

The effect of female presence on corporate boards of directors on the value relevance of accounting amounts: empirical evidence from the European Union

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Abstract

This paper investigates the ability of female presence to affect value relevance. Focusing on a sample of 487 entities listed in 18 European countries over the period 2009–2017, it uses a price model to assess the ability of female presence to affect the value relevance of earnings and book value disclosed in the consolidated annual reports of the firms analyzed. Findings offer evidence that female presence on corporate boards increases the value relevance of accounting amounts, providing insights that board composition affects investors' judgments. Taking into account that in the literature scholars have shown that female presence is associated with market prices, this paper provides a contribution, showing its ability to affect the value relevance of earnings and book value of equity. The research findings suggest that not only the quality of accounting standards but also other factors such as female presence on the corporate board of directors affect accounting practices and, in turn, the quality of financial reporting and value relevance. Its

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findings offer an additional support to the European Union Gender Equality Strategy 2020–2025 according to which an increase in women's participation in the labor market has a strong, positive impact on the whole economy.

KEY WORDS

accounting, European Union, female presence, value relevance

1 | INTRODUCTION

On March 5, 2020, the European Commission published a communication entitled “A *Union of Equality: Gender Equality Strategy 2020–2025*”. Starting from the consideration that Member States have not achieved full gender equality and that progress is slow, the document frames the European Commission's work on gender equality and sets out the policy objectives and key actions for the 2020–2025 period. One of the different directions of European Union public policy is to guarantee that men and women should equally share financial responsibilities. According to the document, an increase in women's participation in the labor market has a strong, positive impact on the economy.

This thesis motivated this paper, which aims to provide evidence that an increase of the usefulness of accounting amounts disclosed in annual reports is a possible positive effect produced by a growth in women's presence on corporate boards of directors. As a matter of fact, this research answers the following research question: does female presence on the board of directors affect value relevance of earnings and book value of equity?

The board of directors is considered to be pivotal, being the organizational body at the apex of companies (Melis, 2011, p. 509). According to the research hypothesis of this paper, female presence on corporate boards of directors should positively affect the value relevance of accounting amounts. In particular, the expectation of this paper is that value relevance is higher in boards with high female presence than in boards with low female presence.

Together with conservatism and earning management, value relevance is a dimension of accounting quality (Barth et al., 2008). Studying the effect that female presence might have on the value relevance of accounting amounts might be interesting because literature has mainly focused on the value relevance of female presence and not on its ability to affect value relevance of accounting amounts. In addition, it is an occasion to conduct a review of the literature in order to summarize the so-called “other information” (Ohlson, 1995), that is, variables that academic scholars have found capable of affecting the value relevance of accounting amounts in addition to the quality of accounting standards.

To test the research hypothesis of this paper, it focused on the European context by analyzing data reported by a sample of 4,383 firm-year observations over the period 2009–2017 (487 entities). The firms included in this paper are both financial and non-financial and are listed in 18 European stock markets.

According to the research findings, female presence positively affects value relevance. Value relevance of both earnings and book value is higher in firms where the percentage of women on the board to total board members is over the median.

Findings contribute to the literature and have implications for standard setters and regulators.

As to the contribution to existing knowledge, this paper complements findings of scholars who have investigated the relationship between female presence and other dimensions of accounting quality (Garcia-Sanchez et al., 2017) and of those who have found the benefits of an increase in female

presence in governmental bodies (Krauss & Kroeber, 2020) or in public administration (Lapuenta & Suzuki, 2020). In addition, findings of this paper participate into the debate regarding the ability of female presence on corporate boards to affect value relevance of accounting amounts. As a matter of fact, in literature, scholars have found that female presence is associated with market variables (e.g., Gul et al., 2011; Qureshi et al., 2020), but they have provided few and contradictory findings regarding its ability to affect the value relevance of earnings and book value (Siekkinen, 2017; Tshipa et al., 2018).

As to the practical implications, from the findings of this paper, standard setters might learn that female presence can be included among the “other information” (Ohlson, 1995) which, in addition to the quality of the accounting standards, might affect value relevance judgments. This means that the composition of the board of directors affects investors’ judgments and so it can be used by the shareholders to influence the investors’ perception of the quality of accounting amounts reported in annual reports. For regulators, this paper provides insights that the market (investors) appreciates diversity. Its findings not only point to positive reactions to reforms that encourage the presence of women in the labor market but also support any EU policies aimed at guaranteeing female presence and gender diversification.

This research is divided into six sections. Following the introduction in section 1, section 2 reviews the literature and provides support for our hypothesis. Section 3 describes the research protocol. Section 4 is dedicated to the sample selection strategy and to descriptive statistics, while section 5 presents the research results. Finally, section 6 provides the conclusions of the paper, along with the study’s limitations and possible future developments.

2 | LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1 | Literature review

Accounting amounts calculated according to the requirements of a specific set of accounting standards are value relevant to the extent that they are associated with a market variable (e.g., share prices, stock returns) and so when they are able to reflect the underlying economic value of the firm.

Miller and Modigliani (1966) conducted one of the first value relevance surveys investigating the existence of statistically significant associations between book value and equity market values. In more recent years, the literature has investigated the relationship between accounting amounts and market variables controlling whether the presence of the so-called “other information” (Ohlson, 1995) influences value relevance judgments. Scholars’ findings suggest that not only the quality of accounting standards but also a significantly large number of other factors have an impact on value relevance. These include those affecting accounting practice and the quality of corporate governance (Mechelli & Cimini, 2019; Siekkinen, 2017) or of legal enforcement (Callao et al., 2016), which could be internal or external factors that are able to influence the weight investors place on accounting amounts, that is, value relevance judgments.

The following table summarizes the variables affecting value relevance which might be included under the heading of “other information.” Taking into consideration the very limited evidence provided regarding the incremental effect produced by gender diversification on value relevance, this has motivated this study to investigate the value relevance of accounting amounts (Table 1).

The table suggests that literature has provided inconsistent findings regarding the ability of female presence on corporate boards of directors to be included under “other information” and, as a

consequence, to influence value relevance of earnings and book value. According to this paper, assuming that the board composition affects accounting practice, female presence on corporate boards of directors should impact value relevance of accounting amounts.

The main reason female presence might influence accounting practice can be grounded in studies focusing on the different themes of gender research in accounting. According to Baldarelli et al. (2016, p. 272), a first group of scholars involved in this field studied the gendered division of labor and its specific sub-themes related to women's involvement in accounting (Walker, 2008), the role of contemporary women in the accounting professions (Komori, 2008), the analysis of the gendered division of labor in the contemporary workplace (Whiting et al., 2014), in the context of professional practice, in professional bodies or in academia (Laughlin, 2011). Scholars belonging to this field have provided evidence that female presence and gender diversification might have different positive effects on the economy. For instance, Krauss and Kroeber (2020) showed a reduction in the risk of early government cabinet termination in the presence of a higher proportion of female cabinet members (Krauss & Kroeber, 2020). In addition, the results of multilevel model analysis found by Lapuente and Suzuki (2020) showed statistically significant gender differences in attitudes toward innovation, providing evidence that gender differences matter in public administrations. Focusing on gender inequalities in Italian universities and academia, Baldarelli et al. (2016) confirmed the need to provide more space for women at the summits of political, economic and cultural institutions, including accounting academia and scientific journals.

A second group of scholars focused on the values embedded in accounting practice (Baldarelli et al., 2016, p. 272). Within this field, assuming that gender composition affects accounting practice within the firm, it should influence the financial reporting quality and, in turn, the weight investors place on accounting amounts. Therefore, if in the case of female presence value relevance increases, this paper provides evidence of a supplementary positive effect that female presence might have on the economy.

An analysis of the literature shows that scholars have provided evidence of the value relevance of female presence but they have not investigated its ability to provide an incremental effect on the weight investors place on accounting amounts (i.e., earnings and book value of equity).

Excluding studies focusing on the association between gender variables and possible measures of accounting quality such as accruals (Srinidhi et al., 2011), the analysis of the literature reveals that the large majority of scholars have studied the association between market value and a variable that measures the presence of women on the board of directors, with no interest in the ability of such a variable to affect the value relevance of earnings and book value. In this specific field, there are studies that have investigated the association between a market variable and female representation on the board of directors, in the field of research papers that find an association between a corporate social responsibility variable and a market variable (e.g., Lu & Abeysekera, 2021). To the best of our knowledge, by using a large panel dataset comprising 812 listed European firms belonging to different industries, Qureshi et al. (2020) investigated whether sustainability disclosure (environmental, social, and governance) and female representation on boards affect firm value. In their empirical analysis, they use Ohlson's (1995) model to find factors that affect firm value. Among these factors, there is female presence on the corporate board of directors, which is not only found value relevant to the extent it is associated with market prices, but is also positively associated with sustainability disclosure of European firms. In the same vein of Qureshi et al. (2020), focusing on South Africa, Gyapong et al. (2016) reviewed previous studies on value relevance of gender and ethnic diversity and focused on hand-collected data from 245 South African listed firms from 2008 to 2013. Among others, this research studied the association between the number of women on boards and a measure of firm value. Regarding female presence, the findings confirmed a positive and significant effect of

TABLE 1 Literature review on "other information" and "value relevance"

Other information	Research papers	Main findings
Accounting standards and conservatism	<ol style="list-style-type: none"> 1. Beisland and Hamberg (2013) 2. Isaboke and Chen (2019) 3. Kousenidis et al. (2009) 4. Liu et al. (2014) 5. Januarti and Fahlevi (2017) 6. Ji and Lu (2014) 	<ol style="list-style-type: none"> 1. Firms that operate in industries in which accounting conservatism limits this capitalization display lower value relevance as a result of more unsustainable earnings components. 2. Conditional conservatism is positively (negatively) related to value relevance prior (post) to mandatory IFRS adoption. 3. Value relevance increases when moving from low-conservative to medium-conservative firms and decreases when moving further to high-conservative firms. 4. Both Chinese accounting standards and IAS/IFRS information are value relevant to investors in the Chinese capital markets but IAS standards provide more useful information. 5. The value relevance increases following IFRS implementation. Grouping the sample based on various accounting conservatism levels, IFRS increases the value relevance of earnings, while it decreases value relevance of book value for firms with medium level of conservatism. However, measuring the conservatism as continuous variables, a negative (positive) relationship between conservatisms and value relevance of earnings (book value) is found. 6. Capitalized intangible assets are value relevant in Australia, in both pre- and post-adoption of IFRS periods. Value relevance is higher in firms with more reliable information on intangible assets. This study finds that the value relevance of intangibles has declined in the post-adoption period of IFRS. However, the positive relationship between the value relevance and the reliability of intangibles has remained unchanged in the post-adoption period.
Audit characteristics and audit quality	<ol style="list-style-type: none"> 1. Abdollahi et al. (2020) 2. Hakim and Omri (2012) 3. Robu and Robu (2015) 	<ol style="list-style-type: none"> 1. Auditor's report and audit firm size are positively and significantly correlated with value relevance. 2. Information value relevance is associated with the reputation, experience, and specialization of the external auditors. 3. The audit opinion affects value relevance.
Behavior and aptitude	<ol style="list-style-type: none"> 1. Chaudhry and Sam (2018) 	<ol style="list-style-type: none"> 1. An expansionary monetary policy and increases in foreign portfolio investment lead to increased levels of herding that lowers value relevance.

Other information	Research papers	Main findings
Business cycle	<ol style="list-style-type: none"> 1. Fang et al. (2013) 2. Kane et al. (2015) 3. Tahat and Alhadab (2017) 	<ol style="list-style-type: none"> 1. In Taiwan, during the financial meltdown, the value relevance of fair value accounting information decreased significantly. Furthermore, the value relevance of part of fair value accounting information ceased to exist. 2. Controlling for recession significantly increases the value relevance of both the book value of equity and earnings. 3. Based on a sample of UK FTSE 350, the findings show a significantly incremental association between firms' market values and book value, earning per share and cash flow around the recent financial credit crisis (pre-crisis, during, and post-crisis periods).
Business model	<ol style="list-style-type: none"> 1. Agbodjo et al. (2020) 2. Ciftci et al. (2014) 3. Kadri (2016) 4. Muhanna and Stoel (2010) 	<ol style="list-style-type: none"> 1. Value relevance is higher for Islamic banks, compared to conventional banks. 2. Value relevance for intangible-intensive industries is as high as that for tangible-intensive industries. 3. In Malaysia, the explanatory power toward market value provided by Islamic banks is far behind their conventional counterparts. The results implicated that book value and earnings of Islamic banks provide less information content toward market value despite their relevance. 4. The level of IT spending did not explain variation in market values.
Corporate governance	<ol style="list-style-type: none"> 1. Callao et al. (2016) 2. Cimini et al. (2020) 3. Fiador (2013) 4. Mechelli and Cimini (2019) 5. Habib, and Azim (2008) 6. Omran & Tahat, 2020 7. Siekkinen (2017) 8. Song et al. (2010) 	<ol style="list-style-type: none"> 1. Ownership concentration affects the relationships between value relevance and earnings management. 2. In the presence of differences in corporate governance quality, a deterioration of the auditor independence does not necessarily determine a decrease in the value relevance. 3. Net asset value per share is value relevant on the Ghanaian market and even more so when the board size is small or the CEO also doubles as the board chair. Board independence is virtually irrelevant in the market valuation of shares and when relevant has a negative effect. 4. The quality of corporate governance affects the value relevance of fair value estimates. 5. Firms with strong governance structure exhibit higher value relevance of accounting information. Results further show that firm-specific economic variables are important determinants of the value relevance of accounting information. 6. Institutional ownership level has a significant and positive influence on the VR of accounting information released by the Kuwaiti non-financial listed firms. 7. Board independence and gender diversity have a positive effect on the value relevance of fair value estimates (Level 3). 8. The quality of corporate governance affects the less reliable fair value estimates.

Other information	Research papers	Main findings
Country characteristics	<ol style="list-style-type: none"> 1. Callao et al. (2016) 2. Cimini et al. (2020) 3. El-Diftar and Elkalla (2019) 4. Kang (2003) 5. Manganaris et al. (2016) 6. Mechelli and Cimini (2019) 	<ol style="list-style-type: none"> 1. Enforcement affects the relationship between value relevance and earnings management. 2. In different investor protection environments, a deterioration of the auditor independence does not necessarily determine a decrease in the value relevance. 3. Accounting information in the MENA region is value relevant. Although book value per share and earnings per share are significant determinants of value relevance in both Gulf countries and non-Gulf countries firms, operating cash flows per share is only a significant determinant of value relevance in non-Gulf countries firms. 4. Accounting numbers prepared under U.K. GAAP are more value relevant than those reported under Japanese GAAP. This result lends support to the supply hypothesis and suggests that the legal regime does have a marginal impact on the value relevance of the accounting information. 5. IFRS have reinforced the value relevance for both conservative and non-conservative banks. However, this result alters when controlling for institutional dimensions. Specifically, the value relevance of conservative banks is strengthened when operating in high enforcement, low differences or English-origin environments, while non-conservative banks display better goodness-of-fit in French-origin countries. 6. The quality of legal systems affects the value relevance of fair value estimates.
Female presence	<p data-bbox="264 1034 386 1118">Association with market prices</p> <ol style="list-style-type: none"> 1. Adams and Ferreira (2009) 2. Gul et al. (2011) 3. Gyapong et al. (2016) 4. Qureshi et al. (2020) 5. Rose (2007) 6. Tshipa et al. (2018) <p data-bbox="264 1469 386 1644">Association of its interaction with accounting amounts with market prices</p> <ol style="list-style-type: none"> 1. Siekkinen (2017) 2. Tshipa et al. (2018) 	<ol style="list-style-type: none"> 1. No associations have been found between female presence and market prices. 2. The positive association between gender diversity and stock price suggests that gender diversity improves stock price informativeness. 3. A positive and significant effect of female presence on firm value is found. The increase in firm value is greater when boards have three or more women directors. 4. Female presence in most of the cases is value relevant. 5. Female presence in the corporate board of directors is found value relevant to the extent that it is associated with market prices. 6. No evidence has been found between Tobin's Q and female board representation. <ol style="list-style-type: none"> 1. Female presence has a positive effect on value relevance of the less reliable level 3 fair value estimates. 2. In most of the cases, the interaction term of female presence with accounting variables is not value relevant.

Other information	Research papers	Main findings
Investor sentiment	1. He et al. (2020)	1. The value relevance of accounting variables is collectively lower in high sentiment periods than in low sentiment periods.
Reporting entity	1. Müller (2011)	1. The relevance of consolidated statements is superior than that of the separate statement of the parent.

Note: Table reports the main factors affecting the value relevance of accounting amounts. For female presence, the table distinguishes studies that have investigated the association between market prices and female presence and those investigating the ability of female presence to affect the value relevance of accounting amounts (e.g., earnings and book value of equity). For each study, the table provides the main finding by scholars. The table should suggest that female presence is only one of the variables that might be included in the so-called other information and that studies on the relationship between female presence and value relevance have provided very limited evidence about its ability to affect the weight investors place on earnings and book value.

female presence on firm value, and that the increase in firm value is greater when boards have three or more women directors. The association of female representation with a market variable found by Qureshi et al. (2020) and Gyapong et al. (2016) conflicts with results of other studies. Despite the use of different methodology and samples, these studies do not find any significant link between firm performance, as measured by Tobin's Q, and female board representation (e.g., Rose, 2007), or they find a negative relationship (Adams & Ferreira, 2009).

Lastly, a study that finds an association between market prices and gender diversity is that of Gul et al. (2011), who found that stock prices of firms with gender-diverse boards reflect more firm-specific information after controlling for corporate governance, earnings quality, institutional ownership and acquisition activity. Finding a positive association between gender diversity and stock price, their exploratory analysis suggests that gender diversity improves stock price informativeness by increasing voluntary public disclosures.

The common feature of all these studies focusing on the relationship between market prices and gender diversity is that they say nothing about the contribution that gender diversification of the corporate board might have on value relevance of earnings and book value reported in the annual report.

Moving to studies that focused on the ability of gender diversity to affect the value relevance of accounting amounts, a screening of the research papers published on this topic reveals that there are not many and they provide very conflicting results.

Tshipa et al. (2018) focused on a single country, South Africa, and answered this second research question, investigating the impact of internal corporate governance attributes on the value relevance of accounting information. By analyzing a sample of firms listed in the Johannesburg Stock Exchange (JSE), the findings suggest that female presence, measured by the percentage of women on boards, is value relevant in most cases. However, by using a price model with interaction terms to investigate the ability of female presence to affect the value relevance of earnings and book value, in most cases the scholars found no significant value relevance differences. The only study that found a significant incremental impact of female presence on value relevance is Siekkinen (2017). Focusing on a sample of financial firms from 29 European countries, the scholar assessed value relevance of fair value hierarchy, providing evidence that female presence has a positive effect on value relevance of the less reliable level 3 fair value estimates.

To the best of our knowledge, with the limited exception of Siekkinen (2017), who focused on the value relevance of a proportion of book value of equity (i.e., level 3 fair value estimates), no other studies have provided evidence regarding the ability of female presence to affect value relevance of earnings and book value of equity.

2.2 | Hypothesis formulation

According to the thesis of this paper, female presence should have a positive effect on the value relevance of these accounting figures.

The possible explanations are the following ones.

First, Baselga-Pascual et al. (2018) argue that the effect of female presence on value relevance should be positive and due to the mediated effect of the ethical reputations of the entities involved. Moving from the pivotal governance role of the board of directors and the positive effect produced on value relevance by ethical corporate behavior, value relevance of accounting amounts should increase to the extent that the presence of women on corporate boards increases the ethical reputation of their entities. The findings of Baselga-Pascual et al. (2018) show that the ethical reputation of financial institutions is positively associated with different variables (e.g., board size, CEO duality) when there is gender diversification.

Second, in addition to the effect of ethical reputation on value relevance produced by female presence on corporate boards, Bravo et al. (2018) argued that such presence reduces the cost of capital and increases value relevance. Focusing on manufacturing industries listed on Standard and Poor's 500 for 2009, they found that boards with a high female presence, following the governance code's recommendations, lead to a reduction in the cost of capital through the disclosure of information on risks.

Third, better monitoring activity is a further reason that leads Campbell and Minguez-Vera (2008, 2010) to argue that the quality of the monitoring role performed by the board of directors is affected by board gender composition. In their paper, they provided evidence that there is a positive relationship between the firm value and the percentage of women on boards of directors, in exercising better monitoring activity. In the same vein, the results of Adams and Ferreira's (2009) study advocated greater diversity of corporate boards because group composition affects board effectiveness and determines the success or failure of governance proposals. In particular, gender-diversified boards improve the quality of public disclosure through better oversight and monitoring of managers' actions and reports. In their paper, these scholars quoted the study of Carter et al. (2003) that found a positive relation between gender and ethnic diversity of the board and corporate performance, as proxied by Tobin's *q*. Similarly, Oxelheim and Randøy (2003) provided evidence that firm value is higher in Scandinavian firms whose boards have foreign members, indicating that diversity is important when monitoring managers. According to Gul et al. (2011), female presence on boards could improve the quality of board discussions and should provide better oversight of a firm's disclosures and reports. That is why stock market prices react positively to the appointment of female board members.

Fourth, assuming that accounting (conditional) conservatism positively affects value relevance (Brown et al., 2006), in the presence of a positive relationship between female presence and accounting conservatism, an increase in female presence should enhance the value relevance of accounting amounts.

Finally, female presence reduces the risk of earnings management behavior, to the extent that female directors are less tolerant than male directors toward earnings management (Srinidhi et al., 2011). Considering the negative relationship between value relevance and earnings management (Callao et al., 2016; Lara et al., 2017), female presence should increase value relevance.

Behind these last three assumptions, there is the belief that certain characteristics of women and men affect accounting practices and produce different effects in terms of internal monitoring, conservative accounting, and earnings management. Broadbent (2015, p. 6) highlights some of these characteristics arguing that "the universal masculine is characterized by hard, rational and objective values, the universal feminine by emotion and more subjective values."

All these arguments lead us to formulate a research hypothesis regarding the effect that female representation on boards of directors might have on the value relevance of earnings and book value.

H_1 : value relevance is higher in boards with high female presence than in boards with low female presence

3 | RESEARCH METHODOLOGY

To test the hypothesis, this paper focuses on a sample of entities that adopted the IASB standards during the period 2009–2017, listed in 18 European countries.

The sample is composed of entities that belong to different industries. The focus of this research on both financial and non-financial entities is due to the absence of significant peculiarities regarding female presence on the boards of directors of banks which justify their exclusion from the sample. In addition, both financial and non-financial entities are subject to the same general requirements to disclose information regarding gender composition. The choice to limit the analysis up to the fiscal year 2017 is due to the risk of collecting variables that are not comparable to each other because of the introduction, as of January 1, 2018, of the new accounting standards IFRS 9 on financial instruments' measurement and IFRS 15 on revenue recognition.

All the data used to run the regression models were collected using the Thomson Reuters Eikon database. Due to the interest in the European setting, data regarding the Stoxx 600 constituents list were downloaded to answer our research question. This database includes the largest European listed companies. Its use should prevent potential biases due to the use of other sources of data including entities with significantly different size. Other than market and accounting data, the database provided the variables measuring the percentage of women on the board of directors (BGD_{it}) as well as the percentage of women among the executive members of corporate boards ($EBGD_{it}$). Both range from 0% to 100% and were assessed scaling the number of women and the total board members. From these variables, this paper built the dummy variables $dBGD_{it}$ and $dEBGD_{it}$. They are equal to 1 if BGD_{it} and $EBGD_{it}$ are over the median and 0 otherwise.

By analyzing data that refer to consolidated accounts, this paper assessed value relevance by using a price model (Ohlson, 1995) with variables deflated by the market capitalization at the reporting date (Easton & Sommers, 2003). This scale factor has been used by several accounting scholars (e.g., Tsalavoutas et al., 2012; Xu et al., 2007) to avoid biases to research results due to the scale effect. It requires a weighted least square of the price model to avoid a specification whose dependent variable is always equal to 1 and employs the square of the inverse of market value as weight. In this regard, the specification used to test the hypothesis that female presence increases value relevance is the following:

$$MV_{it} = \alpha_0 + \alpha_1 NI_{it} + \alpha_2 BV_{it} + \alpha_3 dBGD_{it} + \alpha_4 dBGD_{it} \times NI_{it} + \alpha_5 dBGD_{it} \times BV_{it} + \text{control variables} + \text{fixed effects} + \varepsilon_{it} \quad (1)$$

where:

MV_{it} is the market value deflated by the market capitalization at the reporting date;

NI_{it} is the reported net income deflated by the market capitalization at the reporting date;

BV_{it} is the reported book value deflated by the market capitalization at the reporting date;

$dBGD_{it}$ is a dummy variable that measures the presence of women on boards of directors. It is equal to 1 for boards of directors with a number of women over the median and 0 otherwise;

control variables are total asset and cash flow that avoid biases due to the risk taking and the liquidity of the firms analyzed;

fixed effects are dummy variables that control for country, industry, and time effects;

ε is the error term;

subscripts i and t identify the entities and the years analyzed.

As in Kothari and Shanken (2003), this research examines accounting variables' value relevance by analyzing the statistically significant coefficient's magnitude. While statistically significant coefficients suggest the value relevance of the corresponding variables, the magnitude of statistically significant coefficients denotes their higher or lower value relevance. In models with interaction terms like those of this study, the expectation is to find regression coefficients α_4 and α_5 positive and statistically significant. This should validate the hypothesis that there is a statistically significant difference between the value relevance of accounting amounts disclosed by firms that have a percentage of women on the board of directors over the median and the value relevance of accounting amounts disclosed by firms with a female presence under the median. The positive sign of the coefficients should suggest that other than being different, the value relevance of accounting amounts disclosed by the first group of firms is higher than that of the second group of firms.

To test the robustness of the findings, this paper conducted different tests to check whether methodological choices had biased the research findings.

The first test re-estimated the price model by using a different variable that proxies for female presence. It is the percentage of women among the executive members of the board of directors (EBGD_{it}). This test checks for biases due to measurement errors of the variable that this paper considers a proxy for female presence.

The specification used to test the hypothesis is as follows:

$$MV_{it} = \alpha_0 + \alpha_1 NI_{it} + \alpha_2 BV_{it} + \alpha_3 dEBGD_{it} + \alpha_4 dEBGD_{it} \times NI_{it} + \alpha_5 dEBGD_{it} \times BV_{it} + \text{control variables} + \text{fixed effects} + \varepsilon_{it} \quad (2)$$

where:

dEBGD_{it} is the percentage of women among the executive members of the board of directors.

Similarly to the main analysis, the expectation of this paper is to find the regression coefficients of interaction terms positive and statistically significant.

The second test re-estimated the price model by using the specifications that, according to Barth and Clinch (2009), have the best performance, regardless of the type of scale effect. These are the models with undeflated variables and those with variables deflated by the number of outstanding shares. These tests prevent the methodological choice to use the market value of equity in the main analysis as a scale factor from biasing results. While the different size of entities included in the sample led this paper to avoid the use of the model with undeflated variables in the main analysis, concerns of previous literature toward the use of the number of outstanding shares as a deflator resulted in the decision to use the specification with variables scaled by the number of shares in a sensitivity. As a matter of fact, despite Barth and Clinch's (2009) argument that the share-deflated specification performs the best regardless of the type of scale effect, previous literature (e.g., Brown et al., 1999; Easton, 1998) raised doubts concerning the use of the number of shares as a deflator to mitigate the scale effect. Studies have highlighted that managers have discretion as to the number of shares outstanding and that firms may have larger values of all variables even on a per-share basis, with the consequences that the association between accounting amounts on a per-share basis and prices "may be a spurious effect of scale" (Easton, 1998, p. 235) and that "when scale effects are large enough, the researcher is essentially regressing s (the scale effect) on

itself, resulting in an R^2 that approaches unity” (Brown et al., 1999, p. 91). Indeed, these criticisms led this paper to use market value at the reporting date as a deflator, as suggested by Easton and Sommers (2003).

In the third test, to avoid the sample composition biasing results, we excluded banks, insurance companies and other financial entities in order to test the research hypothesis over a sample of non-financial entities.

In the fourth test, between the control variables of the price model, we added the regressor L_{it} which is a dummy variable that is equal to 1 if the firm reports a loss and 0 otherwise (Mitra & Hossain, 2009). This test was useful to demonstrate that the presence of loss firms does not bias results.

4 | SAMPLE SELECTION STRATEGY AND DESCRIPTIVE STATISTICS

The sample selection strategy and the most common descriptive statistics of data used to test our hypothesis are described in this section.

For the sample selection strategy, the Eikon database provided a list of 600 entities that belong to the Stoxx 600 constituents list. After excluding 15 entities with a negative book value (Cimini et al., 2020) and 98 with missing data, the final sample numbered 487 entities. Missing data are above all due to the presence of entities for which the percentage of female presence is not reported. Taking into consideration the time frame analyzed (2009–2017), 4,383 firm-year observations were used to test the research hypothesis of this paper. They were listed in 18 countries that belong to the region “Europe” and operate in 6 different industries. According to the company’s general industry classification made by the Eikon database, 325 entities belong to the industrial sector, 40 to the utility, 11 to transportation, 38 to banks, savings, and loans, 31 are insurance companies, and 42 other financial entities.

Table 2 reports the sample selection strategy, their geographical distribution, and the sectors they belong to.

Table 3 shows the most common descriptive statistics of the variables used to test the research hypothesis of this paper, including those used to test the robustness of findings. It reports the number of observations, the median, the mean, the standard deviation and the minimum and the maximum of variables, which provide interesting insights justifying specific methodological choices made to test our research hypothesis. For instance, the divergence between the mean and the median, due to outliers, explains why in the main analysis we avoided using a model with undeflated variables. The use of a specification with variables deflated by the market capitalization at the reporting date should avoid biases due to the scale effect. The minimum values of net income tabulated in Table 3 show that in the sample analyzed, there are loss firms. The presence of firms with negative earnings led us to employ a robustness test to control whether the presence of such firms might bias results. The sample selection strategy of this paper avoids the presence of entities with negative book value.

It is interesting to observe that the mean value of the variable BGD_{it} calculated over the period analyzed is 21.80%. The Report “*Gender Balance on corporate boards*” by the European Commission states that in April 2016, the average share of women on boards of the largest publicly listed companies that operate in the EU-28 Member States reached 23.3% (22.7% in October 2015). In only ten countries (e.g., France, Sweden, Italy, Finland, the Netherlands, Latvia, Germany, the United Kingdom, Denmark and Belgium) in which women account for at least a quarter of board members, the same report states that the proportion of women among board chairs is still low. As a matter of fact, in April 2016 only 7% of board chairs and 5.1% of CEOs were women. Our data

TABLE 2 Search strategy, industry classification and geographical location

Panel (a) Sample selection strategy					
Strategy		No. of observations			
Listed entities from Eikon database		600			
Entities with a negative book value		15			
Entities with missing data		98			
= Final sample		487			
Panel (b) Country code					
ISO country code	Country name	No. of observations	FYO	%	Cumulative frequency
AT	Austria	8	72	1.64	1.64
BE	Belgium	16	144	3.29	4.93
CH	Switzerland	31	279	6.37	11.29
DE	Germany	56	504	11.50	22.79
DK	Denmark	18	162	3.70	26.49
ES	Spain	22	198	4.52	31.01
FI	Finland	15	135	3.08	34.09
FR	France	75	675	15.40	49.49
GB	Great Britain	126	1,134	25.87	75.36
IE	Ireland	8	72	1.64	77.00
IT	Italy	24	216	4.93	81.93
LU	Luxemburg	2	18	0.41	82.34
NL	The Netherlands	19	171	3.90	86.24
NO	Norway	16	144	3.29	89.53
PL	Poland	7	63	1.44	90.97
PT	Portugal	3	27	0.62	91.58
SE	Sweden	40	360	8.21	99.79
ZA	Croatia	1	9	0.21	100.00
	Total	487	4,383	100.00	
Panel (c) General Industry Classification					
	No. of observations	FYO	%	Cumulative frequency	
Industrial	325	2,925	66.74	66.74	
Utility	40	360	8.21	74.95	
Transportation	11	99	2.26	77.21	
Bank / Savings & Loans	38	342	7.80	85.01	
Insurance	31	279	6.37	91.38	
Other financial	42	378	8.62	100.00	
Total	487	4,383	100.00		

Note: Panel (a) describes the sample selection strategy. Moving from an initial sample of 600 entities listed in European stock exchanges, after eliminations, the final sample numbers 487 entities. Eliminations regard entities with negative book value of equity and those with missing data. Panel (b) describes the geographical distribution of the entities analyzed. Panel (c) discloses the industries of the entities belonging to the final sample. Both panels (b) and (c) report the number of observations, the firm-year observations (FYO), for each country and industry, the percentage compared to the total number of FYO and the cumulative frequency.

TABLE 3 Descriptive statistics

	Number of FYO	Mean	Median	Standard deviation	Minimum	Maximum
MV _{it}	4,383	14,240.63	6,109.37	22,905.55	8.91	222,885.7
NI _{it}	4,383	817.31	307.03	1,926.642	-15,366.66	35,325.03
BV _{it}	4,383	8,905.39	2,985.09	16,342.70	0	186,876.3
BGD _{it}	4,383	21.80	22.22	13.49771	0	66.67
EBGD _{it}	4,383	11.67	10.00	11.85068	0	66.67
TA _{it}	4,383	7.84e+07	8,674,000.00	2.43e+08	8,841	2.43e+08
CF _{it}	4,383	2,062,569	562,000.00	4,414,045	-3.00e+07	5.75e+07

Note: Table shows the number of firm-year observations (FYO), the mean, the median, the standard deviation and the minimum and the maximum values of variables used in this research to test research hypothesis. *Variable definitions:* MV_{it} is the market value (in Thousands of Euros); NI_{it} is the net income (in Thousands of Euros); BV_{it} is the book value of equity (in Thousands of Euros); BGD_{it} is the metric for board female presence and measures the percentage of women on the board of directors; EBGD_{it} is the metric for executive board female presence and measures the percentage of women among the executive members of board of directors; TA_{it} is the total assets (in Thousands of Euros); and CF_{it} is the total cash flow (in Thousands of Euros). Subscripts *i* and *t* refer to entities and years.

TABLE 4 Correlation coefficients

	MV _{it}	NI _i	BV _i	BGD _i	EBGD _i	TA _{it}	CF _i
MV _{it}	+1.00						
NI _{it}	+0.7037***	+1.00					
BV _{it}	+0.7511***	+0.5949***	+1.00				
BGD _i	+0.0974***	+0.0515***	+0.0572***	+1.00			
EBGD _i	+0.0238	+0.0120	+0.0010	+0.2925***	+1.00		
TA _{it}	+0.3758***	+0.2538***	+0.6888***	+0.0757***	-0.0024	+1.00	
CF _i	+0.6445***	+0.5573***	+0.6863***	+0.0387**	-0.0193	+0.4846***	+1.00

Note: Table shows the linear correlation coefficients of variables. (***) denotes correlation coefficient statistically significant at 1% level; (**) denotes correlation coefficient statistically significant at 5% level.

on the female presence among executive members show that, on average, only 11.67% of board members are women.

Table 4 shows the correlation coefficients of the variables downloaded from the Eikon database, with the evidence of coefficients different from zero at 1% level of significance. Because some of the coefficients tabulated in the table are high and statistically significant, in the tables dedicated to the presentation of research results, the value of the variance inflation factors (VIF) for each variable is disclosed. The econometric literature (Greene, 2003; Wooldridge, 2009) considers values under 10 acceptable to avoid bias in the regression estimates due to multicollinearity.

5 | RESEARCH RESULTS

The findings tabulated in Table 5 validate our research hypothesis, providing evidence that female presence increases the value relevance of accounting amounts.

By using a model with variables deflated by the market capitalization at the reporting date (Easton & Sommers, 2003), results suggest that both earnings and book value disclosed by firms with a

TABLE 5 Findings (main analysis)

Variables	Coefficients	Regression parameters	
		t-statistics	VIF
NI_{it} / MV_{it}	+2.97	+17.80***	+3.34
BV_{it} / MV_{it}	+0.76	+32.60***	+4.66
$dBGD_{it} \times NI_{it} / MV_{it}$	+0.48	+2.15**	+3.17
$dBGD_{it} \times BV_{it} / MV_{it}$	+0.10	+3.56***	+3.89
$dBGD_{it}$	+965.89	+2.43**	+1.74
TA_{it} / MV_{it}	-0.00002	-12.35***	+3.28
CF_{it} / MV_{it}	+0.001	+15.00***	+2.12
Intercept	-2,216.98	-0.63	
No. of obs.	+4,383		
Adjusted R ²	+0.71		
R ²	+0.71		

Note: The table shows the regression parameters (coefficients, *t*-statistics, VIF, adjusted R², and R²) estimated running Equation (1) over the sample of 4,383 FYO listed in 18 European countries. By using a price model (Ohlson, 1995) with variables deflated by the market capitalization at the reporting date (Easton & Sommers, 2003), results support the thesis that female presence positively affects the value relevance of both earnings and book value. *Variables definitions*: MV_{it} is the market value; NI_{it} is the net income deflated by the market capitalization at the reporting date; BV_{it} is the book value of equity deflated by the market capitalization at the reporting date; $dBGD_{it}$ is a dummy that control for high and low board female presence; TA_{it} is the total assets deflated by the market capitalization at the reporting date; CF_{it} is the total cash flow deflated by the market capitalization at the reporting date. Subscripts *i* and *t* refer to entities and years. The regression parameters of fixed effects have not been tabulated. (***) and (**) denote regression coefficients statistically significant at 1% and 5%.

percentage of women on boards of directors under the median are value relevant. The regression coefficients NI_i and BV_i are statistically significant at the 1% level and have a positive sign (+2.97 for earnings and +0.76 for book value).

The coefficient of the dummy variable $dBGD$ is positive (+965.89) and statistically significant at 5% providing evidence that such information is value relevant for investors. The positive sign of the interaction terms $dBGD_{it} \times NI_{it}$ and $dBGD_{it} \times BV_{it}$ (+0.48 for earnings and +0.10 for book value of equity) suggests that accounting amounts disclosed by firms with female presence on their board over the median (+3.45 is the coefficient of earnings and +0.86 that of book value) is higher than those of firms in the other group. Their statistical significance at the 1% level indicates that the value relevance difference is statistically significant. This validates the hypothesis that investors value more earnings and book value disclosed by firms whose boards have a female presence over the median or, in more general terms, that there is a positive relationship between female presence and the value relevance of accounting amounts. Findings tabulated in Table 4 should not be biased by multicollinearity because the VIF of each variable is always under the maximum value of 10.

As regards the accounting literature, on the one hand, findings tabulated in Table 5 support a statistical association between the metric of female presence and the market variable (e.g., Qureshi et al., 2020). In addition, the positive and statistically significant coefficients of interaction terms add to the literature and extend those achieved by Siekkinen (2017) who reached a similar conclusion by analyzing the effect of female presence on the value relevance of fair value level 3—that is, a portion

TABLE 6 Findings (a different metrics for female presence)

Variables	Coefficients	Regression parameters	
		<i>t</i> -statistics	VIF
NI_{it} / MV_{it}	+0.96	+10.54***	+1.89
BV_{it} / MV_{it}	+0.60	+30.63***	+3.77
$dEBGD_{it} \times NI_{it} / MV_{it}$	+0.36	+2.54**	+2.05
$dEBGD_{it} \times BV_{it} / MV_{it}$	+0.07	+3.45***	+2.65
$dEBGD_{it}$	+164.47	+1.53	+1.55
TA_{it} / MV_{it}	-0.00001	-8.00***	+2.39
CF_{it} / MV_{it}	+0.008	+18.18***	+1.66
<i>Intercept</i>	-2,373.31	-1.53	
No. of obs.	+4,383		
Adjusted R^2	+0.61		
R^2	+0.60		

Note: The table shows the regression parameters (coefficients, *t*-statistics, VIF, adjusted R^2 , and R^2) estimated running Equation (1) over the sample of 4,383 FYO listed in 18 European countries. By using a price model (Ohlson, 1995) with variables deflated by the market capitalization at the reporting date (Easton & Sommers, 2003), results support the thesis that female presence positively affects the value relevance of both earnings and book value. *Variables definitions:* MV_{it} is the market value; NI_{it} is the net income deflated by the market capitalization at the reporting date; BV_{it} is the book value of equity deflated by the market capitalization at the reporting date; $dEBGD_{it}$ is a dummy that control for high and low percentage of women among the executive members of the board of directors; TA_{it} is the total assets deflated by the market capitalization at the reporting date; and CF_{it} is the total cash flow deflated by the market capitalization at the reporting date. Subscripts *i* and *t* refer to entities and years. The regression parameters of fixed effects have not been tabulated. (***) and (**) denote regression coefficients statistically significant at 1% and 5%.

of book value of equity. On the other hand, both the sign and the significance of our interaction terms contradict the results of Tshipa et al. (2018), who found no difference between the value relevance of earnings and book value disclosed by firms with a high female presence compared to those with low female presence.

To test the robustness of findings, Table 6 shows the regression parameters estimated by using the percentage of women among the executive members of the board of directors as proxy of female presence. Results validate the hypothesis that female presence increases value relevance. As a matter of fact, both the regression coefficients of interaction terms are positive and statistically significant ($dEBGD_{it} \times NI_{it}$ is 0.36 and $dEBGD_{it} \times BV_{it}$ is 0.07). This suggests that despite accounting amounts always being value relevant, earnings and book value of firms with a percentage of women in the executive under the median are less value relevant (NI_{it} is 0.96 and BV_{it} is 0.60) than those with a percentage of women in the executive over the median (NI_{it} is 1.32 and BV_{it} is 0.67).

Also, the other sensitivity analyses validate research results providing evidence that the value relevance of earnings and book value of firms with a female presence on corporate boards over the median is higher than and statistically different from the value relevance of the same accounting amounts disclosed by entities with a female presence under the median.

6 | CONCLUSIONS

The results of this paper have shown that female presence positively affects the value relevance of earnings and book value. These results are new in the literature because no value relevance studies

have investigated the incremental effect that board gender composition might have on the weight investors place on accounting amounts. Indeed, female presence is only one of the possible factors affecting the value relevance of earnings and book value of equity. Indeed, despite this research justifying and demonstrating that female presence increases the value relevance of earnings and book value, it might be considered only one factor that can be included under the so-called “other information” (Ohlson, 1995). Thus, other factors also mentioned in this paper might influence research results. Future studies might perform additional tests to overcome this limitation. In addition, scholars might also investigate the same phenomenon by looking at other countries or might explore other aspects of value relevance. Instead of focusing on the weight investors place on earnings and book value by using price models, scholars might investigate the timeliness of accounting amounts by adopting a return model (Easton & Harris, 1991). Finally, it might be interesting to investigate the ability of female presence and board gender composition to affect other dimensions of accounting quality (Barth et al., 2008) such as conservatism and earnings management.

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CONFLICT OF INTEREST

I declare that I have no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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