

The impact of female directors on earnings management and the moderating effect of board quality: Enabler or deterrent?

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Abstract

Earnings management limits transparency and diligence in financial reporting, which in the long-run is detrimental to corporations due to the reputational consequences regarding ethical behaviour. This paper examines the relationship between board gender diversity and earnings management (EM), considering the quality of directors in the board (i.e. experience and expertise) and CEOs entrenchment as moderating factors in such relationship. Our findings show a negative and significant association between board gender diversity and EM, suggesting that independent female directors are the drivers of such effect. High quality boards decrease the incidence of EM but hinder the potential involvement from female directors towards reducing EM. The incumbent effect of high quality boards on female director's contribution on EM reverses with less powerful CEOs. We find that particular quality attributes of female

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directors do not influence their actions towards earnings management. An exception is the network of female directors, which had a positive and significant estimator, implying that a large network might proxy busyness rather than expertise.

Keywords: earnings management, gender diversity, board quality, independent female directors, transparency.

1. Introduction

The lack of transparency on financial reporting has been the root of serious accounting scandals such as Enron, WorldCom, HealthSouth, Tyco and Global Crossing, among many others² (Khanna et al., 2015). By exploiting the flexibility around accounting standards (Healy and Wahlen, 1999), top corporate executives might alter financial reports with the aim of boosting firms' reported profits, which consequently increase bonuses and decrease income tax. As financial reports constitute a main source of information for investors and stock markets, their inaccuracy in depicting firms' performance impedes investors making informed decisions (Xie et al., 2003). Therefore, both good corporate governance practices (Khanna et al., 2015) and regulation (Dang and Nguyen, 2016) are important to increase the transparency and accountability of financial statements.

The board of directors as an internal corporate governance mechanism is relevant for financial reporting through both the advising and monitoring roles of directors (Hillman and Dalziel, 2003). Board effectiveness in overseeing management's performance intensifies with the diversity of its members (Harjoto et al., 2015), including independency (Beasley, 1996; Klein, 2002), nationality (Du et al., 2017), experience (Kim and Rasheed, 2014) and gender (Poletti-Hughes and Briano-Turrent, 2019). We motivate this research on the gender diversity of the board because of the recent increases in the number of women in top executive teams (Francis et al., 2015), which has probably been the result of the adoption of legislation for gender quotas, as well as, the establishment of corporate governance recommendations for gender diverse boards in several countries. Literature has suggested that female directors are more ethical and risk-averse than their male counterparts (Nekhili and Gatfaoui, 2013; Chen et al., 2016; Ruiz-

² Tesco manipulated its financial reporting a profit of about £326m in 2014, followed by a loss of £6.3bn. This case is deemed to be the biggest accounting scandal in the UK in recent times (Financial Times, 2017). Toshiba overestimated profits between 2008 and 2014, which resulted in the dismissal of Toshiba's CEO and a fine from the Japanese Financial Authority of £780m (The Guardian, 2017).

Jimenez et al., 2016). As a result, female participation in boards is progressively perceived to be valuable because the greater diligence in monitoring over managers (Adams and Ferreira 2009) and increased transparency on reporting (Srinidhi et al 2011) delivers on the improvement of ethical values in the corporation (Cummings et al. 2015).

In this paper, we focus on the proportion of independent female directors as a direct variable to impact earnings management. To this end, we advance previous research (Srinidhi et al., 2011; Sun et al., 2011; Gull et al., 2018) and differentiate between the concept of a gender diverse board and gender diversity among independent directors. The latter is more relevant to the monitoring role, because of learned attributes that differentiate actions while performing their roles. Therefore, whether there are differences in terms of earnings management among firms with female-independent directors is still an open question and calls for more research. With this in mind, we analyse the role of independent-female directors as both a provider of resources to follow a more effective strategy on decision-making and greater contributors to boards' effectiveness from the perspective of the monitoring activity, being crucial in overseeing the financial reporting process (Bravo and Reguera-Alvarado, 2018). Thus, we develop the hypotheses of study in the context of agency theory (as female directors on boards are expected to increase monitoring activities) and resource dependence theory (by differentiating independent-female directors –as providers of strategy and monitoring- to explain the increased effectiveness of a gender diverse board).

A main contribution is with regards the setting where female directors perform their functions. To this end we test whether director's quality (defined interchangeably as board quality) with respect to their experience and expertise is a moderating factor in the relationship of board gender diversity and earnings management. For this, we distinguish that the ability of female directors to influence the supervisory and strategic actions from boards is not only determined by a gender effect or by the quality of the female director itself. Instead, we analyse whether

the association of board gender diversity and earnings management is a result of the environment in which such activities take place. That is, the quality attributes of the directors as a whole are relevant because female directors or male directors do not take firms' decisions individually but collectively. We reason that the interaction of female directors with board attributes, such as experience and expertise, is of utmost importance to moderate female directors' influence on earnings management. Therefore, we advance the work of Gull et al. (2018), who noted that particular attributes (e.g. business qualification) of female directors have an effect on earnings management. Instead, we consider the moderating effect of the attributes of directors for each board (i.e. board quality), contemplating that the ability of female directors to influence boards might represent a missing fragment in the narrative around firms' earnings management and gender diverse boards.

Therefore, we explore the effect of board attributes that signal quality in mitigating/enhancing female directors' attitudes towards earnings management and test whether board quality is an enabler or a deterrent to impel female directors' ability towards reducing earnings management. With this implication, we argue that female directors' attributes per se are not the driver of their behaviour or effectiveness towards decision-making. As an alternative, we hypothesize that such attributes do not function in isolation but jointly with other directors' demographics that coherently shape the environment that facilitates female-directors performance. In this respect, we develop two hypotheses of board quality as a moderator of the impact of female directors on earnings management. First, we hypothesize that high quality boards are stringent in facilitating the actions of female directors towards earnings management. High quality boards are desirable to provide required expertise, which improves monitoring and constitute a more valuable resource for firms (Jermias and Gani, 2014). However, the effectiveness in which boards interact depends on intergroup communication (Forbes and Milliken, 1999), which is not necessarily aligned to quality. Board quality creates cohesiveness among members

(Finkelstein, 1992), which may prevent female directors from experiencing positive board dynamics and therefore deterring their potential contribution. Female directors are more than commonly the minority group (i.e. out-group) within the board which reduces the possibility of positive influence and effective contribution (Westphal and Milton 2000). Therefore, we consider that board processes in high quality boards deter female directors' effectiveness. Second, we hypothesize that less unfettered power by the CEO or Chair enhances the positive aspect of board quality through improved board dynamics, which in turn enables the contribution of female directors towards decreasing earnings management.

To test our hypotheses, we use a sample of 848 U.S. publicly listed non-financial firms for the period of 2000-2016 (8,902 firm-year observations). Our analytical framework follows three stages. First, we differentiate between female directors and independent-female directors in explaining earnings management because a crucial factor of independency is overseeing the financial reporting process (Anderson et al., 2004). Second, we measure board quality using principal component analysis (PCA) with several directors attributes i.e. age, tenure, business qualifications and network size, and define two components: expertise and experience. We interact each of the components of board quality with female directors to assess the moderating effect of the former on female directors' contribution towards earnings management. Third, we distinguish the role of CEO's structural power (i.e. CEO/Chair duality) in the moderating effect of board quality because we identify that female directors' decisions can be influenced by the pressure on reporting to a powerful CEO (Bishop et al., 2016) but more importantly because structural power interferes with board dynamics (Triana et al., 2014).

We find that independent female directors are the main driver of a negative impact when comparing to inside-female and independent-male directors. High quality boards significantly deter the contribution from female directors towards decreasing earnings management, possibly because board quality diminishes female directors' power. This effect is reversed in

companies with less powerful CEOs suggesting that female directors increase transparency when they have more opportunity to do so (i.e. less dominant Chair). In an additional analysis, we test whether the exclusive attributes of female directors as opposed to those of the environment (i.e. directors on the board as a whole) are relevant in moderating their impact on earnings management. We find that only network size reduces the negative impact of female directors on earnings management, suggesting that it is a proxy for busyness as opposed to expertise. All analyses are robust to measures of earnings management and endogeneity concerns with the use system-GMM.

The structure of this paper is as follows. Section 2 develops the hypotheses. Section 3 outlines the methodology, sample and data. Section 4 presents the empirical analysis and provides further analyses. Section 5 discusses and concludes.

2. Theoretical framework and hypotheses development

2.1. Earnings management

Earnings management follows when financial statements are altered to make a company to attain targeted profits, advantaging managers with higher bonuses (Hall et al., 2013) but in detriment of external investors because of its lack of transparency (Krishnan and Parsons, 2008). Although, earnings management does not contradict Generally Accepted Accounting Principles or GAAP and in general would not be considered harmful to firms, it misleads stakeholders with regards to the underlying economic performance of the company (Healy and Wahlen, 1999). There are three common incentives that motivate managers to engage in altering accounting numbers, which are contractual relationships, capital market and political factors (Marques et al., 2011)

Ronen and Yaari (2008) argue that earnings management has an advantage in terms of signalling prospects of firms' value, bridging information asymmetry between managers and

shareholders. By contrast, earnings management could be negatively perceived because of the distortion of real financial outcomes, indicating poor corporate governance. In an extreme position, earnings management might lead to fraud (Dechow and Skinner, 2000) and has been linked to several accounting scandals such as those from Enron, WorldCom, and Xerox, highlighting the importance of good corporate governance practices and the establishment of regulation for investors' protection i.e. the Sarbanes-Oxley Act (SOX) in 2002 (Bhagat and Bolton, 2013).

2.2 Female directors and earnings management

Cumming et al. (2015) argued that gender differences might influence ethical values as female directors pay more attention to social issues when making decisions. At a corporate level, female directors are regarded as being less aggressive and less opportunistic towards financial rewards (Arun et al., 2015), which translate in improved debate and communication on the board. Mason and Mudrack (1996) justify the higher ethical values of women on their communal values of socialization and humanity. Ethical motives underline effective corporate governance practices, which highlight the significance to study gender diversity on boards of directors (Kakabadse et al., 2010). Since the different perspectives of board members shape an effective monitoring system (Robinson and Dechant, 1997), it follows the importance of increased board gender diversity in assisting problem solving and enhancing leadership effectiveness towards achieving transparency in financial reporting i.e. less earnings management.

Board gender diversity has been studied in the context of improving firms' performance (Adams and Ferreira, 2009; Liu et al., 2014), financial reporting quality (Srinidhi et al., 2011) and functioning of audit committees (Sun et al., 2011). A further focus has been placed on the attributes of female directors (suggesting that business education decreases earnings management; Gull et al., 2018; [Zalata et al., 2022](#)), and their company roles (Barua et al., 2010;

Peni and Vähämaa, 2010; Liu et al., 2016) to increase effectiveness on board activities. Considering that a gender diverse board mitigates financial risk, reinforces good corporate governance practices and enhances board effectiveness (Chen et al., 2016; Ruiz-Jimenez, 2016; Nekhili and Gatfaoui, 2013), the monitoring activities from a gender diverse board would consequently improve, decreasing the use of earnings management or the likelihood of financial restatement (Abbott et al., 2012). Similarly, female directors have been found to improve informativeness of stock prices, which in turn influence positively corporate disclosure (Gul et al., 2011).

To date, the effect of female directors on firms' outcomes has been mainly discussed in previous literature without distinguishing between board roles or duties (Adams and Ferreira, 2009; Srinidhi et al., 2011). Du Plessis et al. (2005) explained that directors' legal duties are similar for all directors on the board. However, in practice the role of independent directors is more relevant not only as monitors but also as strategists of the corporation (Reguera-Alvarado and Bravo, 2017). Independent directors provide unbiased perspectives, which can and should enhance ethical decision-making processes and increase their firms' transparency in respect to financial reporting (Terjesen et al., 2016). **In addition, Mnif and Cherif (2018) highlighted the importance of monitoring the functional skills and effectiveness of independent female directors in terms of balancing out the interests of different shareholders, leading to a decrease in the agency problem.** The benefits of an independent board have led to requirements that firms increase the number of independent directors, e.g. the revision of the corporate governance code in the USA in 2002, after the occurrence of accounting scandals (Hoitash et al., 2009). The importance of independent directors is accentuated from the perspective of resource dependence theory as independent directors gain knowledge from previous experience i.e. through networks and other directorships contributing to the successful execution of their roles in terms of decision-making (Terjesen et al., 2016). By contrast, the closeness of inside

directors with constituents of the company, leads to less communication and limited outer information (Chen et al., 2016), increasing firms' internal dependency. Therefore, firms need independent directors to enrich boards' discussion, as well as providing insights acquired by the diversity of external experiences while maintaining the quality of accounting standards (Lara et al., 2017). Extending the previous discussion, we distinguish a different impact from female directors that are independent to other directors (i.e. inside female directors and independent-male directors) leading to the following hypothesis:

H1: *Compared with their male counterparts, female directors that are independent are more effective in decreasing earnings management.*

2.2 The moderating effect of directors' quality and CEO power.

Apart from the demographic characteristics of directors, firms appoint directors for their acquired individual value, such as experience and expertise (Volonté and Gantenbein, 2016). Therefore, these factors impact on directors' decisions to improve firm's performance and reinforce reputation as measured by human capital quality (Dunn, 2012). The upper echelon theory (Hambrick and Mason, 1984) outlines how directors' attributes (i.e. quality effect, Conyon and He, 2016) influence their decisions with respect to a company's operations or strategies.

Board quality can be described by several characteristics. On the one hand, experience, such as age and tenure has been associated with sound decision-making and firm's business strategy (Qi et al., 2018; Bravo and Reguera-Alvarado, 2018). Older directors or managers might be more risk-averse and conservative than younger board members, affecting ethical values (Hambrick and Mason, 1984) and consequently, the quality of financial reports (Huang et al. 2012). Tenure is also considered a crucial factor that reflects experience through the opportunity of acquiring a set of skills that contribute to decision making (Bravo and Reguera-Alvarado, 2018). On the other hand, expertise, such as directors' education, increases boards'

effectiveness and positively impacts on firms' management (Hambrick and Mason, 1984) and financial reporting (Aier et al., 2005). Board of directors that hold business qualifications (i.e. MBA or CPA), decrease accounting restatements (Aier et al., 2005) and firms which optimally shift to an accounting expert from their prior suboptimal choice of no accounting expert have greater earnings quality (Bryan et al., 2013). Expertise is also acquired through networking e.g. number of directorships (Ferris et al., 2003; Renneboog and Zhao, 2011). A large network facilitates access to valuable outside information, such as opportunities for expanding into a new market or merging with another business (Kaplan and Reishus, 1990), as well as, increasing access to politicians and regulators (Hillman, 2005; Pascual-Fuster and Crespi-Cladera, 2018).

Since group effectiveness is established by the role of processes that mediate group composition and performance (Gladstein, 1984), the quality of the directors as a group becomes relevant in disentangling the role of female directors on board effectiveness. Since board quality affects the dynamics of decision making, **as highlighted by Nahum and Carmeli (2020)**, it would not be surprising to find that it influences the opportunities to shape board decisions and actions from female directors. That is, board members might act as enablers or deterrents in facilitating the contribution from female directors in terms of developing strategy and monitoring. Nielsen and Huse (2010) distinguish that board decision-making culture and board working structure facilitate board ability to exchange knowledge effectively and board interaction, respectively. Therefore, it follows that although board quality could be regarded as a valuable mechanism in terms of corporate governance practices (Denis and McConnell, 2003), it might also promote group cohesiveness, reducing the opportunity for intergroup communication and diminishing interpersonal support (Forbes and Milliken, 1999). Also, board quality potentially mirrors structural, expert, and prestige powers which pertain hierarchical authority and perceptions of influence (Finkelstein, 1992). Female directors (i.e.

as the minority group) have lower cohesion within the board and are likely to experience higher levels of conflict than their male counterparts that identify more strongly with the group (Mathisen et al., 2013). Therefore, board of directors' attributes such as experience and expertise could be significant in terms of explaining the effect of gender diversity on a firm's outcome, either inhibiting or enhancing the potential for an effective contribution from female directors. Although board quality might contribute to facilitate monitoring activities that would increase transparency (Adams and Ferreira, 2009; Gull et al., 2018), it might also indirectly hinder the contribution from female directors in the boardroom, leading to the following hypothesis:

H2a: *Ceteris paribus, the negative association between female directors and earnings management is offset in companies with high-quality boards.*

While board quality assists in decreasing earnings management, it might interfere with board dynamics that hinder the influence from female directors towards earnings management. From that perspective, another consideration towards effective board dynamics is the unfettered power from a board member (i.e. CEO power through duality as suggested by Efendi et al., 2007) that might add to the limitation of female directors' actions to reduce earnings management. A dominant CEO might aggravate information asymmetry between the firm's leadership and the board (Kim et al., 2009), lead to conflict that may affect team decision making (Friedman, 2014) and accelerate decision-making without board consultation especially in uncertain environments (Chang et al., 2019). As CEO power compromises board independence (Park et al, 2018) and boards' provision of monitoring (Tuggle et al, 2010), the effectiveness to oversee managerial activities might decrease (Adams et al., 2005) despite the implementation of other internal corporate governance mechanisms (i.e. board quality). The separation between the roles of CEO and Chair is considered as an indicator for good corporate

governance, enhancing the effectiveness of board monitoring and quality audits (Bliss, 2011), which is encouraged by high quality boards.

CEO/Chair duality has been found to weaken the positive relationship of the audit committee towards earnings quality and the increasing effect of board independence on the quality of internal control (Khlif and Samaha, 2019), especially when the dominant CEO is overconfident (Capalbo et al., 2018). Eagly and Carli (2003) suggest that because female directors have difficulties to reach a board membership, there is significant pressure to coerce with other board members, especially in the presence of a powerful CEO, which might impact on monitoring efficacy. Therefore, under the premise that board monitoring activities are more effective in a richer information environment, indicating quality (Chen et al., 2015) alongside cohesiveness (Nahum and Carmeli, 2020), high quality boards in firms with less powerful CEOs might enable female directors' contribution, increasing their effectiveness in the reduction of earnings management. That is, the interaction of female directors with board quality might shape the opportunity to decrease earnings management, but it would be dependent on the level of board quality and CEOs power, leading to the following hypotheses:

H2b: *Ceteris paribus, board quality is an enabler for the contribution of female directors in reducing earnings management in the absence of CEO power.*

3. Data, measurement of the variables and model

3.1 Data

The sample of companies is obtained from the S&P Composite 1500 Index for the period 2000 to 2016. Financial information and firms' age are obtained from the Datastream and Compustat databases, respectively. Data on board of directors is from BoardEx. After excluding financial firms and firms with missing information, we have a final sample of 848 non-financial firms with 8,902 firm-year observations. All continuous variables of financial data have been winsorized at the 98% level to deal with the presence of outliers (Bharath and Shumway, 2008).

3.2 Measurement of the variables

Dependent variable: earnings management

Earnings management is a proxy for financial reporting transparency, where high earnings management means low transparency and vice versa.

Accrual earnings management (Healy and Wahlen, 1999) is an approach to measure earnings management, which includes both discretionary (mandated by firms' managers) and non-discretionary accruals (mandated by standard-setting bodies, such as securities exchange commissions and the board of financial accounting standards). Total accruals as a proxy for earnings management enables us to observe how managers manipulate accounting reports (e.g. when a firm's expenses have been capitalised or their revenues reduced). Managers might more commonly alter accruals aiming to present a target profit to shareholders (Kothari et al., 2005), especially for short-term accruals (Arun et al., 2015). **In addition, according to previous literature on earnings management measures, accruals measure seems to be the a common strategy because managers can artificially alter their earnings in a way that is hard to detect by outsiders (Triki Damak, 2018).** With this consideration, earnings management is measured following Kothari et al. (2005), by adjusting the Jones' (1991) model, with the inclusion of return on assets:

$$TA_{i,t} = \alpha_0 + \alpha_1 (1/A_{i,t-1}) + \alpha_2 (\Delta REV_{it} - \Delta REC_{it}) + \alpha_3 (PPE_{it}) + ROA_{it} + e_{it} \quad [1]$$

TA_{it} represents total accruals of a firm calculated as earnings before extraordinary items minus cash flow from cash flow statements³; $A_{i,t-1}$ is total assets; ΔREV_{it} is the annual change in firm revenues; ΔREC_{it} is the annual change in receivables; PPE_{it} is the gross property, plant and equipment; ROA_{it} represents return on assets. The absolute value of residual discretionary accrual is used to test the research hypotheses, where a high value

³ Discretionary accruals are more accurate in cash flow statements when unexpected circumstances occur to firms, such as mergers and acquisitions (Hribar and Collins, 2002).

indicates high earnings management and vice versa. In the analyses to follow, we also use other measures of earnings management for robustness purposes. **In order to avoid problems of coefficient bias or model specification that may result from using two stage least squares, as highlighted by Chen et al. (2018), system GMM is used with adding female industry ratio as an external instrumental variable.**

Main explanatory variables

Female and independent-female directors' ratios. The female ratio is the proportion of female directors on a board measured as the total number of female directors divided by board size (Adams and Ferreira, 2009). The independent-female ratio is calculated as the proportion of independent-female directors to total independent directors (Terjesen et al. 2016).

Board quality. We use principal component analysis (PCA) to measure the human capital quality of the board (i.e. board quality) based on four attributes: age, tenure, business qualifications and network. Age is the average age of all directors in a board (Sena et al., 2018). Tenure is the average number of years that directors have served on the board (He and Yang, 2014). Business qualifications is the total of either a MBA or a Certified Public Accountant (CPA) qualification to board size (Lara et al., 2017). Network size is the average of networking contacts of all directors to board size.

The PCA analysis resumed four attributes into two principal components: experience (age and tenure) and expertise (business qualifications and network size). Both components were above an eigenvalue of 66 per cent of variance of the sample data, certifying their validity (Carcello et al., 1992). Table 1 presents the summary of the PCA components. The value of the Kaiser-Meyer-Olkin (KMO) test, which varies from zero to one, indicates sampling adequacy (i.e. > 0.5).

The Bartlett's test examines the correlation matrix of the variables used in the PCA, with a null hypothesis of no correlation among variables, favouring the suitability of the PCA.

Insert Table 1 about here

CEO power is a dummy variable that equals one if a firm's Chair is also the CEO, and zero otherwise (Srinidhi et al., 2011). Duality might increase agency conflicts that lead to poor performance and earnings management (Gavious et al., 2012).

Control variables

Board size is the logarithm of the total number of directors on the firm's board. It is expected that larger boards lead to ineffective monitoring (Gavious et al., 2012), but also might benefit from the diversity of directors' skills and experience (Lehn et al., 2009). *Board independence* refers to the independent directors on a company's board, measured by the number of independent directors to board size. *Firms' size* is the logarithm of total assets. Larger firms might face pressure to meet investors' expectations (Srinidhi et al., 2011), and consequently encourage earnings management (Arun et al., 2015). *Firms' age* is the number of years a firm has reported total assets in COMPUSTAT, with the baseline as 1977 (Srinidhi et al., 2011). *Market-to-book ratio* represents firms' growth and is the ratio of market value to book value (Srinidhi et al., 2011). Higher market to book ratios indicate higher growth, which might possibly provide an incentive for managers to increase earnings management to maintain value increases (Sun et al., 2011). *Leverage* is the ratio of total liabilities to total assets. Managers might have an incentive to manipulate earnings in order to have lower debt costs (Peni and Vähämaa, 2010). *Loss* is a dummy variable that equals to one when firms make a loss in EBIT, and zero otherwise. Firms that continue a tendency for making losses might prompt managers to engage in income boosting (Bradbury et al., 2006). *Return on assets (ROA)* is the ratio of EBIT to total assets, as a proxy for a firm's performance. *Big4* is a dummy variable that equals one for firms audited by a 'big four' company (Deloitte, PwC, KPMG and Ernst Young) and zero otherwise. Firms audited by a Big4 company are expected to lessen earnings management because of greater scrutiny through the auditing process (Peni and Vähämaa, 2010; Sun et al.,

2011). *All seats* is the external seats of all directors to number of directors (Adams and Ferreira, 2009).

3.3 Research model

The main model to test the hypotheses is as follows:

$$EM_{it} = \alpha_i + \beta_1 \text{female}_{it} + \beta_2(\text{moderator}) + \beta_k \text{control_variables}_{it} + \varepsilon_{it} + \eta_i \quad [2]$$

where EM represents earnings management. Female indicates the proportions of total female directors to board size or independent-female directors to board independence. Moderator is an interaction term of the female ratio with board quality (i.e. experience and expertise) to test H2a and also with CEO/Chair duality to test H2b. Control variables include board size, board independence, firm size, firm age, market_to_book, ROA, leverage, Loss, Big 4 and all seats.

4. Empirical results

4.1 Descriptive statistics

Table 2, panel A presents differences in means for variables in the two groups: i) at least one female director on the board and, ii) all-male boards. Earnings management in firms with female directors is significantly lower (0.05) than firms with all-male boards (0.07). There is a significant difference between the two groups in all the variables but the market to book ratio. The number of companies with female directors in the sample is 7,569 out of 8,902 firms-year observations, from which only 376 firms have exclusively executive female directors and 7,193 have at least one female-independent director. Firms with at least one female director have larger and more independent boards, where directors are older, have larger tenures and network sizes, but less business qualifications. They are more commonly audited by a BIG4 and have more CEO/Chair duality, larger ROAs and more leverage. These companies are also older and larger with fewer losses. Table 2, panel B presents statistics regarding the total number of directors in the sample, for which 14.5% are female directors, 12.9% are independent-female directors and 64.5% are independent male directors.

Insert Table 2 about here

Table 3 presents the correlation matrix. Correlation indices larger than 0.45 were identified between the following variables: Big4 and firm size, financial qualification and board size, network size and firm size, board size and firm size, and, loss and ROA. Variance inflation factors (VIF) were calculated indicating that there is no a multicollinearity problem as the factors were less than the critical value of 10 (O'Brien, 2007), being the highest 2.87.

Insert Table 3 about here

4.2 Main Empirical Analyses

The analyses follow system-GMM methods to address endogeneity concerns (e.g. a board with higher quality is more likely to have female directors on board and vice versa). Besides the lags of the endogenous variables, we use the female industry ratio as an additional instrument (Liu et al., 2014), as female directors might be inspired by other female directors according to industrial sectors (measured by the two-digit industry codes), where competitors are likely to follow gender diversity practices of other firms within the same industrial sector.

Table 4 reports the initial results. Column (1) shows the effect of all female directors on EM, which is significant and negative. Column (2) presents the impact of independent female directors on EM, which is also significant and negative. In column (3), we test H1 by estimating the effect of independent-female and inside-female directors separately. We find that only independent-female directors are significant in influencing EM in support of H1. To corroborate that such effect is not only due to independency, we exclude inside-female directors from the regression in column (4) and substitute it with independent-male directors, which confirms our results.

We find that firms' size, firms' age, ROA and leverage have a negative association with EM. These results might explain that larger firms with higher growth tend to have less EM, which

might result from having strong internal controls and being audited by a Big4. In addition, older firms are more likely to have established a sound reputation for investors' protection through complying with good corporate governance practices (Srinidhi et al., 2011; Arun et al., 2015). Also, firms with high leverage might lessen EM because higher debt means lower availability of cash. Higher levered firms would undergo creditors' scrutiny being therefore more restricted for EM (Jensen, 1986). The market to book ratio and loss dummy are positively associated with EM, suggesting that managers recognize the impact of achieving expected earnings on stock prices (Srinidhi et al., 2011; Sun et al., 2011) and consequently have more incentives to alter accrual earnings to avoid reporting losses (Bradbury et al., 2006). These findings remain consistent throughout all analyses, albeit significance decreases in system-GMM regressions.

Insert Table 4 about here

Table 5 presents the results for the moderating board quality effect on female directors and EM. Board quality is represented by two indices calculated with PCA, i.e. expertise and experience. The direct effect of board quality on EM is negative and significant in all models, which is consistent with the results of Aier et al., (2005), and Agrawal and Chadha, (2005) with respect to the importance of expertise through business qualifications such as CPA and MBA, and its association with lower EM. Likewise, the negative effect of experience is consistent with Huang et al. (2012) and Hazarika et al. (2012) who found that experience acquired through age and tenure decreases EM because of the increase of risk aversion and conservative attitudes. We find that the interaction term of the female ratio with board quality is negative (H2a), albeit not significant. To investigate further, we subsample two groups to represent high (75th percentile) and low (25th percentile) board quality as presented in columns 3 to 6. In support of H2a, we find that the interaction term of board quality and female directors is significant and positive on explaining EM only in companies with high quality boards, suggesting that high

quality boards deter the contribution from female directors towards reducing earnings management.

Insert Table 5 about here

In Table 6, we test the significance of the moderating effect of board quality by accounting the opportunities for female directors to engage in delivering their roles successfully when CEOs are more powerful i.e. CEO/Chair duality (Tuggle et al., 2010). The results show that board quality enables the actions of female directors when CEOs are less dominant (in support of H2b), possibly because CEOs entrenchment weakens the monitoring ability of the board (Khlif and Samaha, 2019).

Insert Table 6 about here

4.3 Further analyses

4.3.1 SOX and the financial crisis

The Sarbanes-Oxley Act (SOX) in 2002 highlights the importance of good corporate governance practices and the establishment of regulation for investors' protection (Bhagat and Bolton, 2013). The requirement for more regulation might accentuate the role of the board of directors in not only overseeing managerial performance but also in influencing the actions of other board members to fulfil their roles (i.e. female directors). The function of board quality as a moderator of the relationship between female ratio(s) and earnings management might be more relevant before regulation were established.

In unreported regressions, we subsample to test the effect of board quality in influencing the stand of female directors towards EM considering the effect of SOX with data before regulation (2000-2001) and after regulation (2002 onwards). We do not find significant results on the interaction of board quality and female directors by considering the introduction of SOX regulation.

Similarly, literature provides a link between incentives for earnings management and market conditions, such as the 2008 financial crisis as a drastic economic event (Kousenidis et al., 2013). In this context, the quality of the board might be relevant in moderating the actions of its members towards decreased earnings management to maintain transparency (under no drastic events) or regain investors' confidence during the financial crisis (Filip and Raffournier, 2014). By contrast, increasing earnings management might be relevant to deal with the negative effect of the financial crisis on firms' performance to achieve target earnings (Habib et al., 2013). In unreported regressions, we test the effect of before (2000-2006), during (2007-2009) and after (2010-2016) the financial crisis (Filip and Raffournier, 2014) and find that board expertise moderates negatively the actions of female directors before and during the financial crisis. This finding is therefore consistent with the arguments above, which suggest that during the financial crisis board quality leaned towards maintaining investors' confidence by reducing earnings management. Whereas, after the financial crisis board quality favoured (albeit non-significantly) earnings management, possibly to achieve target profits.

4.3.2 Alternative measures of EM

We test the consistency of the results by using three additional measures of EM. First, an accruals model as proposed by Pae (2005), which includes cash flow operations (CFO) to increase the power of the modified Jones' model (1991). Pae (2005) found that by adding cash flow from operations increases the power in predicting accruals in comparison to the Jones model 1991, which loses accuracy in firms with extreme cash flow - calculated as follows:

$$TA_{i,t} = \alpha_0 + \alpha_1 (1/A_{i,t-1}) + \alpha_2 (\Delta REV_{it} - \Delta REC_{it}) + \alpha_3 (PPE_{it}) + CFO_{it} + CFO_{it-1} + e_{it} \quad [3]$$

The results (unreported) for this model remain consistent with previous findings.

Second, we use the modified Jones model by Dechow et al. (1995) as it is commonly used in the literature. This measure of earnings management is equivalent to equation [1] above but excludes ROA. The results (unreported) are consistent with our inferences.

Third, we use a measure of real earnings management (REM), which is more likely to capture managers' discretionary actions, especially because auditor and regulators have been more able to detect accrual earnings management after SOX in 2002 (Cohen and Zarowin, 2010). To measure REM we first follow Roychowdury (2006) to detect real earnings management by calculating abnormal cash flow from operations (CFO), abnormal production costs (PROD) and abnormal discretionary expenses (DISC) as follows:

$$\frac{CFO_{it}}{A_{it-1}} = \beta_1 \frac{1}{A_{it-1}} + \beta_2 \frac{Sales_{it}}{A_{it-1}} + \beta_3 \frac{\Delta Sales_{it}}{A_{it-1}} + \mu_{it} \quad [4]$$

$$\frac{PROD_{it}}{A_{it-1}} = \beta_1 \frac{1}{A_{it-1}} + \beta_2 \frac{Sales_{it}}{A_{it-1}} + \beta_3 \frac{\Delta Sales_{it}}{A_{it-1}} + \beta_4 \frac{\Delta Sales_{it-1}}{A_{it-1}} + \mu_{it} \quad [5]$$

$$\frac{DISX_{it}}{A_{it-1}} = \beta_1 \frac{1}{A_{it-1}} + \beta_3 \frac{\Delta Sales_{it}}{A_{it-1}} + \mu_{it} \quad [6]$$

where, A represents total assets and μ is the residual value for each of the abnormal components of real earnings management. Herewith, we proxy REM with the residuals of the previous equations as in Cohen et al. (2008):

$$REM = \mu_{PROD} + (-1 * \mu_{CFO}) + (-1 * \mu_{DISX}) \quad [7]$$

Table 7 presents the results when using REM as a dependent variable. The interactions of board expertise with the female ratio are negative and significant in firms with less dominant CEOs and in firms with high board quality consistent with previous findings.

 Insert Table 7 about here

4.3.3 Institutional ownership

In unreported regressions, we consider institutional ownership as a control variable, which was excluded from the main regressions because it reduces the sample size to 4,508 observations. Institutional ownership in US corporations has increased considerably since 1980, from 9% to 67% in 2010 (Sakaki et al., 2017). As institutions are major shareholders, focusing on long-term objectives (Chung et al., 2002), they are incentivised to monitor managers and influence

board decisions (Yang et al., 2009). Institutional investors are interested in achieving long-term returns and limit opportunistic behaviour by managers who wish to manipulate earnings, hence acting as a complementary mechanism to mitigate discretionary accruals (Koh, 2003). A possibility would be that the influence of female directors and the moderating effect of board quality on EM could be reduced when controlling the presence of institutional ownership in our model. However, we find that our results remain consistent with our previous findings.

4.3.4 The quality of female directors

In table 8 we repeat the analysis to consider the quality of female directors as opposed to the quality of the board. We use PCA (table 9) with four attributes of female directors - age, tenure, business qualification and network size and create two components, which are above the threshold of one, explaining the majority of the sample variation. The first component includes ‘female age’ and ‘tenure’, the second includes only ‘network size’. To measure quality consistently to the above analysis, we consider a third component representing business expertise captured with ‘female business qualifications’ as a quality attribute. We find that network size is positive and significant in moderating the effect of female and independent-female directors on EM, suggesting that a large network proxies for busyness as opposed to expertise which in return might reduce the efficiency of the directors’ monitoring performance (Fich and Shivdasani, 2006).

Insert Table 8 about here

Insert Table 9 about here

5. Discussion of empirical findings

Gender diversity on boards has been a topic of debate among researchers and policy makers in terms of providing better corporate governance and financial reporting quality (Adams and Ferreira, 2009; Arun et al., 2015; Srinidhi et al., 2011; Chen et al., 2016). Findings regarding

the increased effectiveness of boards with female directors have led to implementing recommendations on Codes of Corporate Governance and quota systems in some countries. Female directors have been found to be more conservative and risk-averse than male directors (Hambrick and Mason, 1984). In addition, based on agency theory, female directors reinforce board independence by increasing monitoring of the corporate financial accounting process, especially when considering their positive demographic attributes (Gull et al. 2018). In our analysis, we distinguish the role of the independent female director from the perspective of resource dependence theory, which explains that directors are also valued by their input on strategy and not only monitoring as described by the agency theory (Jensen and Meckling, 1976). Additionally, we argue that demographic attributes go beyond the female directors to account for the quality of the board as a whole, **taking the upper echelon theory into consideration**. That is, we contribute to the extant literature by recognizing that the effectiveness of a female director on decreasing earnings management is a function of the environment in which decision making takes place (i.e. board quality).

By considering the quality of the board as a main factor that moderates the relationship between female directors and earnings management, we acknowledge the relevance of the demographic characteristics of the directors, such as age, tenure, business qualifications and network; and in particular recognize that the ability to make decisions influences the effectiveness of female directors. Board quality is measured using principal component analysis in where two components are identified, named board experience (captured by average director age and tenure), and board expertise (captured by average business qualifications and network size).

The initial finding is a negative and significant association between female directors' and earnings management, in particular showing that independent female directors are the main driver of this effect (H1). This is probably because independent directors also contribute to strategy increasing the effectiveness on decision making (Du Plessis et al., 2005; Terjesen et

al., 2016; [Zalata et al., 2022](#)). The negative and significant effect is in line with the notion that female directors positively impact on the accounting quality (Lara et al., 2017), and in comparison to male directors they are more sensitive to reputational concerns (Srinidhi et al., 2011). [This result implies the benefits of the skills and expertise that independent female directors can bring to board discussions, as suggested by resource dependency theory.](#)

Awareness of the consequences of earnings management are more apparent as board experience and expertise increases, which improves firm's strategy and decision making (Hazarika et al., 2012; Bravo and Reguera-Alvarado, 2018), and provides more knowledge in terms of business operations and earnings management (Aier et al., 2005; Agrawal and Chadha, 2005). Based on these aspects, a significant contribution is that we measure the environment (i.e. as with board quality) in which female directors perform their role, [using upper echelon theory and agency theory.](#) We find support for H2a and H2b, suggesting that board quality (i.e. experience and expertise) moderates the relationship of female directors and earnings management in firms with high quality boards and less powerful CEOs, respectively. That is, the negative effect of female directors on earnings management reduces (albeit still negative) in high quality boards but becomes more negative with less powerful CEOs. [A positive association of board quality with board decisions, ultimately improving firms' reporting quality, has previously been noted by Bryan et al. \(2013\) and Bravo and Reguera-Alvarado \(2018\).](#)

In particular, we highlight that despite board quality is regarded as a positive corporate governance attribute for board effectiveness (Denis and McConnell, 2003), it deters the contribution of female directors towards the reduction of earnings management (H2a). A possible explanation for this effect stands with the access of minority groups (i.e. female directors) to participate on board decision making. High quality boards are less open for intergroup communication (Forbes and Milliken, 1999), which limits the involvement of female directors. Therefore, when board quality is high, directors would incline to lessen

earnings management, decreasing but not removing the similar negative effect from female directors. This moderating effect of board quality reverses when the CEO is less powerful (H2b), suggesting that the benefits of board quality extend to enable female directors' immersion on board dynamics, which consequently increases the reduction of earnings management. The effects of CEO power and how it can weaken internal control and the monitoring function of the board has been noted by Bliss (2011) and Khlif and Samaha (2019). Finally, we conclude that the quality attributes of the board as a whole are more relevant than the attributes of the female directors as a group. The effect of female directors on earnings management is generally not influenced by their attributes, with the exception of network size, which mitigates the negative effect of female directors on earnings management. This result is possibly because a large network is a proxy of busyness through being actively involved in more than one company, consequently reducing effective monitoring (Fich and Shivdasani, 2006).

6. Conclusion:

As discussed earlier, previous findings on female directors and earnings management are equivocal, and therefore our examination took a different angle in order to elaborate this relationship. This new angle focuses on investigating female directors' roles, if any, in the issue of earnings management, along with shedding light on the environments in which such activities take place.

Based on agency theory, we know that female directors contribute positively with respect to enhancing board independence and increasing board monitoring. However, in practice the role of independent female directors is more relevant not merely as board monitors but also as strategy providers when compared to insider female directors (Reguera-Alvarado and Bravo, 2017), according to our finding that there is a negative association between independent female directors and earnings management. This finding is supported by resource dependence theory,

explaining the value of independent directors for a company's strategy not only because of their monitoring role in relation to a firm's managerial behaviour, but also by their effectiveness in increasing the quality of that firm's decision-making (Terjesen et al., 2016).

Along with the gender of a firm's directors, board decision-making processes can also be affected by the board's quality, such as the directors' experience and expertise, and leadership power (e.g. the CEO's duality). Therefore, these factors might also have an influence on female directors' actions towards reducing earnings management, and may provide an explanation for previous inconsistent results. By adding these factors, this examination offers novel ideas relating to the changes resulting from the 'female directors' effect' on earnings management, based on the board environment in which decision-making takes place.

According to the findings in this paper, the effect of female directors is moderated in firms with high board quality and less powerful CEOs. Incorporating board quality allows us to observe that the female directors' effect has less impact on earnings management when board quality is high, a situation that would appear to reflect an awareness of the consequences of earnings management. We also observed that the female directors' effect would limit earnings management, as would board quality, in those firms without CEO duality and the power that goes with that dual role. These observations indicate the dynamic relationships between board directors in terms of their decision-making processes. In order to provide a complete picture of these relationships, we extend the analysis offered by Gull et al. (2018), incorporating female directors' characteristics in order to observe whether their effects on limiting earnings management are a function of their characteristics.

This research is relevant as it distinguishes the female director's role on the board (i.e. independent) and contemplates board quality and the effect of less independent boards through CEO/Chair duality (i.e. with a powerful CEO). In this regard, earnings management indicates transparency on financial reporting, highlighting the importance of the role of the board of

directors in decreasing this practice. This study's findings have implications for all corporations and company shareholders, as well as policymakers, when considering the value of the external appointments of female directors in order to achieve and access the benefits of gender-diverse board membership. In addition, our general result would indicate that the effect of female directors is still positive with regard to reducing earnings management, even when board directors' quality is high. This would support the idea of gender equality or gender diversity in terms of providing transparent and high quality financial report to users and decision makers. The implications of our results will help practitioners and scholars in terms of suggesting a consideration of broader factors that are related to decision-making, in order to further understand female directors' effects on such key issues as board quality and leadership style. Our results are subject to some limitations that could be take into considerations to enhance future research findings. First, based on the Board Ex database, independent directors were placed in a single category (independent/non-executive directors) without distinguishing whether they were completely independent from firms or were 'grey' directors. The latter category refers to individuals who have previously worked in a firm or have any relationship with it, such as being a family member. Therefore, including other databases which give more information on independent directors will enhance the findings of future research. Second, a CEO might have influenced the appointment of independent directors, leading to a friendly relationship between them; this could be problematic especially if those independent directors are members of the remuneration committee. Therefore, examining the effect of independent directors that sit on different committees, such as remuneration or compensation committees, will enhance the results of future research in this area.

References

- Abbott, L. J., Parker, S. and Presley, T. J. (2012). Female board presence and the likelihood of financial restatement. *Accounting Horizons*, 26(4), 607-629.
- Adams, R. and Ferreira, D. (2009) Women in the boardroom and their impact on governance and performance. *Journal of Financial Economics*, 94, 291–309.
- Adams, R. Almeida, H., and Ferreira, D. (2005) Powerful CEOs and their impact on corporate performance. *Review of Financial Studies*, 18(4), 1403–1432.
- Agrawal, A. and Chadha, S. (2005) Corporate governance and accounting scandals. *Journal of Law and Economics*, 48(2), 371–406.
- Aier, J. K., Comprix, J., Gunlock, M. T., and Lee, D. (2005) The financial expertise of CFOs and accounting restatements. *Accounting Horizons*, 19(3), 123–135.
- Anderson, R. C., Mansi, S. A., and Reeb, D. M. (2004). Board characteristics, accounting report integrity, and the cost of debt. *Journal of Accounting and Economics*, 37(3), 315–342.
- Arun, T., Almahrog, Y., and Aribi, Z. (2015) Female directors and earnings management: evidence from UK companies. *International Review of Financial Analysis*, 39(1), 137–146.
- Barua, A., Davidson, L. F., Rama, D. V., and Thiruvadi, S. (2010) CFO gender and accruals quality. *Accounting Horizons*, 24(1), 25-39.
- Beasley, M. (1996) An empirical analysis of the relation between the board of director composition and financial statement fraud. *The Accounting Review*, 71(4), 443–465.
- Bishop, C.C., De Zoort, F.T., and Hermanson, D.R. (2016) The effect of CEO social influence pressure and CFO accounting experience on CFO financial reporting decisions. *Auditing: A Journal of Practice and Theory*, 36(1), 21-41.
- Bhagat, S. and Bolton, B.J. (2013) Director ownership, governance, and performance. *Journal of Financial and Quantitative Analysis*, 48, (1), 105-135.
- Bharath, S. and Shumway, T. (2008) Forecasting default with the Merton distance to default model. *Review of Financial Studies*, 21, 1339–1369.
- Bliss, M.A. (2011) Does CEO duality constrain board independence? Some evidence from audit pricing. *Accounting and Finance*, 51(2), 361–380
- Bradbury, M., Mak, Y. and Tan, S. (2006) Board characteristics, audit committee characteristics and abnormal accruals. *Pacific Accounting Review*, 18(2), 47–68.
- Bravo, F. and Reguera-Alvarado, N. (2018) Do independent director's characteristics influence financial reporting quality? *Spanish Journal of Finance and Accounting* 47(1), 25–43.
- Bryan, D., Liu, M. C., Tiras, S. L., and Zhuang, Z. (2013). Optimal versus suboptimal choices of accounting expertise on audit committees and earnings quality. *Review of Accounting Studies*, 18(4), 1123-1158.
- Capalbo, F., Frino, A., Lim, M.Y., Mollica, V., and Palumbo, R. (2018) The impact of CEO narcissism on earnings management. *Abacus*, 54(2), 210-226.
- Carcello, J. V., Hermanson, R. H., and McGrath, N. T. (1992) Audit quality attributes: the perceptions of audit partners, preparers, and financial statement users. *Auditing: A Journal of Practice and Theory*, 11(1), 1–15.
- Chang, K., Lee, J., and Shim, H. (2019) CEO Duality and Firm Performance: Does Economic Policy Uncertainty Mediate the Relation? *International Review of Finance*, 9(4), 877–891.
- Chen, G. L., Crossland, C. and Huang, S. (2016) Female board representation and corporate acquisition intensity. *Strategic Management Journal*, 37, 303–313.
- Chen, X., Cheng, Q., and Wang, X. (2015). Does increased board independence reduce earnings management? Evidence from recent regulatory reforms. *Review of Accounting Studies*, 20(2), 899–933.
- Chen, W. E. I., Hribar, P., and Melessa, S. (2018). Incorrect inferences when using residuals as dependent variables. *Journal of Accounting Research*, 56(3), 751–796.

- Chung, R., Firth, M. and Kim, J. (2002) Institutional monitoring and opportunistic earnings management. *Journal of Corporate Finance*, 8(1), 29–48.
- Cohen, D. A., Dey, A. and Lys, Z. T. (2008) Real and accrual-based earnings management in the pre- and post-Sarbanes-Oxley periods. *The Accounting Review*, 83, 757-787.
- Cohen, D.A. and Zarowin, P. (2010) Accrual-based and real earnings management activities around seasoned equity offerings. *Journal of Accounting and Economics*, 50, 2-19.
- Conyon, M. J., and He, L. (2016) Executive compensation and corporate fraud in China. *Journal of Business Ethics*, 134(4), 669-691.
- Cummings, D., Leung, T., and Rui, O. (2015) Gender Diversity and Securities Fraud. *Academy of Management Journal*, 58, 1572–1593.
- Dang, R. and Nguyen, D. K. (2016) Does board gender diversity make a difference? New evidence from quantile regression analysis. *Management International*, 20(2), 95–106.
- Dechow, P. M. and Skinner, D. J. (2000) Earnings management reconciling the views of accounting academics, practitioners and regulators. *Accounting Horizons*, 14(2), 235–50.
- Dechow, P. M., Sloan, R. G., and Sweeney, A. P. (1995) Detecting earnings management. *Accounting Review*, 193-225.
- Denis, D. K. and McConnell, J. J. (2003) International corporate governance. *Journal of Financial and Quantitative Analysis*, 38(1), 1–36.
- Dobija, D., Hryckiewicz, A., Zaman, M., and Puławska, K. (2021) Critical Mass and Voice: Board Gender Diversity and Financial Reporting Quality. *European Management Journal*.
- Du Plessis, P. J., Jooste, C. J., and Strydom, J. W. (2005) Applied strategic marketing, 2nd edition. Sandton: Heinemann.
- Du, X., Jian, W. and Lai, S. (2017) Do foreign directors mitigate earnings management? Evidence from China. *The International Journal of Accounting*, 52(2), 142-177.
- Dunn, P. (2012) Breaking the boardroom gender barrier: the human capital of female corporate directors. *Journal of Management and Governance*, 16(1), 557–570.
- Efendi, J, Srivastava, A., and Swanson, E. (2007) Why do corporate managers misstate financial statements? The role of option compensation and other factors. *Journal of Financial Economics*, 85, 667–708.
- Ferreira, D. (2015) Board diversity: Should we trust research to inform policy? *Corporate Governance: An International Review*, 23(2), 108-111.
- Ferris, S.P., Jagannathan, M., and Pritchard, A.C. (2003) Too Busy to Mind the Business? Monitoring by Directors with Multiple Board Appointments. *Journal of Finance*, 58(3), 1087-111.
- Fich, E. M. and Shivdasani, A. (2006) Are busy boards effective monitors? *Journal of Finance*, 61(2), 689–724.
- Filip, A. and Raffournier, B. (2014) Financial Crisis and Earnings Management: The European Evidence. *The International Journal of Accounting*, 49 (1), 455–478.
- Finkelstein, S. (1992) Power in top management teams: Dimensions, measurement, and validation. *Academy of Management Journal*. 35(3). 505–538.
- Forbes, D.P. and Milliken, F.J. (1999) Cognition and corporate governance: Understanding boards of directors as strategic decision-making groups. *Academy of Management Review*, 24(3), 489–505.
- Francis, B., Hasan, I., Park, J.C., and Wu, Q. (2015) Gender differences in financial reporting decision making: Evidence from accounting conservatism. *Contemporary Accounting Research*, 32(3), 1285-1318.
- Friedman, H.L. (2014) Implications of power: When the CEO can pressure the CFO to bias reports. *Journal of Accounting and Economics*. 58(1), 117-141.
- Gavious, I., Segev, E., and Yosef, R. (2012) Female directors and earnings management in high-technology firms. *Pacific Accounting Review*, 24(1), 4–32.

- Gladstein, D. L. (1984) Group in context: A model of task group effectiveness. *Administrative Science Quarterly*, 29, 499–517.
- Gull, A. A., Nekhili, M., Nagati, H., and Chtioui, T. (2018) Beyond gender diversity: how specific attributes of female directors affect earnings management. *The British Accounting Review*, 1(1), 1–20.
- Habib, A., Uddin Bhuiyan, B., and Islam, A. (2013) Financial distress, earnings management and market pricing of accruals during the global financial crisis. *Managerial Finance*, 39(2), 155-180.
- Hall, S. C., Agrawal, V., and Agrawal, P. (2013) Earnings management and the financial statement analyst. *Accounting and Finance Research*, 2(2), 105-111.
- Hambrick, D. C. and Mason, P. A. (1984) Upper echelons: the organization as a reflection of its top managers. *Academy of Management Review*, 9(2), 193–206.
- Harjoto, M., Laksmana, I., and Lee, R. (2015). Board diversity and corporate social responsibility. *Journal of Business Ethics*, 132(4), 641-660
- Hazarika, S., Karpoff, J. M. and Nahata, R. (2012) Internal corporate governance, CEO turnover, and earnings management. *Journal of Financial Economics*, 104(1), 44–69.
- He, L. and Yang, R. (2014) Does industry regulation matter? New evidence on audit committees and earnings management. *Journal of Business Ethics*, 123(1), 573–589.
- Healy, P. M. and Wahlen, J. M. (1999) A review of the earnings management literature and its implications for standard setting. *Accounting Horizons*, 13(4), 365–383.
- Hillman, A. (2005) Politicians on the board of directors: Do connections affect the bottom line? *Journal of Management*, 31, 464–481.
- Hillman, A. J. and Dalziel, T. (2003) Boards of directors and firm performance: integrating agency and resource dependence perspectives. *Academy of Management Review*, 28(3), 383–396.
- Hoitash, U., Hoitash, R. and Bedard, J.C. (2009) Corporate governance and internal control over financial reporting: a comparison of regulatory regimes. *The Accounting Review*, 84(3), 839–867.
- Hribar, P. and Collins, D.W. (2002) Errors in estimating accruals: implications for empirical research. *Journal of Accounting Research*, 40(1), 105–134.
- Huang, H. W., Rose-Green, E. and Lee, C. C. (2012) CEO age and financial reporting quality. *Accounting Horizons*, 26(4), 725–740.
- Jensen, M. and Meckling, W. (1976) Theory of the firm: managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), 305–360.
- Jensen, M. (1986) Agency cost of free cash flow, corporate finance, and takeovers. *American Economic Review*, 76(2), 323-329.
- Jermias, J., and Gani, L. (2014) The impact of board capital and board characteristics on firm performance. *The British Accounting Review*, 46(2), 135-153.
- Jones, J. J. (1991) Earnings management during import relief investigations. *Journal of Accounting Research*, 29(2), 193–228.
- Kakabadse, A. P., Kakabadse, N. K. and Knyght, R. (2010) The “chemistry factor” in the Chair/CEO relationship. *European Management Journal*, 28(4), 285–296.
- Kaplan, S.N. and Reishus, D. (1990) Outside directorships and corporate performance. *Journal of Financial Economics*, 27 (2), 389-410.
- Khanna, V., Kim, H. E. and Lu, Y. (2015) CEO connectedness and corporate fraud. *The Journal of Finance*, 70(3), 1203–1252.
- Khelif, H. and Samaha, K. (2019) Board independence and internal control quality in Egypt: does CEO duality matter? *International Journal of Law and Management*, 61 (2), 345-358.

- Kim, K., Al-Shammari, H.A., Kim, B., and Lee, S. (2009). CEO duality leadership and corporate diversification behavior. *Journal of Business Research*, 62 (1), 1173–1180.
- Kim, K.H. and Rasheed, A.A., (2014) Board heterogeneity, corporate diversification and firm performance. *Journal of Management Research*, 14(2), p.121.
- Klein, A. (2002), Audit committee, board of director characteristics, and earnings management. *Journal of Accounting and Economics*, 33(3), 375–400.
- Koh, P. (2003) On the association between institutional ownership and aggressive corporate earnings management in Australia. *The British Accounting Review*, 35(1), 105–128.
- Kothari, S. P., Leone, A. and C. Wasley, C. (2005) Performance matched discretionary accrual measures. *Journal of Accounting and Economics*, 39(1), 163–197.
- Kousenidis, D.V., Ladas, A.C. and Negakis, C.I. (2013) The effects of the European debt crisis on earnings quality. *International Review of Financial Analysis*, 30, 351-362.
- Krishnan, G. V., and Parsons, L. M. (2008) Getting to the bottom line: An exploration of gender and earnings quality. *Journal of Business Ethics*, 78(1-2), 65-76.
- Lara, J. M. G., Osma, B. G., Mora, A. and Scapin, M. (2017) The monitoring role of female directors over accounting quality. *Journal of Corporate Finance*, 45(1), 651–668.
- Lehn, K.M., Patro, S. and Zhao, M. (2009) Determinants of the Size and Composition of US Corporate Boards: 1935-2000. *Financial Management*, 38 (4), 747-780.
- Liu, Y., Wei, Z. and Xie, F. (2014) Do women directors improve firm performance in China? *Journal of Corporate Finance*, 28, 169–184.
- Liu, Y., Wei, Z. and Xie, F. (2016) CFO gender and earnings management: evidence from China. *Review of Quantitative Finance and Accounting*, 46 (1), 881–905.
- Marques, M., Rodrigues, L.L. and Craig, R. (2011). Earnings management induced by tax planning: The case of Portuguese private firms. *Journal of International Accounting, Auditing and Taxation*, 20(2), pp.83–96. doi:10.1016/j.intaccudtax.2011.06.003
- Mason, E.S. and Mudrack, P.E. (1996) Gender and ethical orientation: a test of gender and occupational socialization theories. *Journal of Business Ethics*, 15 (6), 599-604.
- Mathisen, G. E., Ogaard, T., and Marnburg, E. (2013) Women in the boardroom: how do female directors of corporate boards perceive boardroom dynamics?. *Journal of Business Ethics*, 116(1), 87-97.
- Mnif, Y. and Cherif, I. (2021). Female board directorship and earnings management. *Pacific Accounting Review*, 33(1), 114–141.
- Nahum, N. & Carmeli, A. (2020). Leadership style in a board of directors: Implications of involvement in the strategic decision-making process. *Journal of Management and Governance*, 24(1), 199–227.
- Nekhili, M. and Gatfaoui, H. (2013) Are demographic attributes and firm characteristics drivers of gender diversity? Investigating women's positions on French boards of directors. *Journal of Business Ethics*, 118(1), 227–249.
- Nielsen, S., and Huse, M. (2010) The contribution of women on boards of directors: Going beyond the surface. *Corporate governance: An international review*, 18(2), 136-148.
- O'Brien, R. M. (2007) A caution regarding rules of thumb for variance inflation factors. *Quality and Quantity*, 41(5), 673–690.
- Pae, J. (2005) Expected Accrual Models: The Impact of Operating Cash Flows and Reversals of Accruals. *Review of Quantitative Finance and Accounting*, 24 (1), 5-22.
- Park, G.H., Kim, C., Chang, Y.K., Lee, D.H., and Sung, Y.D. (2018) CEO Hubris and Firm Performance: Exploring the Moderating Roles of CEO Power and Board Vigilance. *Journal of Business Ethics*. 147 (1), 919–933
- Pascual-Fuster, B. and Crespí-Cladera, R. (2018) Politicians in the boardroom: Is it a convenient burden? *Corporate Governance: An International Review*. 26 (2), 448-470.

- Peni, E. and Vähämaa, S. (2010) Female executives and earnings management. *Managerial Finance*, 36(7), 629–645.
- Poletti-Hughes, J. and Briano-Turrent, G.C., 2019. Gender diversity on the board of directors and corporate risk: A behavioural agency theory perspective. *International Review of Financial Analysis*, 62, 80-90.
- Qi, B., Lin, J. W., Tian, G. and Lewis, H. (2018) The impact of top management team characteristics on the choice of earnings management strategies: evidence from China, *Accounting Horizons* 32(1), 143–164.
- Reguera-Alvarado, N. and Bravo, F. (2017) The effect of independent directors' characteristics on firm performance: Tenure and multiple directorships. *Research in International Business and Finance*, 41 (1), 590–599.
- Renneboog, L. and Zhao, Y. (2011) Us knows us in the UK: on director networks and CEO compensation. *Journal of Corporate Finance*, 17(1), 1132–1157.
- Robinson, G. and Dechant, K. (1997) Building a business case for diversity. *Academy of Management Executive*, 11(3), 21–31.
- Ronen, J., and Yaari, V. (2008) Earnings management: Emerging insights in theory, practice, and research. New York: Springer Science and Business Media.
- Roychowdhury, S. (2006). Earnings management through real activities manipulation. *Journal of accounting and economics*, 42(3), 335-370.
- Ruiz-Jimenez, J., Fuentes-Fuentes, M. and Ruiz-Arroyo, M. (2016) Knowledge combination capability and innovation: the effects of gender diversity on top management teams in technology-based firms. *Journal of Business Ethics*, 135(1), 503–515.
- Sakaki, H., Jackson, D. and Jory, S. (2017) Institutional ownership stability and real earnings management. *Review of Quantitative Finance and Accounting*, 49 (1), 227-244.
- Sena, S., Duygun, M., Lubrano, G., Marra, M. and Shaban, M. (2018) Board independence, corruption and innovation. Some evidence on UK subsidiaries. *Journal of Corporate Finance*, 50(1), 22–43.
- Srinidhi, B., Gul, F. A. and Tsui, J. S. L. (2011) Female directors and earnings quality. *Contemporary Accounting Research*, 28, 1610–1644.
- Sun, J., Liu, G. and Lan, G. (2011) Does female directorship on independent audit committees constrain earnings management? *Journal of Business Ethics*, 99(3), 369–382.
- Terjesen, S., Couto, E. B. and Francisco, P. M. (2016) Does the presence of independent and female directors impact firm performance? A multi-country study of board diversity. *Journal of Management and Governance*, 20(3), 447–483.
- Triana, M. D. C., Miller, T. L. and Trzebiatowski, T. M. (2014) The double-edged nature of board gender diversity: Diversity, firm performance, and the power of women directors as predictors of strategic change. *Organization Science*, 25(2), 609-632.
- Triki Damak, S. (2018). Gender diverse board and earnings management: Evidence from French listed companies. *Sustainability Accounting, Management and Policy Journal*, 9(3), 289–312
- Tuggle, S., Sirmon, D., Reutzel, R. and Bierman, L. (2010) Commanding Board of Director Attention: Investigating How Organizational Performance and CEO Duality Affect Board Members' Attention to Monitoring. *Strategic Management Journal*, 31(1), 946–968.
- Volonté, C. and Gantenbein, P. (2016) Directors' human capital, firm strategy, and firm performance. *Journal of Management and Governance*, 20(1), 115–145.
- Westphal, J. D. and Milton, L. P. (2000) How experience and network ties affect the influence of demographic minorities on corporate boards. *Administrative Science Quarterly*, 45, 366–398.

- Xie, B., Davidson III, W. N., and DaDalt, P. J. (2003). Earnings management and corporate governance: the role of the board and the audit committee. *Journal of Corporate Finance*, 9(3), 295-316.
- Yang, W.S., Chun, L.S. and Ramadili, S.M. (2009) The effect of board structure and institutional ownership structure on earnings management. *International Journal of Economics and Management*, 3(2), 332–353.
- Zalata, A. M., Ntim, C. G., Alsohagy, M. H., and Malagila, J. (2022). Gender diversity and earnings management: The case of female directors with financial background. *Review of Quantitative Finance and Accounting*, 58(1), 101–136.

The data that support the findings of this study are available from BoardEx. Restrictions apply to the availability of these data, which were used under license for this study.

Table 1: Summary of PCA components

Indices	Eigenvalue	Components
Experience index (37)	1.482	Director age (55) Director tenure (63) Director business qualification (-37) Network size (-.38)
Expertise index (29)	1.177	Director age (48) Director tenure (28) Director business qualification (57) Network size (59)
KMO test	0.513	
Bartlett's test	chi-square = 2305.756 P = 0.000	

Numbers in brackets after indices indicate variances counted by each index. The loading for each component in both indices is presented after each variable in the third column.

Table 2: Mean difference test between gender-diverse firms and non-gender-diverse firms for full sample.

Panel (A) Mean difference between firm-year observations with female directors and without female directors							
Variables	Full sample		At least one female director		Only male directors		
No. of observations	8,902		7,569		1,333		t-test diff
	(1) Mean	(2) SD	(3) mean	(4) SD	(5) mean	(6) SD	(5)-(3)
Earnings management	0.056	0.068	0.054	0.065	0.072	0.081	0.018***
Big4 auditor	0.866	0.339	0.884	0.319	0.766	0.423	-0.117***
board size	9.239	2.309	9.523	2.270	7.621	1.805	-1.902***
Independent directors	7.209	2.297	7.513	2.253	5.487	1.714	-2.025***
Tenure	9.561	4.421	9.665	4.343	8.973	4.799	-0.691***
Business qualifications	0.404	0.180	0.402	0.176	0.413	0.199	0.010**
Board's average age	60.758	3.974	60.829	3.799	60.357	4.831	-0.471***
Network size	6.787	0.630	6.822	0.631	6.586	0.582	-0.236***
CEO/Chair duality	0.617	0.486	0.623	0.484	0.583	0.493	-0.039***
Loss dummy	0.188	0.391	0.176	0.380	0.261	0.439	0.085***
ROA	0.026	0.145	0.029	0.137	0.006	0.180	-0.023***
Leverage	0.230	0.180	0.232	0.228	0.217	0.204	-0.014***
Firm size	14.291	1.920	14.459	1.896	13.336	1.767	-1.122***
Market to book	1.874	1.700	1.864	1.685	1.929	1.784	0.064
Firms age	21.269	10.236	22.209	10.125	15.930	9.171	-6.279***

Panel (B) Directors statistics by gender

	Mean	SD	Min	max
Female directors %	0.145	0.093	0	0.75
Independent female directors %	0.129	0.087	0	0.50
Male directors %	0.854	0.093	0.25	1
Independent male directors%	0.645	0.136	0	1

*** p<0.01, ** p<0.05, * p<0.1.

Table 3: Correlation

Variable name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Earnings management															
2. female directors %	-0.02														
3. independent female %	-0.00	0.81***													
4. board size	-0.17***	-0.11***	-0.21***												
5. board independence	-0.02*	0.01	-0.29***	0.14***											
6. ROA	-0.25***	0.01	0.00	0.15***	-0.00										
7. Loss	0.26***	-0.00	0.01	-0.18***	-0.02	-0.66***									
8. Leverage	-0.07***	0.00	-0.04***	0.21***	0.11***	-0.03**	0.01								
9. Firm Size	-0.25***	0.01	-0.07***	0.64***	0.20***	0.28***	-0.28***	0.33***							
10. Market to book	0.09***	0.04***	0.02*	-0.10***	0.01	0.10***	-0.04***	-0.04***	-0.15***						
11. Big4 auditor	-0.11***	-0.01	-0.08***	0.34***	0.15***	0.13***	-0.13***	0.15***	0.46***	0.00					
12. firms age	-0.20***	0.02*	-0.08***	0.35***	0.22***	0.18***	-0.20***	0.12***	0.37***	-0.14***	0.10***				
13. Network size	-0.02*	0.07***	-0.02	0.33***	0.18***	0.09***	-0.07***	0.00	0.51***	0.16***	0.20***	0.07***			
14. board directors age	-0.09***	-0.07***	-0.12***	0.15***	0.09***	0.07***	-0.08***	0.06***	0.18***	-0.07***	0.04***	0.30***	-0.00		
15. Tenure	-0.14***	-0.06***	0.01	0.06***	-0.24***	0.16***	-0.16***	-0.11***	0.02*	-0.02*	0.03**	0.37***	-0.14***	0.38***	
16. Financial qualification	-0.11***	-0.04***	-0.13***	0.48***	0.23***	0.12***	-0.10***	0.16***	0.35***	-0.00	0.22***	0.16***	0.24***	-0.03**	-0.07**

*** p<0.01, ** p<0.05, * p<0.1.

Table 4. The effect of female directors and earnings management (EM).

Variables	(1)	(2)	(3)	(4)
Female ratio%	-0.096*** (0.036)			
Independent-female		-0.092*** (0.019)	-0.060*** (0.016)	-0.049** (0.024)
Inside-female			-0.063 (0.043)	
Independent-male				0.015 (0.017)
CEO/Chair duality	-0.001 (0.006)	-0.001 (0.004)	-0.006* (0.004)	-0.005 (0.004)
Big4 auditor	-0.035 (0.040)	-0.028 (0.020)	-0.026* (0.014)	-0.027* (0.015)
ROA	-0.078 (0.051)	-0.088*** (0.031)	-0.067*** (0.025)	-0.057** (0.024)
Loss	0.015** (0.008)	0.010** (0.005)	0.009** (0.004)	0.009** (0.005)
Leverage	-0.002 (0.031)	-0.003 (0.018)	-0.015 (0.014)	-0.008 (0.013)
Firm Size	0.023*** (0.009)	0.001 (0.003)	-0.003 (0.003)	-0.004 (0.003)
Firm age	-0.002*** (0.001)	-0.000* (0.000)	-0.0009 (0.000)	-0.0008* (0.000)
Market to book	0.008*** (0.003)	0.006*** (0.001)	0.002** (0.001)	0.003*** (0.001)
Board size	-0.007 (0.019)	-0.032*** (0.012)	-0.018* (0.011)	-0.013 (0.010)
Board independence	0.018 (0.039)	0.013 (0.021)	0.005 (0.018)	-
EM _{t-1}	0.388** (0.193)	0.089*** (0.024)	0.111*** (0.023)	0.114*** (0.022)
Constant			0.156*** (0.033)	0.145*** (0.030)
Observations	8,054	8,054	8,054	8,054
AR2	0.137	0.737	0.49	0.45
Hansen test	0.357	0.264	0.21	0.12
Diff. in Hansen test	0.229	0.663	0.20	0.11

This table shows the effect of female directors on earnings management with system-GMM. Accruals earnings management is the (1991) Jones model adjusted by ROA. Years dummies are included in all regressions. J test for over-identification condition (p-value). Robust standard errors clustered by firm are in parentheses. P-values are presented for AR (2), Hansen test and Diff-Hansen. AR (2) is a test of second-order serial correlation in the first-differenced residuals, under the null of no serial correlation. Hansen test of over-identification is under the null that all instruments are valid. Diff-in-Hansen test of exogeneity is under the null that instruments used for the equations in levels are exogenous. *** p<0.01, ** p<0.05, * p<0.1

Table 5: The effect of female directors on earnings management, and the moderating effect on board quality (system-GMM)

Variables	All observations		High board quality (75th percentile)		Low board quality (25th percentile)	
	Board expertise	Board experience	Board expertise	Board experience	Board expertise	Board experience
	(1)	(2)	(3)	(4)	(5)	(6)
Female ratio%	-0.116*** (0.025)	-0.068*** (0.021)	-0.172*** (0.040)	-0.284** (0.132)	-0.079* (0.048)	-0.231* (0.126)
Board quality	-0.014** (0.007)	-0.005* (0.003)	-0.014*** (0.004)	-0.006 (0.014)	0.009 (0.007)	-0.011 (0.022)
Female ratio%*(Board quality)	-0.055 (0.036)	-0.016 (0.030)	0.075*** (0.028)	0.144** (0.057)	-0.035 (0.030)	-0.096 (0.067)
CEO/Chair duality	-0.005 (0.004)	-0.003 (0.004)	-0.040** (0.001)	-0.006 (0.011)	-0.014* (0.008)	0.002 (0.014)
Big4 auditor	-0.043*** (0.010)	-0.024 (0.017)	-0.138*** (0.030)	-0.063 (0.083)	-0.024 (0.024)	0.016 (0.055)
ROA	-0.130*** (0.039)	-0.028 (0.039)	-0.068*** (0.020)	0.028 (0.082)	0.018 (0.013)	0.036 (0.098)
Loss	-0.015 (0.014)	0.027** (0.014)	0.026** (0.007)	0.046* (0.045)	0.019*** (0.003)	0.164*** (0.055)
Leverage	-0.073*** (0.028)	-0.024 (0.015)	-0.047*** (0.016)	-0.028** (0.045)	-0.001 (0.023)	-0.209*** (0.073)
Firm Size	0.011*** (0.004)	0.001 (0.003)	0.017*** (0.004)	0.010 (0.017)	-0.012** (0.005)	0.019 (0.014)
Firms age	-0.0003 (0.000)	0.0001 (0.000)	-0.0004** (0.000)	-0.002 (0.001)	-0.001** (0.000)	0.001 (0.002)
Market to book	0.003* (0.002)	0.002* (0.001)	0.008** (0.001)	0.003** (0.012)	-0.002 (0.002)	0.037*** (0.013)
Board size	-0.058** (0.024)	-0.061*** (0.018)	0.002 (0.011)	0.015 (0.030)	-0.014 (0.019)	-0.025 (0.038)
Board independence	0.017 (0.024)	-0.014 (0.021)	0.008 (0.029)	0.147 (0.149)	-0.033 (0.034)	-0.416 (0.274)
EM _{t-1}	0.107*** (0.022)	0.091*** (0.023)	0.058*** (0.018)	0.114*** (0.041)	0.035** (0.014)	-0.118*** (0.044)
Constant	0.078 (0.058)	0.191*** (0.041)	-0.048 (0.050)	-0.058 (0.247)	0.315*** (0.069)	0.133 (0.292)
Observations	8,054	8,054	2,116	2,050	1,850	1,918
AR2	0.609	0.726	0.939	0.731	0.346	0.555
Hansen test	0.443	0.495	0.299	0.102	0.535	0.682
Difference Hansen test	0.553	0.646	0.275	0.189	0.455	0.122

Definitions of all variables are in Appendix 1. Years dummies are included in all regressions. P-values are presented for AR (2), Hansen test and Diff-Hansen. AR (2) is a test of second-order serial correlation in the first-differenced residuals, under the null of no serial correlation. Hansen test of over-identification is under the null that all instruments are valid. Diff-in-Hansen test of exogeneity is under the null that instruments used for the equations in levels are exogenous. *** p<0.01, ** p<0.05, * p<0.10.

Table 6: The moderating effect on board quality and CEO/Chair duality (System-GMM)

	CEO/Chair duality =1		CEO/Chair duality =0	
	Board expertise	Board experience	Board expertise	Board experience
	(1)	(2)	(3)	(4)
Female ratio% (F)	-0.107*** (0.012)	-0.113*** (0.022)	-0.107*** (0.012)	-0.113*** (0.022)
Board quality (BQ)	-0.005*** (0.002)	-0.008*** (0.002)	-0.005*** (0.002)	-0.008*** (0.002)
CEO/Chair duality (CC)	-0.003 (0.002)	0.022 (0.004)	0.003 (0.002)	0.004 (0.003)
F*BQ*CC	-0.006 (0.018)	0.031 (0.028)	-0.095*** (0.029)	-0.208*** (0.065)
Big4 auditor	-0.042* (0.003)	-0.034 (0.021)	-0.042* (0.003)	-0.034 (0.021)
ROA	-0.079*** (0.008)	0.031 (0.027)	-0.079*** (0.008)	0.031 (0.027)
Loss	0.007 (0.002)	0.057*** (0.013)	0.007 (0.002)	0.057*** (0.013)
Leverage	-0.012 (0.008)	-0.034** (0.015)	-0.012 (0.008)	-0.034** (0.015)
Firm Size	0.004*** (0.001)	0.002 (0.004)	0.004*** (0.001)	0.002 (0.004)
Firms age	-0.000** (0.000)	-0.000 (0.000)	-0.000** (0.000)	-0.000 (0.000)
Market to book	0.006*** (0.000)	0.007*** (0.001)	0.006*** (0.000)	0.007*** (0.001)
Board size	-0.022* (0.006)	-0.011 (0.010)	-0.022* (0.006)	-0.011 (0.010)
Board independence	0.027 (0.010)	0.011 (0.019)	0.027 (0.010)	0.011 (0.019)
EM _{t-1}	0.096*** (0.009)	0.088*** (0.018)	0.096*** (0.009)	0.088*** (0.018)
Constant	0.069*** (0.018)	0.074* (0.045)	0.069*** (0.018)	0.074* (0.045)
Observations	8,054	8,054	8,054	8,054
AR2	0.677	0.833	0.677	0.833
Hansen test	0.131	0.170	0.131	0.170
Difference Hansen test	0.129	0.328	0.129	0.328

Accruals earnings management is the Jones model adjusted by ROA. Definitions of all variables are in Appendix 1. Years dummies are included in all regressions. P-values are presented for AR (2), Hansen test and Diff-Hansen. AR (2) is a test of second-order serial correlation in the first-differenced residuals, under the null of no serial correlation. Hansen test of over-identification is under the null that all instruments are valid. Diff-in-Hansen test of exogeneity is under the null that instruments used for the equations in levels are exogenous. *** p<0.01, ** p<0.05, * p<0.10

Table 7: Real earnings management and the moderating effect on board quality by i) CEO duality and ii) high/low board expertise (System-GMM)

Variables	<u>Board expertise</u>	<u>Board experience</u>	<u>Board expertise</u>	<u>Board experience</u>
	(1)	(2)	(3)	(4)
Panel (A) CEO duality	CEO/Chair duality =1		CEO/Chair duality = 0	
Female ratio% (F)	-0.446*** (0.159)	-0.288* (0.175)	-0.446*** (0.159)	-0.288* (0.175)
Board quality (BQ)	-0.057* (0.031)	0.036** (0.017)	-0.057* (0.031)	0.036** (0.017)
F*BQ*CEO/Chair duality	-0.201 (0.199)	0.202 (0.174)	-0.963*** (0.262)	-0.410 (0.272)
EM _{t-1}	0.543*** (0.053)	0.281*** (0.062)	0.543*** (0.053)	0.281*** (0.062)
Observations	7,974	7,974	7,974	7,974
AR2	0.126	0.280	0.126	0.280
Hansen test	0.440	0.178	0.440	0.178
Difference Hansen test	0.644	0.895	0.644	0.895
Panel (B) High/low Board quality	High board quality (75th percentile)		Low board quality (25th percentile)	
Female ratio% (F)	-0.627*** (0.068)	-0.341** (0.140)	-1.337* (0.737)	-0.976*** (0.286)
Board quality (BQ)	-0.002 (0.007)	0.011 (0.009)	-0.085 (0.054)	0.013 (0.014)
F*BQ	0.348*** (0.042)	0.186*** (0.054)	-0.723 (0.448)	-0.175 (0.165)
EM _{t-1}	0.437*** (0.014)	0.548*** (0.020)	0.420*** (0.048)	0.442*** (0.020)
Observations	2,091	2,038	1,830	1,893
AR2	0.235	0.516	0.977	0.501
Hansen test	0.256	0.196	0.630	0.210
Difference Hansen test	0.460	0.327	0.859	0.467

Definitions of all variables are in Appendix 1. Years dummies are included in all regressions. P-values are presented for AR (2), Hansen test and Diff-Hansen. AR (2) is a test of second-order serial correlation in the first-differenced residuals, under the null of no serial correlation. Hansen test of over-identification is under the null that all instruments are valid. Diff-in-Hansen test of exogeneity is under the null that instruments used for the equations in levels are exogenous. *** p<0.01, ** p<0.05, * p<0.10.

Table 8: The effect of female directors on earnings management, and the moderating effect of female-director quality

Variables	Experience		Network size		Qualifications	
	All.fem	Ind.fem	All.fem	Ind.fem	All.fem	Ind.fem
	(1)	(2)	(3)	(4)	(5)	(6)
Female ratio%	-0.078** (0.038)	-0.092*** (0.033)	-0.087*** (0.029)	-0.057*** (0.018)	-0.075** (0.036)	-0.057** (0.025)
Female quality (FQ)	-0.002 (0.004)	-0.004 (0.004)	0.005 (0.004)	0.007** (0.003)	0.002 (0.005)	-0.005 (0.004)
Female ratio%*(FQ)	-0.063 (0.048)	-0.034 (0.040)	0.128** (0.062)	0.071** (0.036)	-0.078 (0.060)	-0.070 (0.046)
CEO/Chair duality	0.004 (0.007)	0.010 (0.007)	0.001 (0.004)	0.001 (0.003)	-0.004 (0.005)	-0.002 (0.005)
Big4 auditor	-0.027 (0.017)	-0.029 (0.020)	-0.034** (0.015)	-0.010 (0.013)	-0.037 (0.023)	-0.011 (0.017)
ROA	-0.084* (0.045)	-0.084* (0.044)	-0.044* (0.026)	-0.058** (0.023)	-0.018 (0.042)	-0.029 (0.030)
Loss	0.013 (0.013)	0.012 (0.013)	0.016*** (0.005)	0.014*** (0.005)	0.022 (0.015)	0.028*** (0.010)
Leverage	-0.059** (0.025)	-0.056** (0.025)	0.017 (0.017)	0.002 (0.015)	-0.042** (0.021)	-0.043** (0.017)
Firm Size	0.001 (0.003)	0.002 (0.003)	-0.008** (0.003)	-0.007*** (0.002)	-0.003 (0.003)	-0.004 (0.003)
Firms age	-0.0002 (0.000)	-0.0001 (0.000)	-0.0003 (0.000)	-0.0004 (0.000)	-0.0003 (0.000)	-0.0003 (0.000)
Market to book	0.005*** (0.002)	0.005*** (0.002)	0.001 (0.001)	0.002** (0.001)	0.004*** (0.002)	0.005*** (0.001)
Board size	-0.038 (0.026)	-0.048* (0.027)	-0.011 (0.010)	-0.014 (0.009)	-0.032* (0.017)	-0.038** (0.015)
Board independence	0.029 (0.035)	0.007 (0.035)	0.029 (0.020)	0.004 (0.017)	0.051* (0.028)	0.046** (0.024)
Constant	0.101*** (0.023)	0.103*** (0.024)	0.106*** (0.024)	0.113*** (0.024)	0.089*** (0.025)	0.086*** (0.026)
Observations	6,921	6,921	6,921	6,921	6,921	6,921
AR2	0.492	0.469	0.408	0.349	0.460	0.509
Hansen test	0.468	0.298	0.383	0.337	0.528	0.300
Difference Hansen test	0.574	0.343	0.374	0.303	0.542	0.302

This table shows the effect of female directors on earnings management with a system-GMM estimation. Definitions of all variables are in Appendix 1. Years dummies are included in all regressions. J test for over-identification condition (p-value). Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 9: Summary of PCA components for female directors' quality

Indices	Eigenvalue	Components
Experience index (35)	1.38	Female Director age (68) Female Director tenure (65) Female Director business qualification (-30) Female Director Network size (-.02)
Qualification index (25)	0.96	Female Director age (0.08) Female Director tenure (34) Female Director business qualification (92) Female Director Network size (-0.13)
Connectedness index (24)	1.01	Female Director age (13) Female Director tenure (-0.09) Female Director business qualification (16) Female Director Network size (97)
KMO test	0.51	
Bartlett's test	chi-square = 1195.022 P = 0.000	

Numbers in brackets after indices indicate variances counted by each index. The loading for each component in both indices is presented after each variable in the third column.

Appendix A. Definition of variables

Earnings management proxies	
Kothari et al. (2005)	Discretionary accruals earnings measure is the modified Jones model (Dechow et al., 1995) adjusted by ROA.
Pae (2005)	Discretionary accruals earnings measure is the modified Jones model (Dechow et al., 1995) adjusted by cash flow operations (CFO).
Dechow et al., (1995)	Modified Jones model of discretionary accruals earnings.
Real earnings management	Aggregate measure of earnings management proxies, i.e., CFO (Abnormal Cash Flow), PROD (Abnormal Production Costs) and DISC (Abnormal Discretionary Expenses).
Board directors' characteristics	
Female ratio%	Total number of female directors on the board divided by board size.
Independent-female	Number of independent-female directors to total number of independent directors.
Board size	Logarithm of the total number of directors on the firm's board.
Board independence	Total number of independent directors to board size.
CEO/Chair duality	A dummy that equals one when the CEO and Chair are the same person and zero otherwise.
Board quality	It is an index created by using principle component analysis, combining four variables; directors age, tenure, financial expertise and network size.
Network size	Average network size of directors.
Boards' age	Average age of directors.
Tenure	Average number of years in post for directors.
Financial qualification	Percentage of directors who hold a business degree such as CPA and MBA certificates, to total directors
Female directors' characteristics	
Network size	Average network size of female directors.
Age	Average age of female directors.
Tenure	Average number of years in post for female directors.
Financial qualification	Percentage of female Directors who hold a business degree such as CPA and MBA certificates, to total female directors.
Firm characteristics	
ROA	Net income to total assets
Loss	Financial loss: equals one if net income is negative and zero otherwise.
Leverage	Total liabilities to total assets.
Firm Size	Logarithm of total assets.
Firm age	Number of years of total assets reported by COMPUSTAT since 1977.
Market to book	Firms' equity to book value
Institutional ownership	Proportion of equity owned by institutional investors.
Big4 auditor	Dummy that equals one if firms are audited by a big four auditing company and zero otherwise.
Instruments	
Female industry ratio	Proportion of female directors in the same industry based on two-digit code.