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ACCOUNTING, CORPORATE GOVERNANCE & BUSINESS ETHICS | RESEARCH ARTICLE

Do female directors affect accounting conservatism in European Union?

Sandra Alves^{1*}

Abstract: Gender diversity on corporate boards is an important governance issue. Prior research suggests that female directors tend to be more ethical, conservative, socially responsible, independent and risk averse. Thus, female directors may contribute to improve board performance and earnings quality. Using a sample of 3,808 non-financial European Union listed companies from 2011 to 2020, this study examines the effect of female directors on accounting conservatism in European Union listed firms, and whether their influence is more evident when a critical mass of female directors is reached. The study also investigates whether gender equality index moderates the relationship between female directors and accounting conservatism. We document a positive and significant relationship between female directors and accounting conservatism. Firms that have reached a critical mass of female directors on their board tend to report more conservative earnings compared to firms with a ratio of female directors less than a critical mass. This study further suggests that the impact of female directors on accounting conservatism is stronger in the presence of a higher gender equality index. The results of this study may contribute to the ongoing debate on the optimal level of gender diversity in corporate governance and its impact on financial reporting practices.

Subjects: Economics; Finance; Business, Management and Accounting

Keywords: female directors; accounting conservatism; critical mass theory; Europe

1. Introduction

Board gender diversity is considered currently one of the most significant governance issues (Huse, 2018). The under-representation of women on corporate boards has received an increasing emphasis from academic researchers, practitioners, and policymakers (Ararat & Yurtoglu, 2021; Dezsö & Ross, 2012). Since 2005, regulators in different Union European countries have implemented mandatory female quotas for their listed companies (e.g. Austria, Belgium, France, Germany, Portugal, Spain); while others have implemented best practice guidelines and recommendations (e.g. Bulgaria, Croatia, Denmark, Finland, Hungary, Ireland, Lithuania, Poland, Romania, Slovakia) (Deloitte, 2022).

Previous research suggests that compared to male directors, female directors are commonly perceived as more: participative on boards (Virtanen, 2012), ethical (Doan & Iskandar Datta, 2020), conservative (B. Francis et al., 2015), socially responsible (Boulouta, 2013; Virtanen, 2012),

independent (Adams & Ferreira, 2009), cautious (Mather et al., 2021), likely to report fraudulent financial reporting and less engaged in fraud (Wahid, 2019), less aggressive decision-makers (Shin et al., 2020), opportunistic (Watson & McNaughton, 2007), over-investment (Saleh & Sun, 2021), risk-averse (Achour, 2021; Charness & Gneezy, 2012). These features indicate that female directors are likely to supervise management effectively.

Accounting conservatism is seemed as one crucial factor that determines financial reporting quality (Lim, 2011; Watts, 2003a, 2003b). Watts (2003a) points out that conservatism accounting is essential to limit management's opportunistic behaviour and to offset biases introduced in financial reports. Prior studies indicate that firms with conservative accounting are less likely to employ earnings management (Gao, 2013; Khalifa & Othman, 2015). Conservative reporting reduces the potential for overstatements by mitigating aggressive managerial estimates (Basu, 1997; Khan & Watts, 2009; Watts, 2003a) and helps in decreasing the information asymmetry (Hu et al., 2014; LaFond & Watts, 2008).

Female directors tend to be more conservative and ethical. Thus, we expect that female directors are more likely to demand that managers adopt conservative accounting practices to limit managerial opportunism, to reduce information asymmetry, to reduce litigation risks and to reduce the probability and magnitude of corporate collapses. Thus, we predict that firms with higher presence of female directors on the board will exhibit more conservative accounting.

Previous studies suggest that having a critical mass of women on boards can lead to improved board performance (Birindelli et al., 2019; Rossi et al., 2017; Srivastava et al., 2018; Torchia et al., 2011). Thus, we hypothesize that female directors are more likely to influence earnings quality decisions (more accounting conservatism) when a critical mass is reached. Substantial research also suggests that gender equality is associated with higher earnings quality. Countries with higher gender equality index (GEI) scores tend to have higher wages, better job security and better benefits for both men and women. Higher GEI scores also have a positive impact on the overall economic growth of a country. This is because more gender equality leads to higher productivity and more efficient use of resources. Therefore, we also examine whether the gender equality index moderates the relationship between female directors and accounting conservatism.

Thus, our research questions are as follows: (1) *Do female directors affect accounting conservatism in European Union?* (2) *Is the impact of female directors on accounting conservative more evident when there is a critical mass of female directors on the board?* (3) *Do gender equality index moderates the relationship between female directors and accounting conservatism in European Union?*

This paper contributes to the prior literature in several ways. First, we examine if female directors affect the accounting conservatism in European Union listed firms, an issue that has drawn attention from empirical studies. To our knowledge, few studies (García-Sánchez et al., 2017; Srinidhi et al., 2017; Sultana & Van der Zahn, 2011; Wang, 2015) directly examine the effect of female directors on accounting conservatism. Srinidhi et al. (2017) and Sultana and Van der Zahn (2011) focus on Australian and American firms, respectively. Wang (2015) analyzes Finnish companies. García-Sánchez et al. (2017) focus on the banking industry. This study intends to fill a portion of this gap in the literature mainly in Europe. Second, to our knowledge, no previous studies have investigated the impact of a critical mass of female directors on accounting conservatism. Consequently, this study intends to fill this gap in the literature, too. Thus, the results of this study may contribute to the ongoing debate on the optimal level of gender diversity in corporate governance and its impact on financial reporting practices. Third, to our knowledge, no previous studies have also investigated the role of gender equality index on the association between female directors and accounting conservatism. This study also proposes to fill this gap in the literature. Finally, given our study's findings on the impact of female directors on accounting

conservatism, it will be of relevance to shareholders, investors, executives, supervisors, and standard setters.

Using three proxies for accounting conservatism, the results support the predicted (positive) relationship between female directors and accounting conservatism for a sample of 3,808 non-financial European Union listed companies. In addition, our research shows that firms reaching a critical mass of female directors on board tend to have a more conservative approach towards reported earnings when compared to those with a ratio of female directors less than a critical mass. The results also suggest that the influence of female directors on accounting conservatism seems to be stronger in the presence of a higher gender equality index.

The remainder of the paper is structured as follows. Section two provides a brief presentation of the theoretical background and formulates our testable hypothesis. Next, we present the data, variable measurement, and research design in section three. Section four presents the research design. Subsequently, in section five, we report the main results. Finally, section six summarises and concludes this paper.

2. Theoretical background and testable hypothesis

Gender diversity has emerged as a critical issue in the contemporary business world. Historically, there has been a lack of diversity, particularly gender diversity, in top corporate positions. However, over the years, there has been a growing interest in promoting gender diversity, recognizing its importance in ensuring organizational effectiveness and sustainable development (World Development Report, 2012). According to the Institute of Business Ethics (2011), gender diversity is considered as a vital ethical issue for companies.

Regulatory, reform, and policy issues play an essential role in addressing the under-representation of women on corporate boards. Policymakers have placed great importance on achieving board gender diversity (Pucheta-Martínez et al., 2018), leading to both mandatory and voluntary policy reforms at a global level. In fact, gender diversity is widely considered as a critical factor to enhance board effectiveness and an essential component of corporate governance (Valls Martínez et al., 2020; Terjesen et al., 2015).

The role of women on corporate boards in Europe has also been a significant topic of discussion in recent years. In 2020, the European Commission endorsed its Gender Equality Strategy (2020–2025), which includes a key objective of achieving gender balance in decision-making positions, including those in company boards (European Commission, 2020). Several countries in Europe have implemented policies and regulations to increase the representation of women on corporate boards. For example, Norway was the first country in the world to introduce a quota system in 2003, which requires that women must comprise at least 40% of corporate board members. Other countries in Europe have followed suit, including France, Germany, Italy, Spain and the Netherlands, among others.

These developments have raised questions about the potential impact of gender diversity on financial reporting quality, particularly in relation to accounting conservatism. Accounting conservatism refers to the extent to which companies recognize potential losses and liabilities in their financial statements and is seen as an important aspect of financial reporting quality. It has been suggested that female directors may be more likely to support conservative accounting policies due to their risk-averse nature and greater concern for the long-term sustainability of the firm.

Given the regulatory and policy developments aimed at increasing gender diversity on corporate boards in the European Union, it is an appropriate context to investigate the potential impact of female directors on accounting conservatism. This study has the potential to contribute to the ongoing debate about the value of gender diversity in corporate leadership and the potential benefits of more conservative accounting policies for financial reporting quality.

2.1. Female boards and accounting conservatism

Accounting conservatism is considered an important characteristic of high-quality accounting information (Basu, 1997; Watts, 2003a; Xu & Lu, 2008). Literature suggests that conservatism benefits financial statement users by limiting managerial opportunism, alleviating agency problems related with managerial investment decisions, and facilitating efficient debt contracts in the presence of asymmetric information (Watts, 2003a, 2003b; Basu, 2005; Balakrishnan et al., 2016; Goh et al., 2017). Prior researchers have found that accounting conservatism facilitates access to external capital (e.g., Ahmed et al., 2002; Beatty et al., 2008), lowers costs of capital (e.g., Ahmed et al., 2002; Goh et al., 2017; Li, 2015), improves investment efficiency (e.g., García Lara et al., 2016; J. R. Francis & Martin, 2010), increases the value of cash holdings (Lin et al., 2018; Louis et al., 2012), reduces incentive of management to manipulate earnings (Ball, 2001; Khalifa et al., 2016; García Lara et al., 2019; Watts, 2003a), enhances firm value (B. Francis et al., 2013; Bertomeu et al., 2017), decreases bankruptcy risk (Biddle et al., 2019; Zhang, 2008), downside risk of operating cash flows (Biddle et al., 2015; Hsu et al., 2017) and stock price crash risk (Kim & Zhang, 2016; Kousenidis et al., 2014). As a result, accounting conservatism seems to play an important role in providing monitoring and decision-useful information to directors.

The board of directors is seemed as the most important internal corporate governance mechanisms (Fama & Jensen, 1983; Jensen & Meckling, 1976). The key functions of board members are to represent and protect shareholders' interests. Therefore, board members are expected to promote greater conservatism to monitor their managers.

Substantial research suggests that a more diverse board (including gender diversity) improves board effectiveness. Gender diversity has come to be considered as a fundamental feature of a successful board. This is because female directors are more independent (Adams & Ferreira, 2009), more diligent monitors (Ararat & Yurtoglu, 2021), enhance firm's investment efficiency (Mirza et al., 2020), less overconfident (Chen et al., 2019) and more active in board committees (Ararat & Yurtoglu, 2021). Studies have also shown that female directors are more ethical (Doan & Iskandar Datta, 2020; Vermeir & Van Kenhove, 2008), more sensitive to the ethical implications of various issues (Bernardi et al., 2009) and better able to recognize unethical actions than men (Khazanchi, 1995) and demand more audit efforts (Gul et al., 2009). Furthermore, it is also well established that females are more risk-averse (Arun et al., 2015; Belaounia et al., 2020), more anxious and less assertive (Farrell & Hersch, 2005; Powell & Ansic, 1997), adopt less aggressive strategies (Chen et al., 2019), less tax aggressive (Lanis et al., 2017) and improve the level of corporate financial risk disclosure (Bufarwa et al., 2020). All these characteristics suggest that female directors have a conservative mindset and a low tendency to commit fraud (Ho et al., 2015).

Indeed, female directors have been shown to increase the financial reporting quality. Previous research shows that female directors are associated with less likely to manipulate financial statements for personal gain (Srinidhi et al., 2011; Zalata et al., 2018), less corporate fraud (Capezio & Mavisakalyan, 2016; Kaplan et al., 2009; Sun et al., 2017), less financial reporting mistakes (Pucheta-Martínez et al., 2016), less restatements (Abbott et al., 2012), less likely to manipulate earnings (Arun et al., 2015; Belaounia et al., 2020; Gavius et al., 2012; Orazalin, 2020; Peni et al., 2010; Qi & Tian, 2012; Srinidhi et al., 2011; Zalata & Abdelfattah, 2021; Zalata et al., 2019, 2021), less likely to not-compliance with securities laws and regulations (Ararat & Yurtoglu, 2021) and high earnings quality (Dobija et al., 2021; Krishnan & Parsons, 2008; Luo et al., 2017; Pucheta-Martínez et al., 2016; Tee & Kasipillai, 2022). Thus, previous studies suggest that female directors are more likely to promote more conservative accounting practices in financial reporting to monitor their managers. Moreover, considering the conservative, risk averse and ethical inclinations of female directors, we expect a positive effect of female directors on accounting conservatism.

Conservative accounting facilitates the monitoring of managers. Female directors are expected to use conservative accounting to help them in supervising agency conflict and in supplying

transparent financial reporting. In fact, accounting conservatism can help to reduce the risk of financial misstatements or fraud, which can have considerable consequences for a firm and its directors. Thus, conservatism reduces the risks faced by female directors associated with managerial opportunism. Their ethical values also lead female directors to favor conservative accounting, because conservatism helps them to reduce the firm's exposure to ethical dilemmas. Conservatism also helps to create long-term value for the firm and be more responsible, which in turn helps to protect their reputation. Empirical studies have shown that firms with female directors are associated with higher accounting conservatism. For example, Ho et al. (2015), using US data, find a positive relationship between the presence of a female chief executive officer (CEO) and a firm's conservatism in accounting. Additionally, they also find that this relationship seems to be greater in firms with high rather than low litigation and takeover risks. B. Francis et al. (2015), using US data, find a positive relationship between female chief financial officer (CFO) and conservatism. This association is more pronounced when firms have higher litigation risk, default risk, systematic risk, or management turnover risk. For a sample of UK listed companies, Arun et al. (2015) find that firms with female directors on the boards may tend to be more conservative. Boussaid et al. (2015), using French data, find that female directors encourage more conservative reporting in financial statements. García-Sánchez et al. (2017), using a sample of banks from nine different countries, find that female directors have a positive effect on accounting conservatism. Makhoul et al. (2018), using a sample of Jordanian listed firms, find a positive association between gender diversity and accounting conservatism. Al-Shaer and Harakeh (2020), using the UK listed companies, document that female executives exhibit a higher level of conservatism in their financial reporting than their male counterparts.

The above discussion leads to our first hypothesis:

H1: *The proportion of female directors on the board is positively associated to accounting conservatism.*

2.2. Critical mass of female directors on the board and accounting conservatism

The critical mass theory suggests that a certain proportion or "critical mass" of women on a board of directors is necessary in order for there to be meaningful changes in the behavior and decisions of the board. The theory suggests that when there is an unbalanced gender ratio on the board, female directors are often not given equal opportunities to participate in board discussions, and their perspectives are not considered. However, when a critical mass of women is reached, they are more likely to be heard, and their perspectives are more likely to influence the board's decision-making (Abebe & Dadanlar, 2021; Amin et al., 2022; Konrad et al., 2008; Kramer et al., 2006; Liu et al., 2014; Shahab et al., 2020). As emphasized by Liu et al. (2014, p. 171), the critical mass theory on board gender diversity posits that "one is a token, two is a presence, and three is a voice". Consequently, in the absence of a critical mass, female directors may be acting as mere tokens and have a limited impact (García-Meca et al., 2022; Schwartz-Ziv, 2017). Previous studies of women on corporate boards suggest that the critical mass of female directors is achieved when boards of directors have "at least three women" (Erkut et al., 2008; Konrad et al., 2008; Torchia et al., 2011).

The discussion above suggests that it is only after a given threshold of gender diversity that the influence of female directors may be most effective. As a result, we hypothesize that increasing the number of women on boards of directors could improve the board's monitoring effectiveness, leading to greater quality of reporting practices, and thus promote accounting conservatism. Hence, we expect that female directors are more likely to endorse accounting conservatism when the critical mass of women is achieved. That is, if female directors have influences on accounting conservatism, those influences should be more pronounced when the critical mass is reached.

Specifically, this study proposes that board monitoring dynamics can be dependent on the type of group identified by Kanter (1977): (1) *skewed groups* controlled by men in which women account for up to 20%; (2) *tilted groups* with a more adequate allocation of men and women (percentage of women is from 20% to 40%); and (3) *balanced groups* with an equal or quasi-equal gender distribution (percentage of women is from 40% to 60%).

Skewed groups lead to a lack of representation and perspectives of women in the decision-making process of the firm. Thus, when the board is skewed, the effect of female directors on accounting conservatism may be reduced since they are treated as tokens. Conversely, when the board is tilted or balanced, women are more likely to bring diverse perspectives and experiences to the board, which can lead to more effective decision-making (Joecks et al., 2013). In this sense, previous studies find that boards with at least 30% female are more likely to have better decision-making processes, stronger monitoring mechanisms, and improved financial performance (Joecks et al., 2013). Therefore, the titled and balanced boards could be more effective in inducing more conservative accounting practices since the number of female directors has enhanced, and they are more likely to influence board monitoring effectiveness. Accordingly, we test the following hypothesis:

H2a: *Skewed boards (women account for up to 20%) are not related to accounting conservatism.*

H2b: *Tilted boards (comprise 20%-40% women) are positively related to accounting conservatism.*

H2c: *Balanced boards (comprise 40%-60% women) are positively related to accounting conservatism.*

2.3. Moderating effect of gender equality index

As referred previously, literature suggests that the presence of female directors on average leads to better monitoring and advising of the board of directors. However, the efficacy of female directors may be affected by specific contextual factors. We predict that the GEI may be one of these factors. The GEI is a measure of gender equality in a country, developed by the European Institute for Gender Equality. It is calculated based on a number of factors, including economic opportunity, political participation, and health and education outcomes. Female directors in countries with higher gender equality index have greater access to educational and professional opportunities. This access to resources and opportunities helps them to develop the skills and confidence needed to succeed in the boardroom. The amicable dynamics of a gender equal society can also help to create a more welcoming and supportive atmosphere, allowing female directors to feel more comfortable and confident in the boardroom. This can lead to an increase in their influence and authority. Therefore, we expect that if female directors have influences on accounting conservatism, those influences should be more pronounced when the gender equality index is higher. In this sense, Belaounia et al. (2020), using a multi-country sample, also find that countries with greater gender equality strengthen female directors' monitoring effect on earnings quality. On the other hand, for countries with lower gender equality, female directors do not seem to have any real impact on earnings management.

The GEI might play a role as a moderator in the relationship between female board representation and accounting conservatism, because in societies or organizations with high levels of gender equality, there is likely to be more support for, and acceptance of, the presence of women in leadership positions. This can lead to a more positive and productive working environment where female board members can effectively contribute to the decision-making processes and overall performance of the firm.

Thus, we hypothesize that GEI may serve as an important moderator in the relationship between female board representation and accounting conservatism. Consequently, we expect that the impact of female directors on accounting conservatism should be more pronounced when the gender equality index is higher.

Accordingly, we test the following hypotheses:

H3: *The GEI mediate the relationship between female directors and accounting conservatism.*

H4a: *The GEI mediate the relationship between skewed boards and accounting conservatism.*

H4b: *The GEI mediate the relationship between tilted boards and accounting conservatism.*

H4c: *The GEI mediate the relationship between balanced boards and accounting conservatism.*

3. Data and variables

3.1. Sample

We obtain the financial and board structure data from Amadeus, a database managed by Bureau Van Dijk and Informa DandB, S.A. Our initial sample contains all European Union listed firms in main stock exchange for the period 2011–2020. We exclude the financial firms and the firms without data available to measure the variable used in this study. We also exclude from the analysis countries with less than 20 firms. The final sample comprises 20 European Union countries and consists of 30,808 firm-year observations. Table 1 reports the sample composition and country's gender equality index.

3.2. Variables

3.2.1. Measuring female director

In line with previous studies (e.g. Arioglu, 2020; Arun et al., 2015), we use the proportion of females on the board of directors to compute the existence of females on boards of directors. Thus, *B_Women* is measured as the number of women board members divided by the total number of board directors.

Following the Kanter's theory (Kanter, 1977), we characterise the next categories of boards: Skewed boards (takes a value "1" if boards have less than 20% of women, "0" otherwise); Tilted boards (takes a value "1" if boards have between 20%–40% of women, "0" otherwise) and Balanced boards (takes a value "1" if boards have between 40%–60% of women, "0" otherwise)

3.2.2. Measuring accounting conservatism

At the present, there is no single "best" measure of accounting conservatism. However, in the past accounting literature, the most frequently used measurements are the asymmetric earnings timeliness model (Basu, 1997; Khan & Watts, 2009), the market-value measure (Beaver & Ryan, 2000) and the accrual-based measure of Givoly and Hayn's (2000) model (Basu, 1997; García Lara et al., 2009; Khan & Watts, 2009; Ruddock et al., 2006). Givoly et al. (2007) point out that any single measure of conservatism is insufficient to evaluate all dimensions of conservatism in the sample of interest. Therefore, we employ three dominant proxies for accounting conservatism: (1) C-Score developed by Khan and Watts (2009); (2) market-value based proxy (Beaver & Ryan, 2000) and (3) accrual-based (*CON_ACCRUAL*) proxy (Givoly & Hayn, 2000). While the C-Score captures conditional conservatism, the market-value measure and the accrual-based measure capture unconditional conservatism.

Table 1. Sample composition and country's gender equality index. The gender equality index (GEI) is the mean of GEI published to the period 2013–2022 (reference years: 2012, 2015, 2017, 2018, 2019 e 2020) by the European Institute for Gender Equality

	Country	Number of observations	Gender equality index
1	Austria	370	0.655
2	Belgium	1010	0.717
3	Bulgaria	1430	0.590
4	Croatia	840	0.565
5	Cyprus	330	0.555
6	Denmark	1120	0.772
7	Finland	1290	0.744
8	France	6070	0.736
9	Germany	3600	0.670
10	Greece	1190	0.516
11	Ireland	230	0.714
12	Italy	2750	0.623
13	Lithuania	230	0.570
14	Netherlands	590	0.744
15	Poland	6000	0.565
16	Portugal	420	0.594
17	Romania	3180	0.535
18	Slovakia	570	0.544
19	Spain	730	0.710
20	Sweden	6130	0.829
Total		38080	

The C-Score (*CON_C_SCORE*) developed by Khan and Watts (2009) to measure accounting conservatism is calculated as follows. First, we estimate equation (1) with annual cross-sectional regressions:

$$\begin{aligned}
 X_{i,t} = & \beta_{1,t} + \beta_{2,t}D_{i,t} + R_{i,t}(\mu_{1,t} + \mu_{2,t}Size_{i,t} + \mu_{3,t}M/B_{i,t} + \mu_{4,t}Lev_{i,t}) \\
 & + D_{i,t}R_{i,t}(\lambda_{1,t} + \lambda_{2,t}Size_{i,t} + \lambda_{3,t}M/B_{i,t} + \lambda_{4,t}Lev_{i,t}) \\
 & + (\delta_{1,t}Size_{i,t} + \delta_{2,t}M/B_{i,t} + \delta_{3,t}Lev_{i,t} + \delta_{4,t}D_{i,t}Size_{i,t} \\
 & + \delta_{5,t}D_{i,t}M/B_{i,t} + \delta_{6,t}D_{i,t}Lev_{i,t}) + \varepsilon_{i,t}
 \end{aligned} \tag{1}$$

where *i* indicates firm and *t* indicates year:

X = is the net earnings, scaled by lagged market capitalization of firm;

R = is annual stock returns obtained by cumulating monthly returns starting from the fourth month after the firm's fiscal year end;

D = is a dummy variable equal to 1 when *R* < 0 and equal to 0 otherwise;

Size = is the natural logarithm of market capitalization of firm;

M/B = is the market-to-book ratio;

Lev = is leverage, defined as long-term and short-term debt deflated by market value of equity.

Second, we collect the yearly λ -coefficients (i.e., $\lambda_{1,t} - \lambda_{4,t}$) and then calculate the firm-year C-Score by the following equation (2):

$$C - Score_{i,t} = \lambda_{1,t} + \lambda_{2,t}Size_{i,t} + \lambda_{3,t}M/B_{i,t} + \lambda_{4,t}Lev_{i,t} \quad (2)$$

The higher the C-Score, the more conservative the firm is in its financial reporting.

The market-value based (*CON_MTB*) measure of conservatism is the market-to-book ratio. “Intuitively, conservative accounting results in reducing book values relative to market values” (Ahmed & Duellman, 2011, p. 616).

The accrual-based measure of conservatism, *CONS-ACC*, is income operations plus depreciation of less cash flows from operations deflated by average total assets, multiplied by negative one. The intuition underlying this measure is that conservative accounting results in persistently negative accruals (Givoly & Hayn, 2000).

3.2.3. Control variables

Following the recent corporate board and accounting conservatism literature, we include some control variables that may explain accounting conservatism. These control variables are as follows: board size (*B_Size*) is the number of members on the board; leverage (*Leverage*) is calculated as the ratio between the book value of all liabilities and the total assets of the firm and firm size (*Size*) is measured as the natural logarithm of market value of equity (Arun et al., 2015; DeFond & Jiambalvo, 1994; Jiang et al., 2008; Peasnell et al., 2000; Watts & Zimmerman, 1990).

4. Research design

Statistical software Eviews version 12 is used to estimate the regression models.

To study the relationship between female director and accounting conservatism, we use the following OLS regression model:

$$AC_{it} = \beta_0 + \beta_1(B_Women_{it}) + \Sigma(Controls_{it}) + \varepsilon_{it} \quad (3)$$

To test the effects that the different sizes of the minority group (Skewed boards, tilted boards and balanced boards) on accounting conservatism, we use the following OLS regression model:

$$AC_{it} = \beta_0 + \beta_1(Skewed\ boards_{it}) + \beta_2(Titled\ boards_{it}) + \beta_3(Balanced\ boards_{it}) + \Sigma(Controls_{it}) + \varepsilon_{it} \quad (4)$$

To test the role of GEI in the relationship between female directors, skewed boards, titled boards and balanced boards and accounting conservatism we use the following OLS regressions models:

$$AC_{it} = \beta_0 + \beta_1(B_Women_{it}) * (GEI_{it}) + \Sigma(Controls_{it}) + \varepsilon_{it} \quad (5)$$

$$AC_{it} = \beta_0 + \beta_1(Skewed\ boards_{it}) * (GEI_{it}) + \beta_2(Titled\ boards_{it}) * (GEI_{it}) + \beta_3(Balanced\ boards_{it}) * (GEI_{it}) + \Sigma(Controls_{it}) + \varepsilon_{it} \quad (6)$$

Where:

AC_{it} = one of the three measures of conservatism for firm *i* for period *t*:

CON_C_SCORE, the C-Score developed by Khan and Watts (2009).

CON_MTB, the market-value-based conservatism proxy, defined as the market-to-book ratio.
CON_ACCRUAL, the accrual-based measure of conservatism, defined as the income operations plus depreciation less cash flows from operations deflated by average total assets, multiplied by negative one.

B_Women_{it} = number of women board members divided by the total number of board members of firm i for period t .

$Skewed\ boards_{it}$ = dummy variable: 1 if boards have less than 20% of women and 0 otherwise.

$Titled\ boards_{it}$ = dummy variable: 1 if boards have between 20%-40% of women and 0 otherwise.
 $Balanced\ boards_{it}$ = dummy variable: 1 if boards have between 40%-60% of women and 0 otherwise.

$Bsize_{it}$ = number of members on the board of firm i for period t . $Leverage_{it}$ = ratio between the book value of all liabilities and the total assets of firm i for period t .

$Size_{it}$ = logarithm of market value of equity of firm i for period t .

5. Empirical results and discussion

5.1. Descriptive statistics

Table 2 presents the female board representation and diversity categories suggested by Kanter (1977) and by the country. Table 3 presents the sample descriptive statistics for the explanatory variables used in this research.

The descriptive statistics show that the mean (median) of CON_C_SCORE is 0.075 (0.059). For $CON_ACCRUAL$, the mean (median) for our sample is 0.017 (0.011). The mean (median) of CON_MTB is 3.608 (2.523). Overall, the results suggest that exist conservatism in European Union listed firms. Table 3 also indicates that the mean (median) of the Female Directors on Board in European Union listed firms is 23.7% (20.1%). This suggests that women continue to be under-represented in the corporate boards of European Union publicly listed companies. Board size ($Bsize$) is comprised of approximately 8 members (with a median of 7 members). $Leverage$ variable represents on average 0.412 of the total assets of the company (with a median of 0.318). The mean (median) of firm size ($SIZE$) is 21.558 (17.636).

5.2. Multivariate analysis

Table 4 presents OLS regression estimates for the equations 3 and 4. Tables 5 exhibits OLS regression estimates for the equations 5 and 6, developed in section 4.

Table 4 shows that for all three measures of accounting conservatism, the percentage of female directors is positively associated with accounting conservatism. Therefore, this result is consistent with our hypothesis 1 which predicts a positive relationship between female directors and accounting conservatism. Consistent with previous studies (e.g García-Sánchez et al., 2017; Srinidhi et al., 2017; Sultana & Van der Zahn, 2011; Wang, 2015) results suggest that greater gender diversity on the board is related to higher accounting conservatism. Thus, the results seem to support our hypothesis that female directors are more conservative than male directors in financial reporting decision-making.

Table 4 also present the results of our second hypothesis, which emphasizes the importance of a critical mass of female directors on the board. We expect that the impact of women representation is more manifested when a critical mass of female is reached. Results suggest that when the board is skewed, the relationship between female directors and accounting conservatism is positive but not statistically significant. When the boards are skewed, female directors represent minority “token” group, which limits their influence and contributions. Thus, when the board is skewed, female directors may face challenges in having their voices heard and their perspectives taken into account, which can reduce their effectiveness on the board.

Table 2. Female board representation and diversity categories

Country	% of female directors on board	% of firms with skewed boards	% of firms with tilted boards	% of firms with balanced boards
Austria	20.0	56.7	27.1	16.2
Belgium	20.5	45.1	45.1	8.0
Bulgaria	28.3	38.9	26.4	18.8
Croatia	21.7	44.0	30.9	19.0
Cyprus	9.9	69.6	30.4	19.0
Denmark	20.7	43.4	42.5	13.2
Finland	25.7	30.0	49.2	17.7
France	31.5	25.2	33.6	35.3
Germany	18.6	50.8	38.3	9.7
Greece	11.8	72.3	25.2	2.5
Ireland	19.6	37.5	54.2	4.2
Italy	26.5	32.4	37.1	27.3
Lithuania	14.9	69.6	17.4	4.3
Netherlands	24.7	32.2	49.2	16.9
Poland	19.0	54.2	26.3	13.2
Portugal	21.3	33.3	57.1	7.1
Romania	25.2	44.9	29.4	14.9
Slovakia	20.5	49.1	36.8	5.3
Spain	21.2	45.2	46.6	8.2
Sweden	25.6	34.9	46.2	17.1

Table 3. Summary of descriptive statistics number of observations: 38.080; period: 2011–2022

	Mean	Median	Min.	Max.
CON_C_SCORE	0.075	0.059	−0.019	0.099
CON_ACCRUAL	0.017	0.011	−0.022	0.087
CON_MTB	3.608	2.523	−23.402	37.791
B_Women	0.237	0.201	0.000	1.000
B_Size	8.327	7.000	2.000	36.000
Leverage	0.412	0.318	0.053	29.834
Size	21.558	17.636	5.171	33.821

CON_C_SCORE represents the C_Score developed by Khan and Watts 2009; CON_ACCRUAL represents the income operations plus depreciation less cash flows from operations deflated by average total assets, multiplied by negative one; CON_MTB is the market-to-book ratio; B_Women represents the ratio between the number of women board members and the total number of board members; B_Size is the number of members of the board; Leverage represents the ratio between the book value of all liabilities and the total assets; Size represents the firm's size.

Titled and balanced boards are positively related to accounting conservatism. However, the results suggest that female directors' influence on accounting conservatism is more evidenced for titled boards than for balanced boards. In addition, for balanced boards, when accounting conservatism is using the market-to-book ratio and the proportion of female directors increases to more than 60%, the relationship is positive but insignificantly related to accounting conservatism. Overall, this result is in line with the critical mass theory, which suggests that when the board is tilted or balanced, women are more likely to bring diverse perspectives and experiences to the board, which can lead to more effective decision-making (Joecks et al., 2013). Thus, results suggest

Table 4. OLS regression results of models 3 e 4

Independent variable	Model 3						Model 4					
	Dependent variable						Dependent variable					
	CON_MTB		CON_ACCRUAL		CON_C_SCORE		CON_MTB		CON_ACCRUAL		CON_C_SCORE	
	Coef.	t-values	Coef.	t-values	Coef.	t-values	Coef.	t-values	Coef.	t-values	Coef.	t-values
B_Women	0.009	0.054*	0.016	0.061**	0.012	0.024**	-	-	-	-	-	-
Skewed boards	-	-	-	-	-	-	0.001	1.041	0.011	0.457	0.003	0.463
Titled boards	-	-	-	-	-	-	0.027	2.423***	0.025	2.631***	0.031	2.922***
Balanced boards	-	-	-	-	-	-	0.007	1.456	0.019	1.199*	0.014	1.342*
Control variables	Yes		Yes		Yes		Yes		Yes		Yes	
Observations	38080		38080		38080		38080		38080		38080	
Adjusted R ²	22%		23.2%		20.7%		30.57%		37.92%		40.78%	
F-statistic	6.045***		6.254***		9.087***		11.098***		15.887***		17.092***	

Notes: CON_MTB is the market-to-book ratio; CON_ACCRUAL represents the income operations plus depreciation less cash flows from operations deflated by average total assets, multiplied by negative one; CON_C_SCORE is the C-Score developed by Khan and Watts (2009); B_Women is number of women board members divided by the total number of board members; Skewed boards dummy variable which takes a value 1 if boards have less than 20% of women and 0 otherwise; Titled boards dummy variable which takes a value 1 if boards have between 20%-40% of women and 0 otherwise; Balanced boards dummy variable which takes a value 1 if boards have between 40%-60% of women and 0 otherwise; Control variables included: Bsize is the number of members on the board; Leverage is ratio between the book value of all liabilities and the total assets of firm; Size represents the firm's size.

***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

that female directors' influence on accounting conservatism is more evidenced, mainly, when there is a critical mass of women on the board (tilted boards).

Table 5 shows that the coefficient on $B_Women*GEI$ is positive and statistically significant, for all three measures of accounting conservatism, suggesting that the gender equality index affects the relationship between female directors and accounting conservatism. Thus, the level of accounting conservatism increase associated with the proportion of female directors on the board is magnified when GEI is higher.

For all three measures of accounting conservatism, the coefficient on $Titled\ boards*GEI$ is positive and statistically significant, which suggest that boards with GEI higher increase their monitoring, leading to higher earnings quality when the board is titled. In other words, when the board is titled, the higher the GEI, the higher the accounting conservatism. Table 5 also shows that the coefficient on $Balanced\ boards*GEI$ is positive and statistically significant, but only for two measures of accounting conservatism (CON_ACCRUAL and CON_C_SCORE), suggesting that boards with GEI higher, also seem to have higher accounting conservatism when the board is balanced.

Thus, the performance impact of female directors on accounting conservatism seems to be contingent on GEI. This evidence is consistent with the premise that in countries with high level of GEI, female directors are more likely to be appointed to board positions and have a greater impact on corporate decision-making processes, including accounting policies. As a result, the presence of female directors may have a stronger influence on the adoption of conservative accounting practices in countries with high GEI. Therefore, this study suggests that *Titled/Balanced boards* with high GEI has significant influence over the financial reporting process. Thus, the results presented offer empirical evidence for our hypothesis that the impact of female directors on accounting conservatism should be more pronounced when the gender equality index is higher.

5.3. Additional analyses

In order to mitigate potential concerns about unobservable firm-specific factors influencing the positive association identified in the empirical results of Equations (3-6), the study performs additional tests to examine the relationship between changes in the proportion of female directors and earnings conservatism. This approach seeks to isolate the effect of board gender diversity in Equations 3-6. The empirical results are reported in Tables 6 and 7. The results suggest that with the proportion of female directors increasing, firms tend to be more conservative. Thus, the empirical results offer more support to the robustness of the main test results.

Prior literature suggests that a firm's financial reporting quality may influence the features of its board structure (e.g. Armstrong et al. 2014; Chen et al., 2015). There is a possibility that companies which exhibit a higher level of accounting conservatism are more likely to attract and promote the participation of women on their boards. Thus, the endogeneity issue is that female on boards may be the result of firm's accounting conservatism. Therefore, our variable related to females may not be exogenous, and consequently, our results may be biased (Wintoki et al., 2012). To address the potential issue of endogeneity, we utilize the two-stage least squares (2SLS) method to estimate a simultaneous equation system of female directors and accounting conservatism. In the first stage, we ran an OLS model with female directors as the dependent variable and a set of factors identified in the previous literature (e.g. Adams & Ferreira, 2009; Oyotode-Adebile & Ujah, 2021; Saeed et al., 2016) as independent variables. We then use the coefficient estimates to obtain the predicted level of female directors ($Bwomen_Predicted$). The main results (Table 8) remain qualitatively similar to those reported in Table 4.

6. 6. Summary and conclusions

In recent years, there has been a growing importance on gender diversity on corporate boards (Ararat & Yurtoglu, 2021; Dezsö & Ross, 2012). Thus, motivated by the increasing emphasis on gender diversity in European countries, this study examines the impact of board gender diversity

Table 5. OLS regression results of models 5 e 6

Independent variable	Model 5						Model 6					
	Dependent variable						Dependent variable					
	CON_MTB		CON_ACCRUAL		CON_C_SCORE		CON_MTB		CON_ACCRUAL		CON_C_SCORE	
	Coef.	t-values	Coef.	t-values	Coef.	t-values	Coef.	t-values	Coef.	t-values	Coef.	t-values
B_Women*GEI	0.016	1.014**	0.031	1.989***	0.056	2.091***	-	-	-	-	-	-
Skewed boards*GEI	-	-	-	-	-	-	0.005	1.078	0.013	0.382	0.008	0.211
Titled boards*GEI	-	-	-	-	-	-	0.027	2.777***	0.050	2.986***	0.046	2.157***
Balanced boards*GEI	-	-	-	-	-	-	0.009	1.098	0.022	1.275**	0.019	2.016**
Control variables	Yes		Yes		Yes		Yes		Yes		Yes	
Observations	38080		38080		38080		38080		38080		38080	
Adjusted R ²	24.47%		27.92%		30.21%		33.34%		39.09%		43.83%	
F-statistic	7.078***		9.042***		11.098***		12.783***		16.653***		19.763***	

Notes: CON_MTB is the market-to-book ratio; CON_ACCRUAL represents the income operations plus depreciation less cash flows from operations deflated by average total assets, multiplied by negative one; CON_C_SCORE is the C-Score developed by Khan and Watts (2009); B_Women*GEI represents the interaction variable of B_Women and GEI; Skewed boards*GEI represents the interaction variable of Skewed boards and GEI; Titled boards*GEI represents the interaction variable of Titled boards and GEI; Balanced boards*GEI represents the interaction variable of Balanced boards and GEI; Control variables included: Bsize is the number of members on the board; Leverage is ratio between the book value of all liabilities and the total assets of firm; Size represents the firm's size. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 6. Change of female director proportion and earning conservatism - Results of models 3 e 4

Independent variable	Model 3						Model 4					
	Dependent variable						Dependent variable					
	CON_MTB		CON_ACCRUAL		CON_C_SCORE		CON_MTB		CON_ACCRUAL		CON_C_SCORE	
	Coef.	t-values	Coef.	t-values	Coef.	t-values	Coef.	t-values	Coef.	t-values	Coef.	t-values
<i>Change_B_Women</i>	0.011	0.061*	0.014	0.067**	0.062	0.055***	-	-	-	-	-	-
<i>Skewed boards</i>	-	-	-	-	-	-	0.009	1.052	0.016	0.465	0.009	0.480
<i>Titled boards</i>	-	-	-	-	-	-	0.042	2.501***	0.037	2.599***	0.018	2.877***
<i>Balanced boards</i>	-	-	-	-	-	-	0.010	1.844	0.026	1.202**	0.013	1.335*
<i>Control variables</i>	Yes		Yes		Yes		Yes		Yes		Yes	
Observations	38080		38080		38080		38080		38080		38080	
Adjusted R ²	25%		26.5%		31.3%		31.06%		37.87%		41.21%	
F-statistic	6.570***		7.003***		12.677***		11.201***		15.799***		18.081***	

Notes: *CON_MTB* is the market-to-book ratio; *CON_ACCRUAL* represents the income operations plus depreciation less cash flows from operations deflated by average total assets, multiplied by negative one; *CON_C_SCORE* is the C-Score developed by Khan and Watts (2009); *Change_B_Women* represents the change of female director proportion; *Skewed boards* dummy variable which takes a value 1 if boards have less than 20% of women and 0 otherwise; *Titled boards* dummy variable which takes a value 1 if boards have between 20%-40% of women and 0 otherwise; *Balanced boards* dummy variable which takes a value 1 if boards have between 40%-60% of women and 0 otherwise; *Control variables* included: *Bsize* is the number of members on the board; *Leverage* is ratio between the book value of all liabilities and the total assets of firm; *Size* represents the firm's size.

***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 7. Change of female director proportion and earning conservatism - Results of models 5 e 6

Independent variable	Model 5						Model 6					
	Dependent variable						Dependent variable					
	CON_MTB		CON_ACCRUAL		CON_C_SCORE		CON_MTB		CON_ACCRUAL		CON_C_SCORE	
	Coef.	t-values	Coef.	t-values	Coef.	t-values	Coef.	t-values	Coef.	t-values	Coef.	t-values
B_Women*GEI	0.020	1.072**	0.035	1.992***	0.074	2.189***	-	-	-	-	-	-
Skewed boards*GEI	-	-	-	-	-	-	0.010	1.145	0.015	0.301	0.011	0.199
Titled boards*GEI	-	-	-	-	-	-	0.039	2.938***	0.052	3.082***	0.053	2.382***
Balanced boards*GEI	-	-	-	-	-	-	0.011	1.108	0.034	1.833**	0.027	2.104**
Control variables	Yes		Yes		Yes		Yes		Yes		Yes	
Observations	38080		38080		38080		38080		38080		38080	
Adjusted R ²	25.05%		26.89%		31.65%		34.09%		39.55%		44.02%	
F-statistic	7.093***		9.002***		11.455***		12.902***		16.751***		19.809***	

Notes: CON_MTB is the market-to-book ratio; CON_ACCRUAL represents the income operations plus depreciation less cash flows from operations deflated by average total assets, multiplied by negative one; CON_C_SCORE is the C-Score developed by Khan and Watts (2009); B_Women*GEI represents the interaction variable of B_Women and GEI; Skewed boards*GEI represents the interaction variable of Skewed boards and GEI; Titled boards*GEI represents the interaction variable of Titled boards and GEI; Balanced boards*GEI represents the interaction variable of Balanced boards and GEI; Control variables included: Bsize is the number of members on the board; Leverage is ratio between the book value of all liabilities and the total assets of firm; Size represents the firm's size. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 8. 2SLS regressions results of models 3 e 4

Independent variable	Model 3						Model 4					
	Dependent variable						Dependent variable					
	CON_MTB		CON_ACCRUAL		CON_C_SCORE		CON_MTB		CON_ACCRUAL		CON_C_SCORE	
	Coef.	t-values	Coef.	t-values	Coef.	t-values	Coef.	t-values	Coef.	t-values	Coef.	t-values
<i>B_Women_Predicted</i>	0.008	0.049*	0.011	0.059**	0.047	0.078**	-	-	-	-	-	-
<i>Skewed boards</i>	-	-	-	-	-	-	0.003	1.049	0.008	0.398	0.011	0.303
<i>Titled boards</i>	-	-	-	-	-	-	0.032	2.489***	0.031	2.629***	0.022	2.544***
<i>Balanced boards</i>	-	-	-	-	-	-	0.006	1.301	0.020	1.312**	0.029	1.455**
<i>Control variables</i>	Yes		Yes		Yes		Yes		Yes		Yes	
Observations	38080		38080		38080		38080		38080		38080	
Adjusted R ²	22.01%		24.34%		19.43%		29.33%		35.23%		40.34%	
F-statistic	6.078***		6.983***		10.843***		10.384***		13.843***		19.384***	

Notes: *CON_MTB* is the market-to-book ratio; *CON_ACCRUAL* represents the income operations plus depreciation less cash flows from operations deflated by average total assets, multiplied by negative one; *CON_C_SCORE* is the C-Score developed by Khan and Watts (2009); *B_Women_Predicted* represents the predicted level of female directors; *Skewed boards*GEI* represents the interaction variable of *Skewed boards* and *GEI*; *Titled boards*GEI* represents the interaction variable of *Titled boards* and *GEI*; *Balanced boards*GEI* represents the interaction variable of *Balanced boards* and *GEI*; *Control variables* included: *Bsize* is the number of members on the board; *Leverage* is ratio between the book value of all liabilities and the total assets of the firm; *Size* represents the firm's size.

***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

on accounting conservatism. We also test the critical mass theory to evaluate the ability of female directors to impact accounting conservatism based on their numerical representation on the board of directors, an issue that has not been studied earlier. Moreover, this study examines whether the relationship between female directors and accounting conservatism is moderated by the GEI, another subject that has not been explored in prior research.

Consistent with our first hypothesis, the results show a positive relationship between female directors and accounting conservatism. This result suggests that female directors on the board may increase the likelihood of accounting conservatism. The findings indicate that the initiatives implemented in several European countries to enhance the representation of women on corporate boards could have a positive impact on earnings quality through the promotion of accounting conservatism. In line with the second hypothesis, we find that titled and balanced boards are positively related to accounting conservatism. The results support the critical mass theory, suggesting that reaching the critical mass level of female directors increases the impact on the decisions and outcomes of the board, hence, significantly affecting the level of accounting conservatism. Our findings are consistent with the third hypothesis, which suggests that the relationship between female directors and accounting conservatism is moderated by the GEI. As a result, the presence of female directors may have a stronger influence on the adoption of conservative accounting practices in countries with high GEI. Thus, it is essential to consider the GEI as a potential moderator when examining the relationship between gender diversity and financial reporting outcomes.

Globally, the outcomes in this study reveal that board gender diversity positively influences the implementation of conservative accounting policies in European Union listed firms.

The study offers significant contributions to both theory and practice. First, this paper supports legislating to reach a greater presence of female directors and suggests that increasing the representation of female directors on boards can lead to the adoption of more conservative accounting policies in European Union listed firms. Second, the research contributes to critical mass theory by providing evidence of the impact of the number of female directors on accounting conservatism, which suggests a minimum of women that a board should reach to obtain benefits of gender diversity. Accordingly, firms with skewed boards should consider adding female directors to their boards. Third, the study also extends the literature on gender diversity by exploring the moderating effect of GEI on the relationship between gender diversity and accounting conservatism. Thus, this study emphasizes the significance of considering specific contextual factors, such as the GEI, when examining the impact of gender diversity on accounting practices. Fourth, the results of the study offer valuable insights for policymakers and investors to assess the impact of augmenting the representation of women on the boards of publicly listed companies. The study indicates that having female directors on the board of a company leads to increased accounting conservatism, which provides assurance and trust in investors. Finally, knowledge of how female directors affect earnings quality (more accounting conservatism) plays a crucial role in advocating for increased representation of women on corporate boards worldwide. This, in turn, can help enhance the efficiency of financial reporting.

The results of this study are subject to some limitations. First, this study does not test the impact of other diversity variables related gender (e.g. experience, expertise, skills, busyness, multiple directorships), which may impact conservatism accounting and earnings quality. Thus, future studies should consider exploring the effect of these attributes. Second, despite controlling for various board-governance factors and firm characteristics, there may still be some omitted factors in our study. Therefore, for future research, it would also be interesting to include board-governance factors and firm characteristics, such as ownership structure, and independent directors. Third, as this study's sample only consists of publicly listed companies, it may not be possible to generalize our findings to smaller and non-listed firms. Thus, it would be valuable for future research to replicate the analyses using data from European Union SMEs.

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