the intuition behind the use of *ΔROA* instead of *ΔRET* as the dependent variable (Bhagat & Bolton, 2008). More specifically, Bhagat and Bolton (2008) investigate the relationship between corporate governance and firm performance and argue that, "*While previous studies have used both stock market based and accounting measures of performance, we primarily rely on accounting performance measures. Stock market based performance measures are susceptible to investor anticipation.*" (p. 264). We thus use an accounting measure of performance (*ΔROA*) instead of a stock-market based measure of performance (*ΔRET*) in an attempt to mitigate the above concern. We present the regression results in Table 8 Panel A and find that our inferences remain the same.[10] This outcome is consistent with the main conclusion presented in the paper, namely that board gender diversity is associated with increased transparency in financial reporting, which pays off in times of crisis.

Second, in Table 8 Panel B, we consider the gender composition of the audit committee and examine whether audit committee gender diversity influences the association between firm opacity in financial reporting and stock returns around the financial crisis. Similar to our measures for board gender diversity (*BGD_DUM* and *BGD_BLAU*), we use two measures for the gender composition of the audit committee. Specifically, we define: *ACGD_DUM* as an indicator variable that takes the value 1 if any of the firm's audit committee members is a woman in 2005 and 2006, and 0 otherwise; and *ACGD_BLAU* as the average of the firm's Blau index of audit committee diversity in 2005 and 2006.[11] The regressions in Table 8 Panel B are similar to the ones reported in Table 5 of the paper but replace the measures of board gender diversity (*BGD_DUM* and *BGD_BLAU*), with the measures of audit committee gender diversity (*ACGD_DUM* and *ACGD_BLAU*). In line with our findings in Table 5, our regression results in Table 8 Panel B suggest that the participation of women on the audit committee ameliorates the negative impact of firm opacity prior to the crisis on stock returns during the crisis. This finding is consistent with Green and Homroy (2018), who provide evidence that the gender composition of board committees, including the audit committee, affects corporate outcomes.

[9] Our conclusions remain unchanged when using a threshold of 30%; however, the variation in *CMASS* becomes significantly lower when using the 30% threshold (mean value of *CMASS* = 0.043) instead of the 20% threshold (mean value of *CMASS* = 0.198).

[10] In untabulated analyses, we also find that our inferences remain unchanged when using *ROA* instead of *RET* as the dependent variable in Models 4.1–4.4, as presented in Table 4.

[11] The Blau index of audit committee diversity is calculated as $1 - [(AUDFEM\%)^2 + (1 - AUDFEM\%)^2]$, where *AUDFEM%* is the percentage of female directors on the audit committee.

**Table 9**
Instrumental variable 2SLS regressions (H2).

| First Stage | | | Second Stage | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Discretionary Accruals | | | Information Asymmetry | | |
| | Model 9.1 | Model 9.2 | | Model 9.3 | Model 9.4 | | Model 9.5 | Model 9.6 |
| | *BGD_BLAU* | *BGD_DUM* | | *ΔRET* | *ΔRET* | | *ΔRET* | *ΔRET* |
| *MALEFRAC_IV* | 0.1023*** | 0.2975*** | *BGD_BLAU* | −0.0013 | | *BGD_BLAU* | 1.5696*** | |
| | (9.39) | (8.08) | | (−0.02) | | | (4.25) | |
| *OPAC_DA* | −0.0851 | −0.3598 | *BGD_DUM* | | 0.0028 | *BGD_DUM* | | 0.4685*** |
| | (−1.06) | (−1.33) | | | (0.14) | | | (3.02) |
| *OPAC_IA* | −0.0436*** | −0.1332*** | *OPAC_DA* | 0.1931 | 0.8439 | *OPAC_IA* | −0.0317 | 0.0857 |
| | (−4.64) | (−4.20) | | (0.32) | (0.97) | | (−0.51) | (0.79) |
| *SIZE* | 0.0062*** | 0.0257*** | *BGD_BLAU×OPAC_DA* | 3.9464*** | | *BGD_BLAU×OPAC_IA* | 0.3907*** | |
| | (3.18) | (3.90) | | (3.08) | | | (3.96) | |
| *MTB* | 0.0039*** | 0.0057** | *BGD_DUM×OPAC_DA* | | 1.1103*** | *BGD_DUM×OPAC_IA* | | 0.1184*** |
| | (4.80) | (2.07) | | | (2.89) | | | (2.77) |
| *BETA* | −0.0284*** | −0.0948*** | *SIZE* | −0.0163*** | −0.0175*** | *SIZE* | −0.0184*** | −0.0198*** |
| | (−4.81) | (−4.75) | | (−3.79) | (−4.04) | | (−4.31) | (−4.41) |
| *MOMENT* | −0.0017 | −0.0075 | *MTB* | 0.0008 | 0.0019 | *MTB* | −0.0018 | −0.0015 |
| | (−0.26) | (−0.35) | | (0.43) | (1.18) | | (−0.95) | (−0.89) |
| *BIG4* | 0.0469*** | 0.0727** | *BETA* | −0.1042*** | −0.1028*** | *BETA* | −0.0989*** | −0.0960*** |
| | (4.70) | (2.15) | | (−7.68) | (−7.33) | | (−7.21) | (−6.90) |
| *BODSIZE* | 0.0098*** | 0.0440*** | *MOMENT* | 0.0206 | 0.0217 | *MOMENT* | 0.023 | 0.0228 |
| | (8.89) | (11.77) | | (1.41) | (1.49) | | (1.54) | (1.54) |
| *INDEP* | −0.0241* | −0.2779*** | *BIG4* | 0.0803*** | 0.0740*** | *BIG4* | 0.0842*** | 0.0875*** |
| | (−1.85) | (−6.29) | | (3.57) | (3.37) | | (3.69) | (4.20) |
| *MEETINGS* | 0.0046 | −0.0362** | *BODSIZE* | 0.0017 | 0.0006 | *BODSIZE* | 0.0007 | −0.0022 |
| | (1.05) | (−2.46) | | (0.59) | (0.18) | | (0.24) | (−0.54) |
| *CEOFEM* | 0.1668*** | 0.2674*** | *INDEP* | −0.023 | −0.0059 | *INDEP* | −0.0193 | 0.0072 |
| | (12.22) | (5.79) | | (−0.92) | (−0.20) | | (−0.77) | (0.24) |
| *DUALITY* | −0.0031 | −0.0098 | *MEETINGS* | 0.0011 | 0.0051 | *MEETINGS* | 0.0007 | 0.0047 |
| | (−0.72) | (−0.68) | | (0.13) | (0.59) | | (0.09) | (0.56) |
| *TENURE* | −0.0028*** | −0.0164*** | *CEOFEM* | −0.0131 | 0.0102 | *CEOFEM* | −0.0077 | 0.0115 |
| | (−4.97) | (−8.74) | | (−0.29) | (0.28) | | (−0.17) | (0.31) |
| | | | *DUALITY* | 0.0226*** | 0.0219*** | *DUALITY* | 0.0244*** | 0.0235*** |
| | | | | (2.67) | (2.58) | | (2.86) | (2.75) |
| | | | *TENURE* | 0.0014 | 0.0017 | *TENURE* | 0.0017 | 0.0030* |
| | | | | (1.13) | (1.18) | | (1.32) | (1.74) |
| *Intercept* | −0.1415*** | 0.0434 | *Intercept* | −0.1217** | −0.1693*** | *Intercept* | −0.217 | 0.1511 |
| | (−3.71) | (0.34) | | (−2.42) | (−2.98) | | (−0.96) | (0.39) |
| Industry FE | Included | Included | Industry FE | Included | Included | Industry FE | Included | Included |
| N | 3,027 | 3,027 | N | 3,027 | 3,027 | N | 3,027 | 3,027 |

Notes: This table reports 2SLS instrumental variable regressions. The instrument used (*MALEFRAC_IV*) is the fraction of male directors on the board who sit on other with-female boards. In the first stage (Models 9.1 and 9.2), we regress the endogenous variables (*BGD_BLAU* and *BGD_DUM*) on the instrument used (*MALEFRAC_IV*). In the second stage (Models 9.3–9.6), we use the fitted values from the first stage to instrument the endogenous variables. The t-statistics or z-statistics in parentheses are calculated based on clustered standard errors at the firm level. All continuous variables are winsorized at 1% and 99%. All variables are defined in Appendix 1. The asterisks indicate a 1% (***), 5% (**), and 10% (*) level of significance.

**Table 10**
Placebo tests.

Panel A: Computing the difference in stock returns around 2006 (instead of 2007)

| Discretionary Accruals | | | Information Asymmetry | | |
|---|---|---|---|---|---|
| | Model 10.1a | Model 10.2a | | Model 10.3a | Model 10.4a |
| | *ΔRET '2006'* | *ΔRET '2006'* | | *ΔRET '2006'* | *ΔRET '2006'* |
| *BGD_BLAU* | 0.3645** | | *BGD_BLAU* | 1.2207 | |
| | (2.22) | | | (0.98) | |
| *BGD_DUM* | | 0.0912* | *BGD_DUM* | | 0.2981 |
| | | (1.76) | | | (0.62) |
| *OPAC_DA* | −0.9431 | −1.3357 | *OPAC_IA* | −0.2159** | −0.2032* |
| | (−1.30) | (−1.58) | | (−2.39) | (−1.66) |
| *BGD_BLAU × OPAC_DA* | −2.2057 | | *BGD_BLAU × OPAC_IA* | 0.2652 | |
| | (−0.60) | | | (0.81) | |
| *BGD_DUM × OPAC_DA* | | 0.1000 | *BGD_DUM × OPAC_IA* | | 0.059 |
| | | (0.10) | | | (0.45) |
| Control Variables | Included | Included | Control Variables | Included | Included |
| Industry FE | Included | Included | Industry FE | Included | Included |
| Adj. $R^2$ | 0.0593 | 0.0623 | Adj. $R^2$ | 0.0614 | 0.0636 |
| N | 3027 | 3027 | N | 3027 | 3027 |

**Panel B: Using alternative dependent variables**

| | Cash | | Leverage | | Book Value of Equity | |
|---|---|---|---|---|---|---|
| | Model 10.1b | Model 10.2b | Model 10.3b | Model 10.4b | Model 10.5b | Model 10.6b |
| | *ΔCASH* | *ΔCASH* | *ΔLEV* | *ΔLEV* | *ΔBVE* | *ΔBVE* |
| *BGD_DUM* | −0.0022 | −0.0093 | 0.0146 | 0.057 | −0.0165 | −0.2599* |
| | (−0.19) | (−0.11) | (1.16) | (0.50) | (−1.02) | (−1.78) |
| *OPAC_DA* | 0.2429 | | 0.1773 | | 0.0244 | |
| | (0.97) | | (0.89) | | (0.08) | |
| *OPAC_IA* | | 0.0258 | | −0.035 | | 0.0969** |
| | | (1.24) | | (−1.18) | | (2.44) |
| *BGD_DUM × OPAC_DA* | −0.2218 | | −0.0454 | | −0.1183 | |
| | (−0.77) | | (−0.18) | | (−0.34) | |
| *BGD_DUM × OPAC_IA* | | 0.0002 | | 0.013 | | −0.068 |
| | | (0.01) | | (0.40) | | (−1.64) |
| Control Variables | Included | Included | Included | Included | Included | Included |
| Industry FE | Included | Included | Included | Included | Included | Included |
| Adj. $R^2$ | 0.0207 | 0.0251 | 0.0501 | 0.0522 | 0.0433 | 0.0561 |
| N | 3027 | 3027 | 3027 | 3027 | 3027 | 3027 |

**Panel C: Using all non-S&P 1500 firms as an alternative treatment group**

| Discretionary Accruals | | Information Asymmetry | |
|---|---|---|---|
| | Model 10.1c | | Model 10.2c |
| | *ΔRET* | | *ΔRET* |
| *NONSP1500* | −0.0632*** | *NONSP1500* | −0.1601 |
| | (−3.35) | | (−1.02) |
| *OPAC_DA* | −1.1329*** | *OPAC_IA* | −0.0983** |
| | (−3.81) | | (−2.38) |
| *NONSP1500 × OPAC_DA* | 0.2597 | *NONSP1500 × OPAC_IA* | −0.0347 |
| | (0.82) | | (−0.79) |
| *Intercept* | −0.2101*** | *Intercept* | −0.6025*** |
| | (−13.81) | | (−4.07) |
| Control Variables | *SIZE, MTB, BETA, MOMENT, BIG4* | Control Variables | *SIZE, MTB, BETA, MOMENT, BIG4* |
| Industry FE | Included | Industry FE | Included |

(*continued on next page*)

**Table 10** (*continued*)

| **Panel C: Using all non-S&P 1500 firms as an alternative treatment group** | | | |
|---|---|---|---|
| Discretionary Accruals | | Information Asymmetry | |
| | Model 10.1c | | Model 10.2c |
| | *ΔRET* | | *ΔRET* |
| Adj. $R^2$ | 0.055 | Adj. $R^2$ | 0.049 |
| N | 5040 | N | 5040 |

Notes: Panel A replicates the results of regression analyses that test hypothesis H2 while computing the difference in stock returns around a placebo crisis year (2006) instead of the actual crisis year (2007). Panel B replicates the results of regression analyses that test hypothesis H2 while replacing the outcome variable in Equation (4), *ΔRET*, with a placebo dependent variable, i.e., *ΔCASH*, *ΔLEV*, or *ΔBVE*. We define *ΔCASH* as the average total cash scaled by total assets in 2007 and 2008 minus the average total cash scaled by total assets in 2005 and 2006; *ΔLEV* is defined as the average total liabilities scaled by total assets in 2007 and 2008 minus the average total liabilities scaled by total assets in 2005 and 2006; and *ΔBVE* is defined as the average book value of equity scaled by total assets in 2007 and 2008 minus the average book value of equity scaled by total assets in 2005 and 2006. Panel C replicates the results of regression analyses that test hypothesis H2 while using all non-S&P 1500 firms as a placebo treatment group (instead of using with-female S&P 1500 firms), while keeping the existing control group (i.e., all-male S&P 1500 firms). The t-statistics in parentheses are calculated based on clustered standard errors at the firm level. All continuous variables are winsorized at 1% and 99%. All variables are defined in Appendix 1. The asterisks indicate a 1% (***), 5% (**), and 10% (*) level of significance.

As we have highlighted above, it is plausible that the relation between board gender diversity and stock returns is endogenous. In other words, it is possible that omitted variables that influence both female board representation and firms' stock returns could lead to a spurious correlation between the two. For example, stock returns are susceptible to investor anticipation, as investors may anticipate the board gender diversity effect on stock-market based performance (Bhagat & Bolton, 2008).[12] In addition, firm performance is likely to influence firms' incentives to hire female directors as well as female directors' incentives to join firms, leading to reverse causality concerns (Adams & Ferreira, 2009). To address potential endogeneity concerns arising from omitted variable bias and reverse causality, we conduct a two-stage least squares (2SLS) regression analysis. Specifically, we follow Adams and Ferreira (2009) who instrument board gender diversity using the fraction of male directors on the board who sit on other with-female boards (*MALEFRAC_IV*). Similar to Adams and Ferreira (2009), we conjecture that the greater this fraction is, the greater the board's gender diversity should be.[13] Consequently, the instrument we employ is plausibly correlated with female board representation; we test the assumption of *instrument relevance* below. Importantly, consistent with Adams and Ferreira (2009), we further argue that the above instrument has no partial effect on firms' stock return performance except through board gender diversity and control variables included in the regression (*instrument exogeneity*).[14] Table 9 first presents the results from regressing the endogenous variables (*BGD_BLAU* and *BGD_DUM* in Models 9.1 and 9.2 respectively) on the instrument we employ (*MALEFRAC_IV*); consistent with prior literature (e.g., Adams & Ferreira, 2009), we control for all variables we use in the second stage. The coefficients of *MALEFRAC_IV* are positive and significant at the 1% level across both columns of the first-stage instrumental variables models, indicating that our instrument is significantly positively correlated with our measures of board gender diversity.[15] In Table 9, we also report the results from the second-stage regressions in Models 9.3–9.6, and show that our findings from Table 5 remain unchanged. Consequently, using the fraction of male directors on the board who sit on other with-female boards as the instrument, we continue to find evidence that board gender diversity moderates the association between firm opacity in financial reporting and stock returns around the financial crisis. Collectively, although we

[12] In fact, investor anticipation would most likely bias the results against finding a positive and significant coefficient for board gender diversity. For example, Bhagat and Bolton (2008) claim that if investors expect the board gender diversity effect on stock-market based performance, firms' long-term stock-market based performance will not be significantly associated with board gender diversity, even if a significant association indeed exists.

[13] In untabulated analyses, we provide evidence that our findings remain robust when following: (i) Huang and Kisgen (2013) who instrument board gender diversity using a state-level gender equality index developed by Sugarman and Straus (1988). In other words, we employ as an instrumental variable the state's level of gender status equality for each firm based on the firm's headquarters location. Similar to Huang and Kisgen (2013), we argue that the identifying assumption is that firms located in a state which is more friendly to women's equality in general are more likely to have female board members; and (ii) Carter et al. (2017) who instrument board gender diversity using the industry-average proportion of female board members while excluding focal firms from the computation of the industry average. However, some industries may have more female directors than others for non-random reasons; thus, instrument exogeneity is less likely to hold in this setting.

[14] A potential concern with this assumption for the instrument we employ (*MALEFRAC_IV*) is that the percentage of male directors connected to female directors may be correlated with stock return performance through industry effects (Adams & Ferreira, 2009). We address this concern by controlling for industry fixed effects.

[15] We perform an F-test to assess the strength of the instrument and we test the null hypothesis that the excluded instrument is irrelevant in the first-stage regressions. The documented F-statistics are above the common threshold of 10 (Staiger & Stock, 1997). Although our choice of instrumental variable is motivated by the extant literature (Adams & Ferreira, 2009), we also perform an additional set of diagnostics based on the Stock and Yogo (2005) characterization of weak instruments (untabulated); we find that the Cragg-Donald F-statistic, as well as its robust counterpart, the Kleibergen–Paap rk F-statistic, exceed the critical value tabulated by Stock and Yogo (2005), suggesting that our instrument (*MALEFRAC_IV*) is relevant to the endogenous variable (*BGD_BLAU* or *BGD_DUM*).

acknowledge that we cannot completely rule out the impact of unobservable variables on our findings, we argue that these robustness tests mitigate endogeneity concerns and increase our confidence that the results capture the moderating role of board gender diversity, rather than the influence of an omitted variable.

In Table 10, we conduct a battery of additional placebo and falsification tests to better establish the validity of the difference-in-differences research design we employ in the paper. First, Table 10 Panel A replicates the primary regression results for hypothesis H2 while computing the difference in stock returns around a placebo crisis year (2006) instead of the actual crisis year (2007). Consistent with our expectations, the results indicate that the coefficients of the interaction terms across all Models 10.1a-10.4a are statistically indistinguishable from zero, suggesting that our findings on the moderating role of board gender diversity are less likely to be due to some alternative force (Almeida, Campello, Laranjeira, & Weisbenner, 2012; Roberts & Whited, 2013). Second, to further examine the internal validity of our difference-in-differences research design, in Table 10 Panel B, we replace the outcome variable in Equation (4) (the change in stock returns, *ΔRET*) with other variables that should not be affected in the same way as stock returns, such as: the change in cash, *ΔCASH* (Models 10.1b and 10.2b); the change in leverage, *ΔLEV* (Models 10.3b and 10.4b); and the change in the book value of equity, *ΔBVE* (Models 10.5b and 10.6b). If our identification strategy is correct, we would not expect to find the same moderating effect for board gender diversity when examining these alternative outcome variables (Roberts & Whited, 2013). Consistent with our expectations, the results strongly support our assertion that our primary findings (reported in Table 5) disappear when using placebo dependent variables, such as *ΔCASH*, *ΔLEV* or *ΔBVE*. Third, in Table 10 Panel C, we replicate the results of regression analyses that test hypothesis H2, but this time we use all US non-S&P 1500 firms as a placebo treatment group (instead of with-female S&P 1500 firms). The control group remains unchanged (all-male S&P 1500 firms). Therefore, we define *NONSP1500* as an indicator variable that takes the value 1 if the firm is not listed on the S&P 1500 index, and 0 if the firm is all-male and listed on the S&P 1500 index. If our identification strategy is correct, we would not then expect to find the same moderating effect that we report in Table 5 when using a placebo treatment group. In line with our expectations, the interaction terms *NONSP1500* × *OPAC_DA* and *NONSP1500* × *OPAC_IA* are statistically indistinguishable from zero in Models 10.1c and 10.2c respectively.

We also examine whether our findings are robust to using a different control group. Specifically, we define the variable *SPFEM* as an indicator variable that takes the value 1 if the firm is listed on the S&P 1500 index and has at least one female director on board (i.e., the same treatment group as in Table 5) and the value 0 if the firm is *not* listed on the S&P 1500 index and has an all-male board (i.e., the new control group instead of using all-male S&P 1500 firms). In other words, all US non-S&P 1500 firms that have all-male boards serve as the new control group for the purposes of this robustness test. In untabulated analyses, we find that our primary results remain unchanged when using the above alternative control group.

Lastly, we examine the robustness of our findings when using a larger estimation window. In untabulated analyses, we use an extended sample for the period 2003–2010, which contains 4 years in the pre-crisis period (i.e., 2003–2006) and 4 years in the post-crisis period (i.e., 2007–2010); we find that the results are qualitatively similar to the ones reported in Tables 4 and 5 in terms of statistical and economic significance. Overall, the above robustness tests further strengthen our inferences and help us to rule out alternative explanations for the primary results reported in the manuscript.

## 5. Conclusions

In this study, we investigate the interplay between board gender diversity, firm opacity in financial reporting, and stock price crash. In order to do so, we utilize the negative credit supply shock of the 2007–2008 global financial crisis that initiated in the US. Specifically, the financial crisis disrupted real corporate economic activity as well as firms' access to external financing; hence, the crisis highlights the importance of financial reporting transparency in maintaining investor confidence and facilitating the financing of investments and operations. Thus, the financial crisis provides a setting that allows us to examine the channel through which firm opacity in financial reporting affects stock returns, and whether the presence of female directors on the board influences the association between firm opacity and stock returns around the crisis.

We employ a difference-in-differences research design to test our hypotheses. First, we validate prior research findings that board gender diversity mitigates firm opacity in financial reporting in the pre-crisis period. We then demonstrate that firms with higher opacity before the financial crisis witness a steeper decline in stock returns during the crisis. Further, we find that firms with gender-diverse boards *ex ante* witness a softer decline in their stock returns *ex post* compared to firms without gender-diverse boards. Finally, we provide evidence that board gender diversity plays a moderating role on the association between firm opacity in the pre-crisis period and the decline in stock returns during the crisis. We mitigate endogeneity concerns arising from omitted variable bias and reverse causality by employing a two-stage least squares (2SLS) regression analysis. The findings also hold in matched samples using two different matching algorithms, i.e., propensity score matching and coarsened exact matching. Lastly, we show that our results are robust to using: alternative proxies of firm performance and board gender diversity, a larger estimation window, and a battery of placebo and falsification tests. These robustness and sensitivity tests strengthen our inferences and suggest that the findings capture the moderating role of board gender diversity and not the influence of an unobservable variable.

Our study contributes to the literature by showing favorable economic consequences for board gender diversity during times of economic uncertainty through the channel of transparency in financial reporting. Our findings complement extant research on gender differences and financial performance, and have important implications for corporate executive suites that are responsible for the composition of corporate boards, as well as for policy makers who are concerned with improving firms' corporate governance mechanisms. However, our results may not be generalizable to other countries. Future research could extend our findings to explore countries that impose quotas on board composition, and to investigate the role of other board diversity attributes on the association between firm opacity in financial reporting and stock price performance. In addition, future research should seek to better understand

the impact of board gender diversity on financial reporting transparency and stock price crash during the Covid-19 pandemic. Unlike the 2007–2008 global financial crisis which spread gradually to the financial markets and real economy, leading progressively to a global recession, the Covid-19 pandemic represents an exogeneous shock, exerting a more radical and abrupt effect.

## Declaration of competing interest

The authors declare that they have no conflict of interest.

## Appendix 1. Variable Definitions

| Variable (sorted) | Definition |
|---|---|
| Firm-level variables: | |
| *ACGD_BLAU* | Average of the firm's Blau index of audit committee diversity in 2005 and 2006. The Blau index of audit committee diversity is calculated as 1 – [(*AUDFEM%*)$^2$ + (1 – *AUDFEM%*)$^2$], where *AUDFEM%* is the percentage of female directors on the audit committee. |
| *ACGD_DUM* | Indicator variable that takes the value 1 if any of the firm's audit committee members is a female in 2005 and 2006, and 0 otherwise. |
| *BGD_BLAU* | Average of the firm's Blau index in 2005 and 2006. The Blau index is calculated as 1 – [(*FEM%*)$^2$ + (1 – *FEM%*)$^2$], where FEM% is the percentage of female directors on the board. |
| *BGD_DUM* | Indicator variable that takes the value 1 if any of the firm's board of directors is a female in 2005 and 2006, and 0 otherwise. |
| *CMASS* | Indicator variable that takes the value 1 if the percentage of female directors exceeds 20% of the total number of directors on the board, and 0 otherwise. |
| *OPAC_DA* | Average of the firm's absolute value of discretionary accruals in 2005 and 2006. Discretionary accruals are calculated as described in Appendix 2. |
| *OPAC_IA* | Average of the firm's absolute value of the annual bid-ask spread in 2005 and 2006. |
| *ΔRET* | Average stock return in 2007 and 2008 minus average stock return in 2005 and 2006. |
| **Firm-year variables:** | |
| *BETA* | CAPM beta computed over the last year and estimated from time-series regressions of daily stock returns on market returns. |
| *BIG4* | Indicator variable that takes the value 1 if the firm's external auditor is one of the big four auditors, and 0 otherwise. |
| *BODSIZE* | Number of directors on board. |
| *BVE* | Book value of equity scaled by total assets. |
| *CASH* | Cash available scaled by total assets. |
| *CEOFEM* | Indicator variable that takes the value 1 if the CEO is female, and 0 otherwise. |
| *DIVIDEND* | Indicator variable that takes the value 1 if the firm pays dividends, and 0 otherwise. |
| *DUALITY* | Indicator variable that takes the value 1 if a dual role is taken by the CEO on the board, and 0 otherwise. |
| *INDEP* | Percentage of independent directors on board. |
| *LEV* | Total liabilities scaled by total assets. |
| *MALEFRAC_IV* | Instrumental variable for board gender diversity computed as the fraction of male directors on the board who sit on other boards on which there are female directors. |
| *MEETINGS* | Natural log of the number of board meetings. |
| *MOMENT* | Growth in the firm's stock price over the last year, excluding the last month. |
| *MTB* | Market value to book value of equity. |
| *NONSP1500* | Indicator variable that takes the value 1 if the firm is not listed on the S&P 1500 index, and 0 if the firm is all-male and listed on the S&P 1500 index. |
| *OCF* | Cash flow from operating activities scaled by total assets. |
| *PRICE* | Natural logarithm of closing stock price. |
| *RET* | Annual stock return, compounded monthly. |
| *ROA* | Net income before extraordinary items to total assets. |
| *SIZE* | Natural logarithm of total assets. |
| *TENURE* | Average tenure of directors on board. |
| *VOLAT* | Standard deviation of daily stock returns. |
| *ΔINCOME* | Indicator variable that takes the value 1 if the change in net income is positive, and 0 otherwise. |

## Appendix 2. Calculation of Discretionary Accruals

We calculate discretionary accruals by using the modified cross-sectional Jones (1991) model as described in Dechow et al. (1995); discretionary accruals serve as proxy for financial reporting quality. We estimate the following regression equation for each industry-year cross-section, using the Fama and French (1997) 48-industry classification. Discretionary accruals are the estimated residuals from the regression model below (Jones, Krishnan, & Melendrez, 2008; Kim, Liu, & Zheng, 2012).

$$TACC_{it}/TA_{it-1} = b_0 + b_1(1/TA_{it-1}) + b_2(\Delta REV_{it} - \Delta REC_{it})/TA_{it-1} + b_3 PPE_{it}/TA_{it-1} + b_4 ROA_{it} + b_5 ECON_{it} + e_{it}$$

Where:

$TACC_{it}$ = *NIBX* - *OCF*, where *NIBX* is the net income before extraordinary items and *OCF* is operating cash flow (Hribar & Collins, 2002).
$TA_{it-1}$ = lagged total assets,
$\Delta REV_{it}$ = change in revenues,

$\Delta REC_{it}$ = change in receivables,
$PPE_{it}$ = property, plant and equipment,
$ROA_{it}$ = return on assets,
$ECON_{it}$ = a measure of idiosyncratic economic shocks, defined as the firm-specific stock return variation in years $t$ and $t-1$ (Owens et al., 2017). $ECON_{it}$ is estimated as the mean squared errors of the residuals from the regression of the firm's monthly return on the monthly industry return and monthly market return using 2 years of monthly data (i.e., years $t$ and $t-1$).

## References


Adams, R., & Ferreira, D. (2009). Women in the boardroom and their impact on governance and performance. *Journal of Financial Economics, 94*(2), 291–309.
Adams, R., & Funk, P. (2012). Beyond the glass ceiling: Does gender matter? *Management Science, 58*(2), 219–235.
Adhikari, B., Agrawal, A., & Malm, J. (2019). Do women managers keep firms out of trouble? Evidence from corporate litigation and policies. *Journal of Accounting and Economics, 67*(1), 202–225.
Ahern, K., & Dittmar, A. (2012). The changing of the boards: The impact on firm valuation of mandated female board representation. *Quarterly Journal of Economics, 127*, 137–197.
Ahmed, S., Neel, M., & Wang, D. (2013). Does mandatory adoption of IFRS improve accounting quality? Preliminary evidence. *Contemporary Accounting Research, 30*(4), 1344–1372.
Al-Shaer, H., & Harakeh, M. (2020). Gender differences in executive compensation on British corporate boards: The role of conditional conservatism. *The International Journal of Accounting, 55*(1), Article 2050002.
Almeida, H., Campello, M., Laranjeira, B., & Weisbenner, S. (2012). Corporate debt maturity and the real effects of the 2007 credit crisis. *Critical Finance Review, 1*(1), 3–58.
Angrist, J. D., & Pischke, J.-S. (2014). *Mastering metrics : The path from cause to effect*. Princeton University Press.
Balakrishnan, K., Core, J., & Verdi, R. (2014). The relation between reporting quality and financing and investment: Evidence from changes in financing capacity. *Journal of Accounting Research, 52*(1), 1–36.
Balakrishnan, K., Watts, R., & Zuo, L. (2016). The effect of accounting conservatism on corporate investment during the global financial crisis. *Journal of Business Finance & Accounting, 43*(5), 513–542. & (6)).
Ball, R., Robin, A., & Sadka, G. (2008). Is financial reporting shaped by equity markets? An international study of timeliness and conservatism. *Review of Accounting Studies, 13*, 168–205.
Barth, M., & Landsman, W. (2010). How did financial reporting contribute to the financial crisis? *European Accounting Review, 19*(3), 399–423.
Becker, C., Defond, M., Jiambalvo, J., & Subramanyam, K. R. (1998). The effect of audit quality on earnings management. *Contemporary Accounting Research, 15*(1).
Bertrand, M., Duflo, E., & Mullainathan, S. (2004). How much should we trust differences-in-differences estimates? *Quarterly Journal of Economics, 119*(1), 249–275.
Bhagat, S., & Bolton, B. (2008). Corporate governance and firm performance. *Journal of Corporate Finance, 14*(3), 257–273.
Bruce, A., & Johnson, J. (1994). Male and female betting behaviour: New perspectives. *Journal of Gambling Studies, 10*(2), 183–198.
Bugeja, M., Matolcsy, Z. P., & Spiropoulos, H. (2012). Is there a gender gap in CEO compensation? *Journal of Corporate Finance, 18*(4), 849–859.
Burgstahler, D., & Dichev, I. (1997). Earnings management to avoid earnings decreases and losses. *Journal of Accounting and Economics, 24*, 99–126.
Callen, J., & Fang, X. (2015). Religion and stock price crash risk. *Journal of Financial and Quantitative Analysis, 50*(1–2), 169–195.
Carter, M. E., Franco, F., & Gine, M. (2017). Executive gender pay gaps: The roles of female risk aversion and board representation. *Contemporary Accounting Research, 34*(2), 1232–1264.
Chang, X., Chen, Y., & Zolotoy, L. (2017). Stock liquidity and stock price crash risk. *Journal of Financial and Quantitative Analysis, 52*(4), 1605–1637.
Chang, E., Milkman, K., Chugh, D., & Akinola, M. (2019). Diversity thresholds: How social norms, visibility, and scrutiny relate to group composition. *Academy of Management Journal, 62*(1), 144–171.
Daily, C. M., Certo, S. T., & Dalton, D. R. (1999). A decade of corporate women: Some progress in the boardroom, none in the executive suite. *Strategic Management Journal, 20*(1), 93–100.
Daske, H., Hail, L., Leuz, C., & Verdi, R. (2008). Mandatory IFRS reporting around the world: Early evidence on the economic consequences. *Journal of Accounting Research, 46*(5), 1085–1142.
Deaves, R., Lüders, E., & Luo, G. Y. (2009). An experimental test of the impact of overconfidence and gender on trading activity. *Review of Finance, 13*(3), 555–575.
Dechow, P., Ge, W., & Schrand, C. (2010). Understanding earnings quality: A review of the proxies, their determinants and their consequences. *Journal of Accounting and Economics, 50*(2–3), 344–401.
Dechow, P., Sloan, R., & Sweeney, A. (1995). Detecting earnings management. *The Accounting Review, 70*(2), 193–225.
DeFond, M., Erkens, D., & Zhang, J. (2017). Do client characteristics really drive the big N audit quality effect? New evidence from propensity score matching. *Management Science, 63*(11), 3628–3649.
DeFond, M., Hung, M., Li, S., & Li, Y. (2015). Does mandatory IFRS adoption affect crash risk? *The Accounting Review, 90*(1), 265–299.
DeFond, M., & Jiambalvo, J. (1994). Debt covenant effects and the manipulation of accruals. *Journal of Accounting and Economics, 17*, 145–176.
Dong, Y., Girardone, C., & Kuo, J. M. (2017). Governance, efficiency and risk taking in Chinese banking. *The British Accounting Review, 49*(2), 211–229.
Duchin, R., Ozbas, O., & Sensoy, B. (2010). Costly external finance, corporate investment, and the subprime mortgage credit crisis. *Journal of Financial Economics, 97*(3), 418–435.
Eagly, A., & Carli, L. (2003). The female leadership advantage: An evaluation of the evidence. *The Leadership Quarterly, 14*(6), 807–834.
Faccio, M., Marchica, M.-T., & Mura, R. (2016). CEO gender, corporate risk-taking, and the efficiency of capital allocation. *Journal of Corporate Finance, 39*, 193–209.
Fama, E., & French, K. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics, 33*(1), 3–56.
Fama, E., & French, K. (1997). Industry costs of equity. *The Journal of Finance, 43*, 153–193.
Fama, E., & French, K. (2002). Testing tradeoff and pecking order predictions about dividends and debt. *Review of Financial Studies, 15*(1), 1–33.
Fauver, L., Loureiro, G., & Taboada, A. (2017). The impact of regulation on information quality and performance around seasoned equity offerings: International evidence. *Journal of Corporate Finance, 44*(1), 73–98.
Fortune. (2019). The Fortune 500 has more female CEOs than ever before. Retrieved from https://fortune.com/2019/05/16/fortune-500-female-ceos/.
Francis, B., Hasan, I., Park, J. C., & Wu, Q. (2015). Gender differences in financial reporting decision making: Evidence from accounting conservatism. *Contemporary Accounting Research, 32*(3), 1285–1318.
Francis, B., Hasan, I., & Wu, Q. (2013). The benefits of conservative accounting to shareholders: Evidence from the financial crisis. *Accounting Horizons, 27*(2), 319–346.
Garcia Lara, J. M., Garcia Osma, B., Mora, A., & Scapin, M. (2017). The monitoring role of female directors over accounting quality. *Journal of Corporate Finance, 45*, 651–668.
Greene, W. (2012). *Econometric analysis* (7th ed.). Prentice Hall.
Green, C., & Homroy, S. (2018). Female directors, board committees and firm performance. *European Economic Review, 102*(C), 19–38.

Griffin, J., & Lemmon, M. (2002). Book-to-Market equity, distress risk, and stock returns. *The Journal of Finance, 57*(5), 2317–2336.
Guest, P. (2009). The impact of board size on firm performance: Evidence from the UK. *The European Journal of Finance, 15*(4), 385–404.
Gul, F. A., Hutchinson, M., & Lai, K. M. (2013). Gender-diverse boards and properties of analyst earnings forecasts. *Accounting Horizons, 27*(3), 511–538.
Gull, A. A., Nekhili, M., Nagati, H., & Chtioui, T. (2018). Beyond gender diversity: How specific attributes of female directors affect earnings management. *The British Accounting Review, 50*(3), 255–274.
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.
Harakeh, M., El-Gammal, W., & Matar, G. (2019). Female directors, earnings management, and CEO incentive compensation: UK evidence. *Research in International Business and Finance, 50*, 153–170.
Harrison, D., & Klein, K. (2007). What's the difference? Diversity constructs as separation, variety, or disparity in organizations. *Academy of Management Review, 32*(4), 1199–1228.
Healy, P., & Palepu, K. (2001). Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature. *Journal of Accounting and Economics, 31*(1), 405–440.
He, W., Ng, L., Zaiats, N., & Zhang, B. (2017). Dividend policy and earnings management across countries. *Journal of Corporate Finance, 42*, 267–286.
Hong, H., Hung, M., & Lobo, G. (2014). The impact of mandatory IFRS adoption on IPOs in global capital markets. *The Accounting Review, 89*(4), 1365–1397.
Hribar, P., & Collins, D. (2002). Errors in estimating accruals: Implications for empirical research. *Journal of Accounting Research, 40*(1), 105–134.
Huang, J., & Kisgen, D. (2013). Gender and corporate finance: Are male executives overconfident relative to female executives? *Journal of Financial Economics, 108*, 822–839.
Hutton, A., Marcus, A., & Tehranian, H. (2009). Opaque financial reports, R2 , and crash risk. *Journal of Financial Economics, 94*(1), 67–86.
Iacus, S., King, G., & Porro, G. (2012). Causal inference without balance checking: Coarsened exact matching. *Political Analysis, 20*(1), 1–24.
Iliev, P. (2010). The effect of SOX section 404 compliance on audit fees , earnings quality and stock prices. *The Journal of Finance, LXV*(3), 1163–1196.
Ivashina, V., & Scharfstein, D. (2010). Bank lending during the financial crisis of 2008. *Journal of Financial Economics, 97*(3), 319–338.
Jegadeesh, N., & Titman, S. (1993). Returns to buying winners and selling losers: Implications for stock market efficiency. *The Journal of Finance, 48*(1), 65–91.
Jensen, M., & Meckling, W. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics, 3*(4), 305–360.
Jin, L., & Myers, S. (2006). R2 around the world: New theory and new tests. *Journal of Financial Economics, 79*(2), 257–292.
Joecks, J., Pull, K., & Vetter, K. (2013). Gender diversity in the boardroom and firm performance: What exactly constitutes a "critical mass?". *Journal of Business Ethics, 118*(1), 61–72.
Johnson, J., & Powell, P. (1994). Decision making, risk and gender: Are managers different? *British Journal of Management, 5*(2), 123–138.
Jones, J. (1991). Earnings management during import relief investigations. *Journal of Accounting Research, 29*(2), 193–228.
Jones, K., Krishnan, G., & Melendrez, K. (2008). Do models of discretionary accruals detect actual cases of fraudulent and restated earnings? An empirical analysis. *Contemporary Accounting Research, 25*, 499–531.
Kang, E., & Zardkoohi, A. (2005). Board leadership structure and firm performance. *Corporate Governance: An International Review, 13*(6), 785–799.
Kanter, R. M. (1977a). *Men and women of the organization*. New York: Basic Books.
Kanter, R. M. (1977b). Some effects of proportions on group life: Skewed sex ratios and responses to token women. *American Journal of Sociology, 82*(5), 965–990.
Kasznik, R. (1999). On the association between voluntary disclosure and earnings management. *Journal of Accounting Research, 37*, 57–81.
Khan, W., & Vieito, J. P. (2013). Ceo gender and firm performance. *Journal of Economics and Business, 67*, 55–66.
Kim, Y., Li, S., Pan, C., & Zuo, L. (2013). The role of accounting conservatism in the equity market: Evidence from seasoned equity offerings. *The Accounting Review, 88*(4), 1327–1356.
Kim, J. B., Liu, X., & Zheng, L. (2012). The impact of mancdatory IFRS adoption on audit fees: Theory and evidence. *The Accounting Review, 87*(6), 2061–2094.
Kim, J. B., Li, Y., & Zhang, L. (2011a). CFOs versus CEOs: Equity incentives and crashes. *Journal of Financial Economics, 101*(3), 713–730.
Kim, J. B., Li, Y., & Zhang, L. (2011b). Corporate tax avoidance and stock price crash risk: Firm-level analysis. *Journal of Financial Economics, 100*(3), 639–662.
Kothari, S. P., Leone, A., & Wasley, C. (2005). Performance matched discretionary accrual measures. *Journal of Accounting and Economics, 39*(1), 163–197.
Kothari, S. P., Shu, S., & Wysocki, P. (2009). Do managers withhold bad news? *Journal of Accounting Research, 47*(1), 241–276.
Krishnan, G., & Visvanathan, G. (2008). Does the SOX definition of an accounting expert matter? The association between audit committee directors' accounting expertise and accounting conservatism. *Contemporary Accounting Research, 25*(3), 827–858.
LaFond, R., & Watts, R. (2008). The information role of conservatism. *The Accounting Review, 83*(2), 447–478.
Lang, M., & Maffett, M. (2011). Transparency and liquidity uncertainty in crisis periods. *Journal of Accounting and Economics, 52*(2–3), 101–125.
Lee, P. M., & James, E. H. (2007). 'She'-E-OS: Gender effects and investor reactions to the announcement of top executive appointments. *Strategic Management Journal, 28*(3), 227–241.
Leuz, C., & Wysocki, P. (2016). The economics of disclosure and financial reporting regulation: Evidence and suggestions for future research. *Journal of Accounting Research, 54*(2), 525–622.
Leventis, S., Dimitropoulos, P., & Owusu-Ansah, S. (2013). Corporate governance and accounting conservatism: Evidence from the banking industry. *Corporate Governance: An International Review, 21*(3), 264–286.
Levi, M., Li, K., & Zhang, F. (2014). Director gender and mergers and acquisitions. *Journal of Corporate Finance, 28*, 185–200.
Lin, J.-C., Sanger, G., & Booth, G. (1995). Trade size and components of the bid-ask spread. *Review of Financial Studies, 8*(4), 1153–1183.
Livnat, J., Smith, G., Suslava, K., & Tarlie, M. (2021). Board tenure and firm performance. *Global Finance Journal, 47*(1), Article 100535.
Lobo, G., & Zhou, J. (2006). Did conservatism in financial reporting increase after the sarbanes-oxley act? Initial evidence. *Accounting Horizons, 20*(1), 57–73.
Lobo, G., & Zhou, J. (2010). Changes in discretionary financial reporting behavior following the sarbanes-oxley act. *Journal of Accounting, Auditing and Finance, 25*(1), 1–26.
Marshall, A., McCann, L., & McColgan, P. (2019). The market reaction to debt announcements: UK evidence surrounding the global financial crisis. *The British Accounting Review, 51*(1), 92–109.
Melé, D., Rosanas, J., & Fontrodona, J. (2017). Ethics in finance and accounting: Editorial introduction. *Journal of Business Ethics, 140*(4), 609–613.
Muller, K., Riedl, E., & Sellhorn, T. (2011). Mandatory fair value accounting and information asymmetry: Evidence from the European real estate industry. *Management Science, 57*(6), 1138–1153.
Owens, E., Wu, J. S., & Zimmerman, J. (2017). Idiosyncratic shocks to firm underlying economics and abnormal accruals. *The Accounting Review, 92*(2), 183–219.
Peni, E., & Vähämaa, S. (2010). Female executives and earnings management. *Managerial Finance, 36*(7), 629–645.
Roberts, M., & Whited, T. (2013). Endogeneity in empirical corporate finance. *Handbook of the Economics of Finance, 2*(Part A), 493–572.
Shipman, J., Swanquist, Q., & Whited, R. (2017). Propensity score matching in accounting research. *The Accounting Review, 92*(1), 213–244.
Sila, V., Gonzalez, A., & Hagendorff, J. (2016). Women on board: Does boardroom gender diversity affect firm risk? *Journal of Corporate Finance, 36*, 26–53.
Sila, V., Gonzalez, A., & Hagendroff, J. (2017). Independent director reputation incentives and stock price informativeness. *Journal of Corporate Finance, 47*, 219–235.
Smith, C., & Watts, R. (1992). The investment opportunity set and corporate financing, dividend, and compensation policies. *Journal of Financial Economics, 32*(3), 263–292.
Srinidhi, B., Gul, F. A., & Tsui, J. (2011). Female directors and earnings quality. *Contemporary Accounting Research, 28*(5), 1610–1644.
Staiger, D., & Stock, J. (1997). Instrumental variables regression with weak instruments. *Econometrica, 65*(3), 557.
Stock, J., & Yogo, M. (2005). Testing for weak instruments in linear IV regression. In D. W. K. Andrews, & J. Stock (Eds.), *Identification and inference for econometric models: Essays in honor of thomas rothenberg*. Cambridge: Cambridge University Press.
Strydom, M., Au Yong, H. H., & Rankin, M. (2017). A few good (wo)men? Gender diversity on Australian boards. *Australian Journal of Management, 42*(3), 404–427.
Sturges, H. (1926). The choice of a class-interval. *Journal of the American Statistical Association, 21*(153), 65–66.
Sugarman, D., & Straus, M. (1988). Indicators of gender equality for American states and regions. *Social Indicators Research, 20*(3), 229–270.

Sun, S. L., Zhu, J., & Ye, K. (2015). Board openness during an economic crisis. *Journal of Business Ethics, 129*(2), 363–377.
Sweeney, A. (1994). Debt convenant violations and managers' accounting resposes. *Journal of Accounting and Economics, 17*, 281–308.
Torchia, M., Calabrò, A., & Huse, M. (2011). Women directors on corporate boards: From tokenism to critical mass. *Journal of Business Ethics, 102*(2), 299–317.
Vafeas, N. (1999). Board meeting frequency and firm performance. *Journal of Financial Economics, 53*(1), 113–142.
Vafeas, N. (2003). Length of board tenure and outside director independence. *Journal of Business Finance & Accounting, 30*(7-8), 1043–1064.
Wan, D., & Ong, C. H. (2005). Board structure, process and performance: Evidence from public-listed companies in Singapore. *Corporate Governance: An International Review, 13*(2), 277–290.
Warfield, T., Wild, J., & Wild, K. (1995). Managerial ownership, accounting choices, and informativeness of earnings. *Journal of Accounting and Economics, 20*(1), 61–91.
Watkins, M. B., Simmons, A., & Umphress, E. (2019). It's not black and white: Toward a contingency perspective on the consequences of being a token. *Academy of Management Perspectives, 33*(3), 334–365.