

Does board gender diversity improve environmental, social and governance disclosure? Evidence from South Africa

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Dates:

Received: 28 Sept. 2022

Accepted: 13 Mar. 2023

Published: 21 Apr. 2023

How to cite this article:

Toerien, F., Breed, C., & De Jager, P.G. (2023). Does board gender diversity improve environmental, social and governance disclosure? Evidence from South Africa. *South African Journal of Business Management*, 54(1), a3646. <https://doi.org/10.4102/sajbm.v54i1.3646>

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Purpose: This study examines the relationship between board gender diversity and environmental, social and governance (ESG) disclosure of companies listed on the Johannesburg Stock Exchange (JSE).

Design/methodology/approach: Panel regressions were used to analyse an unbalanced sample of 92 companies (725 company years) listed on the JSE All Share Index during 2011 to 2021. Board gender diversity, measured as the percentage of women on a board, was regressed against aggregate and individual component Bloomberg ESG disclosure scores. 'Critical mass theory' was tested using a 30%+ female board representation dummy variable.

Findings/results: Positive correlation is found between female board representation and both aggregate ESG and S-disclosure. This likely results from unexplained differences between company and overall economy level time effects, as no time series correlation remains between board gender diversity and ESG disclosure scores once these effects are controlled for. Little evidence is found in support of critical mass theory.

Practical implications: The results, although not conclusive, provide support for the argument that greater female representation on South African corporate boards is desirable to attain higher ESG disclosure. However, both female board representation and ESG disclosure scores may be driven by the same non-modelled underlying process, likely controlled for by the fixed effects.

Originality/value: This study adds to the growing ESG and board gender diversity research – specifically in South Africa, an interesting case of an emerging economy with well-developed governance and disclosure frameworks, where more equitable gender board representation and increasing ESG disclosure are topics of great practical and academic importance.

Keywords: ESG disclosure; corporate social responsibility; board gender diversity; responsible investing; South Africa.

Introduction

Business stakeholders, including investors, regulators and broader society, are increasingly demanding corporate transparency and disclosure on environmental, social and governance (ESG) activities, impact and performance (Tamimi & Sebastianelli, 2017). This adds a new dimension to the responsibilities, accountability and role of company directors, and has resulted in a global trend of improved corporate ESG reporting. The Governance and Accountability Institute, for example, reports that the percentage of S&P 500 companies that release sustainability or corporate responsibility reports increased from 20% in 2011 to 90% in 2019 (G&A Institute, 2020), and the United Nations Sustainable Stock Exchange (UN SSE) initiative expects all major companies to report their environmental and social practices by 2030.

A second area that is receiving much attention from governments, policymakers and academics is the gender diversity of company boards. As a result, a large amount of academic research now exists on the link between women on corporate boards and company performance and behaviour, both financial and non-financial.¹ However, most existing literature on board gender diversity examine the relationship between women on corporate boards and company financial performance, with a smaller strand examining the relationship between board gender diversity

1. See Nguyen et al. (2020), for a recent review on the academic literature on women on corporate boards.

and corporate social responsibility.² Similarly, most of the literature on ESG examine its relationship to company value and performance.³ However, only a small number of studies focus specifically on the relationship between women directors and corporate ESG disclosure, and these mostly involve developed economies (see e.g. Manita et al., 2018; Nicolò et al., 2021).

There is, thus, a need for additional investigation of this link, especially within developing economies, and given the growing stakeholder focus on both corporate ESG disclosure and board gender diversity, additional insights on the link between the two should be of interest to investors, regulatory authorities and governments.

South Africa provides a unique context in which to study this question as, despite being an emerging economy, it has a well-developed financial sector and equity market, a strong corporate governance framework, and comparatively high female board representation by global standards. Thus, according to Deloitte's seventh Women in the Boardroom Report, 31.8%⁴ of South African board seats are now occupied by women, up from 18.9% as recently as 2015. This now places the country 8th out of 51 countries surveyed, with the only other emerging country in the top 20 being Malaysia in position 18. Interestingly, unlike the first four countries on the list, South Africa does not have any formal or informal board gender representation quotas. Furthermore, South Africa is one of only nine countries surveyed (and the only emerging economy) to exceed 30% female board representation, which in terms of critical mass theory (CMT) is the threshold commonly accepted as indicative of sufficient representation to meaningfully influence board decision making based on the finding of Joecks et al. (2013) in Germany. Thus, unusually for a developing economy, the large variability of female board representation at South African company level across the period, combined with the availability of comprehensive data on the ESG disclosure levels of its listed companies over a 10-year period, makes a study of this nature possible.

To the authors' knowledge, there are two related studies in the South African context, namely the work of Buerthey (2021), who investigates the moderating effect of ownership concentration on the link between board gender representation and Corporate Social Responsibility (CSR) assurance but does not consider ESG disclosure, and that of Nel et al. (2022), who explore the relationship between online corporate governance disclosure and board composition, including the role of board gender diversity. To address this gap, this study examines the relationship between board female representation and ESG disclosure in aggregate, as

2. For examples of studies of this type, see Terjesen et al. (2015) (multinational), Erhardt et al. (2003) (USA), Adams and Ferreira (2009) (USA), and Mkhize and Msweli (2011) (South Africa).

3. For examples of studies of this type, see Fatemi et al. (2017) (USA), and Johnson et al. (2019) (South Africa).

4. As a cross-check, the 2021 Businesswomen of South Africa's Women in Leadership Census (BWASA 2021) indicates women board representation for listed companies and large state-owned entities at 27.7%.

well as segregated into its E, S and G disclosure components, for an unbalanced panel of 92 listed South African companies (725 company years) over the period 2011 to 2021.

The remainder of this article is structured as follows: section 'The South African institutional context' gives a brief overview of the South African institutional context, section 'Literature review' explores existing relevant literature and theories, section 'Sample, data and methodology' expands on the methodology used, and section 'Discussion' discusses the results. Lastly, section 'Conclusion' concludes the article.

The South African institutional context

South Africa is a pioneer in corporate governance and sustainability reporting, and was one of the first countries in the world to introduce a corporate governance code in the form of the various King reports (King I to IV).⁵ These governance codes are not legislated but are embedded in the Johannesburg Stock Exchange (JSE) listing requirements. The JSE is therefore in line with global best practice in encouraging companies listed on it to maintain high levels of corporate governance and ESG disclosure, further indicated by its introduction of the first emerging market CSR index in 2004, its status as signatory to the UN supported Principles for Responsible Investment (PRI), and its membership of the Sustainability Working Group of the World Federation of Exchanges (WFE), of which it is a past chair (JSE, 2022).

The King reports include guidelines in terms of board functions, responsibilities and composition, but also increasingly consider environmental and social reporting dimensions, in addition to that of traditional corporate governance. Thus, in terms of non-financial reporting, they recommend that South African companies produce sustainability (King II) and integrated reports (King III and IV) (Mans-Kemp & Van der Lugt, 2020). In addition, various South African investment industry bodies established the Code for Responsible Investing in South Africa (CRISA) in 2011 as a guide to institutional investors on how to effectively execute an investment analysis and investment activities to incorporate ESG issues into their investment decisions, and to encourage good governance in companies. Lastly, in terms of ESG regulation, the *South African Pension Funds Act* was updated in 2012 to include ESG considerations, and Yamahaki and Frynas (2016) find that the sophistication of South Africa's ESG legislation is more typical of a developed than developing country.

With regard to board composition, all King codes emphasise the importance of independence and a balance of power, and further recommend that diversity of board membership should be considered. Thus, according to the seventh principle of King IV, every board should consider whether it includes the appropriate balance of knowledge, skills, diversity and independence to make it effective. However, King IV goes further by also advocating that boards should

5. The four King reports were issued, respectively, in 1994, 2002, 2011 and 2016.

set targets for race and gender representation, although these are not specified. In line with this, in 2017 the JSE changed its listing requirements to promote gender diversity at board level by compelling companies to develop and implement policies in this regard.

Literature review

Environmental, social and governance disclosure

The Commission of the European Communities defines CSR as, 'A concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis' (Commission of the European Communities, 2001, p. 3). On the other hand, ESG is an acronym that was developed in 2004 by 20 financial institutions in response to a call from the former secretary of the UN, Kofi Annan (Gillan et al., 2021). Although some studies use the terms CSR and ESG interchangeably, ESG information is mostly used by market participants as a proxy to value and assesses the CSR quality of organisations. The disclosure of CSR and ESG activities is termed *sustainability reporting* (Bosi et al., 2022).

Theoretical frameworks relevant to the quality of an organisation's voluntary sustainability reporting include institutional theory, legitimacy theory and stakeholder theory (Roberts, 1992; Tamimi & Sebastianelli, 2017). *Institutional theory* argues that external influences like government policies and customers pressure organisations to behave according to rules and structures built into their larger environment. *Legitimacy theory* argues that organisations aim to be perceived as functioning within the bounds and norms of the society in which they operate (Fernando & Lawrence, 2014), and therefore aim to legitimise their activities and behaviour to their stakeholders by maintaining a socially responsible image (Tamimi & Sebastianelli, 2017). *Stakeholder theory* investigates the relationship between an organisation and its stakeholders, which include employees, customers, public interest groups, creditors, board of directors, competitors and governments.

In keeping with these theories, Jensen (2002), who combines value maximisation and stakeholder theory into a single concept called 'enlightened value maximisation', argues that although long-term value maximisation remains the main objective of an organisation, its long-term market value cannot be maximised if any important stakeholders are ignored or mistreated. In addition, there is a positive relationship between ESG disclosure level and company value, suggesting that improved transparency and accountability and enhanced stakeholder trust assist in maximising company value (Li et al., 2018). In parallel, institutional investors and information intermediaries are increasingly integrating ESG data into their valuation models, increasing the demand for sustainability reporting (Ioannou & Serafeim, 2011; Li et al., 2018). Mandatory sustainability reporting laws and regulations are on the increase worldwide (Ioannou & Serafeim, 2011). Regulatory bodies and stock exchanges are introducing regulatory

reporting measures relating to sustainability and there is a gradual trend of companies providing more information on their sustainability impacts within their mainstream annual filings (Ioannou & Serafeim, 2011). Sustainability disclosure can give organisations a competitive advantage and increase investor confidence, trust and employee loyalty (Tamimi & Sebastianelli, 2017).

Significant relationships exist between corporate characteristics and ESG disclosure levels (Cowen et al., 1987; Roberts, 1992). These characteristics include company size, cross-listing, age, profitability, financial leverage, industry classification and governance practices. Numerous studies across various countries, including the UK, the USA, Japan and India, have identified that there is also a relationship between board characteristics and ESG disclosure. The important board characteristics were identified as board size, CEO duality, board independence and the average age of board members (see e.g. Giannarakis, 2014a, 2014b; Ho & Taylor, 2007; Lagasio & Cucari, 2019; Tamimi & Sebastianelli, 2017).

Environmental, social and governance research in South Africa is limited, with the focus instead being placed on CSR and corporate governance (Johnson, 2020). Although Atkins and Maroun (2014) find that South African institutional investors welcomed the introduction of integrated reports in 2012 and were gradually starting to accept the importance of ESG reporting, Moikwatlhai et al. (2019) report that South African institutional investors' commitment to CRISA does not yet fully influence their investment decisions, which indicates a need for greater industry guidance and monitoring in this regard. Furthermore, Johnson (2020) examines the link between ESG disclosure scores and companies' weighted average cost of capital, and finds a significant negative relationship for the consumer goods and consumer services sectors, but a significant positive relationship for industrial firms. This seems to support the view that South African financiers, including institutional investors, consider ESG disclosure in their funding decisions.

Female leadership characteristics

It is widely accepted that women are underrepresented on the boards of companies, although this situation is slowly changing. Thus, a recent study by Egon Zehnder Management Consulting (2020) indicates that in 2020 women occupied 23.3% of global board positions, compared to 20.4% in 2018.

Various theories postulate differences between men and women that could result in the latter making very specific and value-adding contributions to board decisions and behaviour, hence implying that equal female board representation is not merely a question of fairness and equity. Biological explanations, which are based on evolutionary arguments, are generally cited for differing gender-based board contributions than socialisation and structural or cultural explanations (see e.g. Bartol et al., 2003; Weyer, 2007; Wood & Eagly, 2002). Social role theory and expectation state theory are both underpinned by the concept that men and

women are given different roles because of their gender (Weyer, 2007). *Social role theory* claims that women and men conduct themselves differently in leadership roles because of the different expectations society has of men and women (Eagly & Wood, 1991), and *expectation theory* adds an element of status to gender stereotypes (Weyer, 2007).

Studies on gender roles have identified and distinguished between two attributes that are relevant when trying to understand leadership, namely agency and communality. *Agency* is often associated with the male stereotype, and involves performance orientated and rational behaviours. In contrast, in terms of the above theories, *communality* is associated with the female stereotype. Communal behaviours include caring for and respecting others, and affiliative tendencies such as being friendly, helpful and being open about emotions. Communal characteristics are therefore summarised as considerate, collaborative and intuitive (Eagly & Johannesen-Schmidt, 2001; Eagly & Wood, 1991; Weyer, 2007). Although some studies claim that corporate leaders are constrained by their gender roles (Eagly & Johannesen-Schmidt, 2001), others argue that leadership roles require certain types of leadership skills, and that men and women in the same organisational role will therefore behave similarly (Eagly, 2007).

The most common approach taken by studies on the impact of gender roles on leadership styles is to examine the differences between *task-orientated* and *interpersonally orientated* leadership styles, *democratic* and *autocratic* leadership styles and *transactional* and *transformational* leadership styles (Eagly & Johannesen-Schmidt, 2001; Eagly & Johnson, 1990). These particular measures in style reflect the agentic standards associated with the male stereotype and the communal standards associated with the female stereotype. When compared, female leaders act more interpersonally orientated, democratic and transformational. Male leaders act more task-orientated, autocratic and transactional (Eagly & Johannesen-Schmidt, 2001). These characteristics influence female directors to better address stakeholder terms, whereas their male director counterparts tend to be more concerned with shareholder and economic issues (Manita et al., 2018). However, a meta-analysis conducted by Eagly and Johnson (1990) indicates that the influence of gender stereotypes on leadership styles is much larger in an experimental setting than in a natural setting. Consistent with this reasoning, some studies indicate that there is little difference between male and female leaders in an organisational setting (Weyer, 2007).

Women on corporate boards

The effectiveness of a board is strongly associated with its structure. Each board of directors is likely to have its own dynamics resulting from the different personalities, backgrounds, experiences and skills of the boards of directors. Resource Dependency Theory holds that board diversity gives a company legitimacy and access to more views, networks and experience than can be found internally

(Hillman et al., 2002). Thus, each director brings different resources to the board, and given the differences between male and female directors' characteristics, backgrounds and experience, the latter bring a different voice to debates and decision-making, especially those concerning CSR (see e.g. Byron & Post, 2016; Manita et al., 2018; Terjesen, 2009). As a result, some authors postulate a positive relationship between female directors and the extent and quality of CSR reporting (Wang et al., 2021).

Empirical findings: Gender diversity and environmental, social and governance disclosure

Empirical findings on the relationship between gender diversity and ESG disclosure are mixed. Thus, some studies, such as Lagasio and Cucari's (2019) meta-analysis on a sample of 24 studies involving developed countries, as well as the studies of Harjoto et al. (2015), Nicolò et al. (2021), Wasiuzzaman and Wan Mohammad (2020) and Wang et al. (2021), respectively in the USA, 21 European countries, Malaysia and China, suggest that there is a significant positive relationship between the percentage of women on boards and the level of ESG disclosure. On the other hand, Manita et al. (2018) and Boulouta's (2013) studies, both in the USA, find either no or a statistically very weak relationship.

However, despite strong arguments for increased female board representation, women remain the minority on most boards. Furthermore, cultural factors can affect the influence of women on boards. Thus, Cabeza-García et al. (2019) show that in more masculine cultures, women are less likely to be accepted in positions of power such as boards, and that culture affects the promotion of women to boards. Consequently, when investigating the impact of female representation on boards' decisions and actions, CMT becomes relevant. Critical mass theory argues that the influence of a minority group (in this case, women) depends on its absolute or relative size (see e.g. Erkut et al., 2008). Several studies (see e.g. Amorelli & García-Sánchez, 2021; Atif et al., 2020; Baldini et al., 2018; Terjesen, 2009) argue that the critical mass for female directors is reached when there are at least three female representatives on a board of directors. Consistent with this reasoning, a study based on S&P 1500 companies in the USA suggests that one woman on the board has a marginally significant positive influence on sustainable investing. This relationship statistically improves with two and three or more women on the board (Atif et al., 2020). Other studies indicate that the critical mass for women to have significant board influence is when they constitute at least 30% of a board (see e.g. Joecks et al., 2013).

Women on corporate boards continue to be recognised as a key value driver in organisations and corporate social responsibility is gradually becoming a tool for organisations to increase their competitive advantage (Manita et al., 2018; Wasiuzzaman & Wan Mohammad, 2020). In global terms, South Africa is doing comparatively well in terms of corporate governance policies and practices (Buertey, 2021; Johnson et al., 2019; Mans-Kemp & Van der Lugt, 2020), but

it remains important to consider all three elements of ESG (Johnson, 2020). However, the empirical results of tests of the relationship between board gender diversity and ESG disclosure are inconsistent. Different country-level influences like legislation and corporate governance practices and policies might be the reason for these inconsistent findings (Byron & Post, 2016; Wang et al., 2021).

Furthermore, most research on the influence of board gender diversity on ESG disclosure scores was carried out in developed economies. Thus, the lack of consensus as to the relationship between board gender diversity and ESG disclosure scores in existing literature and the gap existing in South Africa, lead to the following hypotheses in the South African context:

Hypotheses 1a to 1d: The percentage of women on a company board is positively related to, respectively, its (1a) combined ESG disclosure, (1b) environmental disclosure, (1c) social disclosure, and (1d) governance disclosure.

Hypotheses 2a to 2d: For women to have an impact on, respectively, a company's (1a) combined ESG disclosure, (1b) environmental disclosure, (1c) social disclosure, and (1d) governance disclosure, they need to constitute at least 30% of the board.

Sample, data and methodology

Sample and data

This study's sample consisted of all 92 companies listed on the JSE FTSE All Share Index between 2011 and 2021 for which ESG disclosure scores were, for any year, available on the Bloomberg database. This resulted in an unbalanced panel of 725 company years. The percentage of women on board, as well as the control variables of company size, profitability, financial leverage, board size, board independence and average age of board members were also collected from Bloomberg.

Bloomberg ESG disclosure scores are calculated using a complex approach involving approximately 120 quantitative and qualitative measures, and rate organisations on disclosure of their ESG policies and practices, based on their CSR and integrated reports, company websites and, where applicable, proprietary surveys. The three scores (E, S and G) are combined using a proprietary method to form a combined score. The scores range from 0 to 100 and are annually updated. The more ESG information a company discloses, the higher its score. Thus, these scores can be considered to reflect the breadth of ESG disclosure of a specific company (Tamimi & Sebastianelli, 2017). It is important to note, however, that ESG disclosure scores do not measure ESG performance, but instead indicate the level of transparency and accountability of an organisation (Manita et al., 2018).

Regression variables

Previous studies found significant relationships between CSR or ESG disclosure and various corporate and board characteristics, including female board representation. Thus, Bloomberg ESG disclosure scores, as well as those for E, S and G individually, were used as the dependent variables and, in the base models, the percentage of women on boards

as the independent variable of interest. In line with the CMT, in the second set of models the latter was replaced with a dummy variable indicating whether a company board consisted of at least 30% women or not (see Joecks et al., 2013). The control variables used were as follows:

Company size

Larger organisations are more likely to disclose information than smaller ones. The positive relationship can be explained using legitimacy theory. Larger organisations are more visible and therefore placed under greater pressure to fulfil their so-called 'social contract' (Roberts, 1992). Thus, for example, Baldini et al. (2018) finds a positive relationship between size and the level of ESG disclosure for a sample of 14174 company years across various countries for the period 2005 to 2012. The three most common measures of company size are market capitalisation, total assets and total sales (Dang et al., 2018). In line with previous South African studies involving ESG (e.g. Johnson et al., 2019), market capitalisation (in natural log form for the regression models) was used as a proxy for company size.

Profitability

Existing evidence on the effect of profitability on ESG disclosure, the former usually measured as return on equity (ROE) or return on assets (ROA), is inconsistent. An analysis of a 100 Fortune 500 companies in the USA indicates a positive relationship between profitability and ESG disclosure (Giannarakis, 2014a), as does a similar study conducted in the UK (Li et al., 2018). The reasoning behind these results is that organisations with greater profitability have more financial freedom and flexibility when it comes to ESG disclosure. In contrast, evidence from the UK and Japan indicates that less profitable organisations have increased levels of ESG disclosures to demonstrate their commitment to social responsibility (Ho & Taylor, 2007). Boulouta (2013) indicates that ROE is the most commonly used proxy of profitability in studies on corporate social and financial performance. Therefore, based on this, and in accordance with similar studies such as the one of Manita et al. (2018), ROE was used as a proxy for financial profitability.

Financial leverage

Leveraged companies may disclose more information to satisfy the expectations and demands of creditors. A cross-country analysis by Baldini (2018) finds a positive relationship between financial leverage and ESG disclosure. However, studies conducted in the UK, Japan and the USA find that organisations with lower leverage have higher levels of ESG disclosure (Giannarakis, 2014a; Ho & Taylor, 2007). The reason for the negative relationship is postulated to be the costly disclosure and reporting procedures which higher leveraged firms have to satisfy their financiers (Jensen & Meckling, 1976). Leverage for this study was measured as total assets to equity.

Board size

More directors can result in a wider exchange of new and innovative ideas, and hence, the larger the size of the board

of directors, the higher the level of ESG disclosure is expected to be. This hypothesis is, for example, supported by Allegrini and Greco's (2013) study of 177 Italian listed companies, Esa and Ghazali (2012) on government-linked companies in Malaysia, and Jizi et al.'s (2014) study of US banks. Other studies, such as that on 100 US companies by Giannarakis (2014a), however, find no statistically significant relationship between board size and ESG disclosure.

Board independence

Independent board directors are more likely to be attuned to a broader set of external stakeholders and their needs, and potentially take a less short-term and profit-focused view. Thus, for example, both Khan et al. (2013) and Jizi et al. (2014) find evidence that greater board independence is related to greater CSR disclosure. Board independence was proxied by the percentage of non-executive directors on the board.

Average age of board members

It can be argued that the greater focus on ESG is a relatively recent development in the corporate world, and hence younger directors may weight ESG, and hence ESG disclosure, relatively more relative to profitability than their older colleagues. The average age of the board of directors is therefore expected to be inversely correlated to ESG disclosure.

With regard to board attributes, some previous studies (e.g. Allegrini & Greco, 2013; Jizi et al., 2014) find relationships between CSR or ESG disclosure and CEO duality. However, according to the King III code of governance and JSE listing requirements, the CEO of a JSE-listed company is not permitted to fill the position of chairman of the board, and CEO duality is therefore not applicable to this study.

Two sets of four models were tested. One set used the percentage of women on board as the variable of interest, and the other, a dummy variable for meeting the critical value of 30% women on a board (1 if yes, 0 if no). The four models per set, respectively, used the Bloomberg ESG, E, S or G disclosure score as dependent variable.

TABLE 1: Summary of variables used in the study.

Variable	Measure	Source of data
Dependent variables:		
E, S, G and ESG disclosure	E, S, G and disclosure scores	Bloomberg
Independent Variables:		
Percentage of women on board	Percentage women representatives on board of directors	Bloomberg
30% women on board dummy	1 if > 30%, 0 otherwise	Bloomberg
Control variables:		
Company size	Natural log (ln) of market capitalisation	Bloomberg
Profitability	Return on common equity	Bloomberg
Financial leverage	Financial leverage	Bloomberg
Board size	Number on directors on board	Bloomberg
Board independence	Percentage independent directors on board	Bloomberg
Average age of board members	Average age of board of directors	Bloomberg

ESG, Environmental, social and governance.

Models 1 to 4

$$Z_{i,t} = C + \beta_1 \text{PERCWOMEN}_{i,t} + \beta_2 \text{MCAP}_{i,t} + \beta_3 \text{ROE}_{i,t} + \beta_4 \text{LEVERAGE}_{i,t} + \beta_5 \text{BSIZE}_{i,t} + \beta_6 \text{BINDEPENDENCE}_{i,t} + \beta_7 \text{BAGE}_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad [\text{Eqn 1}]$$

Models 5 to 8

$$Z_{i,t} = C + \beta_1 \text{WCRITICAL}_{i,t} + \beta_2 \text{MCAP}_{i,t} + \beta_3 \text{ROE}_{i,t} + \beta_4 \text{LEVERAGE}_{i,t} + \beta_5 \text{BSIZE}_{i,t} + \beta_6 \text{BINDEPENDENCE}_{i,t} + \beta_7 \text{BAGE}_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad [\text{Eqn 2}]$$

i is the company identifier; t is the time period; $Z_{i,t}$ is, depending on the model, one of the Bloomberg ESG, E, S or G disclosure score; C is the shared constant; ROE is Return on Equity; LEVERAGE is the company's financial leverage; $\log(\text{MCAP})$ is the natural logarithm of market capitalisation; BSIZE is the number of directors on board; BINDEPENDENCE is the percentage independent directors on board; BAGE is the board average age; μ is the intercept term of each company (fixed effects regression); λ is the intercept term of time-specific effects; α is the intercept of each company and ε is the error term. Table 1 summarises the variables used in this study.

Variance Inflation Factor (VIF) statistics of close to one indicated that multicollinearity is not present in the data (Daoud, 2017).

F -tests for poolability indicated that two-way fixed effects (firm and year) were valid across all models. All companies with data available were sampled and, thus, random sampling with replacement was not done as theoretically required for random effects (De Jager, 2008). However, for each of the eight models, both 'between' (pooled regression) and 'within' (two-way fixed effects regression) models were run – thus 16 models in all.⁶

To address possible endogeneity concerns resulting from feedback between board attributes and disclosure scores, as well as the argument that time is needed to allow a board to influence disclosure scores, all models were rerun with a 1-year lag on the women and board-related variables. (see Liu et al., 2014; Manita et al., 2018) as robustness check.

Although it is believed that arbitrarily adjusting input data by winsorising is subjective and therefore not desirable, as a robustness check, all variables were winsorised at 1% per tail to assess whether the results were potentially influenced by possible outliers. The results of this are reported in the next section.

Results

Table 2 shows the descriptive statistics for the dependent and independent variables for the total sample of JSE-listed companies with Bloomberg ESG disclosure data.

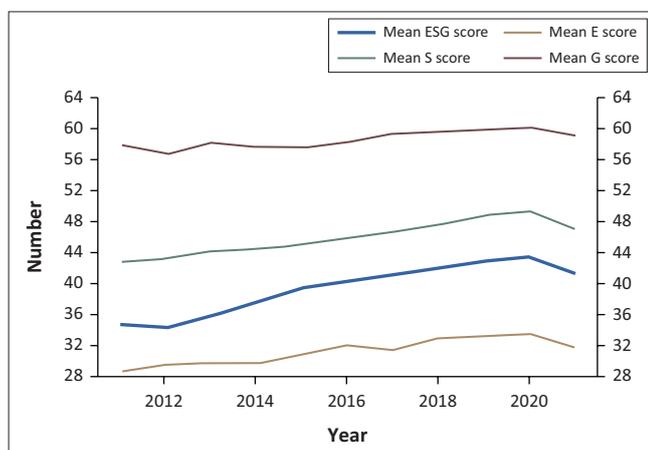
Three things are evident from the descriptive statistics for this sample. Firstly, both the median (20%) and mean

⁶Thus, Models 1A to 8A were pooled models, and Models 1B to 8B were two-way fixed effects models.

(21.49%) of female board representation are well below the 30% minimum identified in terms of CMT (see e.g. Joecks et al., 2013) to have an impact. Secondly, for only 7% of the company years in the sample do women constitute at least the postulated critical mass of 30% of board members to have real impact. Thirdly, for the sample the mean governance (G) disclosure score is well above the social (S) disclosure score, which in turn is above the environmental (E) disclosure score. This is not surprising, as governance has long been an important focus of investors, especially in South Africa with the publication of the various King reports, with social disclosure being relevant given South Africa's history and unequal wealth distribution, and environmental issues only relatively recently gaining more prominence locally. Figure 1 shows the development over time of the mean E, S, G and aggregated ESG scores for the sample. In all cases, there is an upward trend, albeit much less pronounced for governance, in line with the arguments made above. Interestingly, there is a significant downward turn in all scores in 2021, which may be related to the difficulties in reporting introduced by the coronavirus disease 2019 (COVID-19) pandemic during 2020 and 2021.

Table 3 shows the correlations between variables. This indicates that there are no collinearity problems with the data. Furthermore, all key correlations are in line with expectations and mostly statistically significant. Thus, the percentage of women is strongly positively correlated with all disclosure scores, except the environmental score, while the positive correlation of the women critical value is statistically significant for the ESG and social disclosure scores. As expected, company size is positively correlated with disclosure scores, but ROE and leverage mostly are negatively correlated, in line with some previous studies (see Ho & Taylor, 2007; Giannarakis, 2014a). Also, as expected, larger boards and greater board independence seem to support greater disclosure but, contrary to expectations, the correlation between average board age and disclosure is positive.

Table 4 shows the results of the 'between' and 'within' models using the percentage of women on boards as variable of interest. Note that winsorisation of the input data at 1% per



ESG, Environmental, Social and Governance.

FIGURE 1: Change in disclosure scores over time (2011–2021).

tail did not materially affect the results, and hence the authors are comfortable that these are not unduly affected by outliers.

In the 'between' company models (Models 1A to 4A), the percentage of women on the board was in all cases positively correlated with disclosure scores as expected. This was particularly so for the aggregate ESG and social component scores, which were both found to be highly statistically significant. This is consistent with Hypotheses 1a and 1c and provides some support for the hypotheses that women exert a positive influence on ESG and social disclosure when on boards. These findings, especially the stronger finding for aggregate ESG disclosure, are in line with those of Ardito et al. (2020), who find that female board representation is beneficial for CSR overall, but not necessarily for all its components. However, when measured 'within' companies (i.e. time series) in Models 1B to 4B, the coefficient of the percentage of women on the board is not statistically significant.

With regard to the control variables in the 'between' company models, the direction of correlation with disclosure scores was in nearly all cases, with the exception of average board age, either as expected, or had previous literature precedent. The log of market capitalisation, leverage and average board age have a high degree of statistical significance across most of the 'between' models, but this only applies to leverage when it comes to the 'within' models. Both ROE and financial leverage have a negative coefficient across nearly all models. The finding on ROE contradicts the findings of Giannarakis (2014a) and Li et al. (2018), who reasoned that organisations with greater profitability have more financial freedom to take part in, and properly disclose, ESG activities. However, this finding is consistent with that of Ho and Taylor (2007), who attribute this to less profitable companies using ESG disclosure to indicate a commitment to social responsiveness. One other possible reason for this finding could be some less profitable companies use greater ESG disclosure to try to draw attention away from their (un)profitability. The negative coefficient for financial leverage could be because more leveraged companies are less likely to implement costly disclosure and reporting procedure (Giannarakis, 2014a; Ho & Taylor, 2007).

Although mostly not statistically significant, the mostly positive coefficients of the board variables of size and independence are in line with theory (see Harjoto et al., 2015; Wang et al., 2021), but average board age unexpectedly appears to be positively correlated to ESG disclosure, with some statistical significance in the 'between' company models. Thus, the results of Model 1A, for example, seem to point to older directors being more likely to drive greater levels of ESG disclosure. Although unexpected based on theory, Nel et al. (2022) found a positive correlation between the number of directors over 50 years of age for JSE-listed companies and the latter's online corporate governance and transparency disclosure.

The results for Models 5 to 8, which test the CMT using a dummy variable representing female board representation of either < 30% or 30% or above, are not presented here due to space considerations. However, these results were in line with Models 1 to 4 in terms of the control variables, while the dummy variable, similarly, is statistically significant in the pooled regressions, but not in the two-way fixed effect regressions.

From the results discussed above, it can be concluded that there is some evidence that female representation on boards in South Africa is positively correlated to aggregate ESG disclosure, as well as disclosure on its social component. This therefore supports Hypotheses 1a and 1c. However, this finding only holds in 'between' companies, but when both firm and year fixed effects are controlled for, the statistical

TABLE 2a: Descriptive statistics for dependent and independent variables.

Item	ESG score	E score	S score	G score	% Women	Women 30% +
Mean	42.57	31.81	48.42	60.12	23.60	0.28
Median	43.80	33.04	49.12	60.71	22.22	0.00
Maximum	68.18	70.54	84.21	82.14	66.67	1.00
Minimum	14.88	2.33	5.26	37.50	0.00	0.00
Std. Deviation	11.60	15.09	15.35	7.71	11.32	0.45
Observations	725	725	725	725	725	725

ESG, Environmental, Social and Governance.

TABLE 2b: Descriptive statistics for dependent and independent variables.

Item	Market cap (R million)	ROE (%)	Leverage	Board size	Independence score	Average board age
Mean	129138.10	13.88	4.70	11.77	63.11	56.69
Median	35218.88	14.08	2.31	11.00	63.64	56.79
Maximum	2941611.00	297.28	84.06	21.00	100.00	68.88
Minimum	743.79	-125.65	1.14	0.00	20.00	34.28
Std. Deviation	324436.30	25.16	7.83	2.96	13.21	3.71
Observations	725	725	725	725	725	725

ROE, return on equity.

TABLE 3: Correlation table.

Correlations Probability Observations	ESG score	E Score	S Score	G Score	% women	Women critical	Market cap	ROE	Leverage	Board size	Board indep	Board age
ESG Score	1 ----- 1051	-	-	-	-	-	-	-	-	-	-	-
E score	0.9423 0 958	1 ----- 958	-	-	-	-	-	-	-	-	-	-
S score	0.8049 0 1000	0.5477 0 952	1 ----- 1000	-	-	-	-	-	-	-	-	-
G score	0.7327 0 1051	0.5486 0 958	0.4478 0 1000	1 ----- 1051	-	-	-	-	-	-	-	-
% women	0.2403 0 1049	0.0395 0.2222 956	0.2666 0 998	0.1885 0 1049	1 ----- 1063	-	-	-	-	-	-	-
Women critical	0.1124 0.0003 1049	0.0133 0.6804 956	0.1810 0 998	0.0293 0.3431 1049	0.7458 0 1063	1 ----- 1063	-	-	-	-	-	-
Market cap	0.2276 0 966	0.2440 0 883	0.0470 0.154 920	0.2668 0 966	-0.0086 0.7876 979	-0.0056 0.8597 979	1 ----- 991	-	-	-	-	-
ROE	-0.0629 0.042 1045	-0.0927 0.0042 952	0.0329 0.2982 996	-0.0358 0.2468 1045	-0.0051 0.8669 1056	-0.0201 0.5123 1056	0.0728 0.0225 981	1 ----- 1079	-	-	-	-
Leverage	-0.1075 0.0005 1046	-0.1391 0 953	-0.0847 0.0075 997	0.0019 0.9491 1046	0.1995 0 1057	0.1384 0 1057	-0.0515 0.1064 982	-0.0977 0.0013 1079	1 ----- 1080	-	-	-
Board size	0.2491 0 806	0.1490 0 750	0.2038 0 785	0.2554 0 806	0.0611 0.082 810	-0.0059 0.8656 810	0.1836 0 794	0.0125 0.7213 815	0.0887 0.0112 815	1 ----- 832	-	-
Board independ.	0.1634 0 1032	0.1228 0.0001 950	0.0694 0.0294 984	0.2320 0 1032	0.2363 0 1045	0.1849 0 1045	0.0778 0.0152 971	-0.1315 0 1038	0.0878 0.0046 1039	-0.130 0.0002 798	1 ----- 1045	-
Board age	0.2379 0 1037	0.3079 0 947	0.0207 0.515 986	0.1361 0 1037	-0.1676 0 1051	-0.1345 0 1051	0.2512 0 967	-0.0599 0.0528 1044	-0.0473 0.1264 1045	0.0219 0.5343 802	0.3669 0 1033	1 ----- 1051

ESG, Environmental, social and governance; ROE, return on equity.

TABLE 4: Regression results for tests using % of women on boards.

Item	Panel A: 'Between' company models (No period and company fixed effects)				Panel B: 'Within' company models (Period and company fixed effects)			
	Model 1A	Model 2A	Model 3A	Model 4A	Model 1B	Model 2B	Model 3B	Model 4B
Dependent variable	ESG Score	E Score	S Score	G Score	ESG Score	E Score	S Score	G Score
Independent variables								
C	-41.644**	-59.981***	1.467	17.828**	26.122**	14.899	46.000***	50.053***
% Women on board	0.297***	0.157	0.399***	0.057	0.046	0.036	0.014	-0.000
Log (market cap)	2.322**	3.464***	0.308	1.560***	0.203	0.227	0.141	0.385
RoE	-0.055	-0.101**	0.006	-0.019	-0.013	-0.017	-0.025	-0.003
Leverage	-0.286**	-0.272**	-0.339**	-0.026	-0.214***	-0.155	-0.131**	-0.027
Board size	0.474	-0.015	0.847*	0.230	-0.021	-0.181	0.267	-0.079
Board independence	0.032	0.037	0.002	0.081*	0.045	0.041	-0.054	0.069***
Board age	0.812**	0.918**	0.438	0.295*	0.180	0.249	0.013	0.040
Adjusted R^2	0.252	0.229	0.107	0.188	0.866	0.834	0.810	0.749
F-statistic probability	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Note: statistical significance of 1%, 5% and 10% are respectively indicated by ***, ** and *. All models made use of White two-way cluster standard errors and covariance. ESG, Environmental, social and governance.

significance disappears. Similarly, gender diversity remains statistically significant when firm-fixed effects only regressions are run or when year-only fixed effects models are run. The authors interpret this to indicate that the positive correlation between gender diversity and the above disclosure scores is quite possibly due to exogenous (macro) factors such as the increasing global pressure on firms for both better disclosure and greater board gender diversity, rather than a direct link between the two. This study's findings for South Africa, therefore, at best, only weakly confirm the relationship between female board representation and ESG disclosure found by Harjoto et al. (2015) in the USA, the meta-analysis of Byron and Post (2016) involving 20 countries, Nicolò et al.'s (2021) study of 21 European countries, Wasiuzzaman and Wan Mohammad's (2020) study involving Malaysia, and Wang et al.'s (2021) in China. However, this study's results are consistent with the findings of Manita et al. (2018), who do not find a statistically significant relationship, and Boulouta (2013), who find a weak relationship (< 10% statistical significance).

Consistent with CMT (Joecks et al., 2013), one possible reason for the finding of no significant relationship could be the small percentage of South African boards in the sample in which women constitute a sizeable enough proportion to influence decision making – for only approximately 7% of the company-years do women constitute 30% or more of boards. Another possibility is that in South Africa, compared to some of the countries covered in prior studies, the roles and/or approaches of South African female directors are not very different compared to their male counterparts. It is possible that cultural differences between countries could play a role – for example, Wasiuzzaman et al. (2022) find that specific cultural differences between countries play a moderating effect on the relationship between ESG disclosure and the financial performance of energy firms globally, and Byron and Post (2016) whose meta-study of 87 independent samples from 20 countries indicates that the relationship between CSR performance and female board membership is dependent on national context (specifically

to what extent boards are likely to draw on the skills and perspectives women directors bring to boards).

As previously indicated, in terms of CMT, the study further tested the hypothesis that female board representation of 30% or more within the sample is positively correlated to ESG disclosure and that of its components. The authors also ran most of the models with 1-year lagged board characteristics (including the percentage of women on boards) to allow for any possible endogeneity and as a robustness check. However, none of the above tests fundamentally affected the results, and the details of these are therefore not reported here.

Conclusion

This study is based on two pillars: firstly, that ESG issues (and hence their disclosure) are becoming very important to corporate stakeholders, and secondly, that in light of theories about the role of women in leadership positions, their presence on boards may improve ESG disclosure, as has been empirically found by some studies in other countries. Thus, in line with previous studies that found a positive relationship between female board representation and ESG disclosure, this study investigated the relationship between board gender diversity and aggregate and segregated ESG disclosure scores of a sample of companies listed on the JSE FTSE All Shares Index between 2011 and 2021. Because CMT postulates that a minority in a board setting only has an impact on decisions once a higher level of representation is reached, it was also investigated whether a level of 30% female board representation affects ESG disclosure for the above sample.

The findings provide at best weak support for the hypotheses that female board representation is positively correlated with aggregate ESG and social disclosure. However, in general the results lack statistical significance, and hence only tentatively support the view that more women on South African corporate boards will improve ESG disclosure. The tests of

CMT similarly do not provide evidence of the above link. Although the results contradict some international studies, they are in line with others, and hence the evidence on this question remains mixed. Thus, although ESG, E and S disclosure seems to show some improvement between 2011 and 2020, while at the same time female board representation for JSE-listed companies has similarly increased, the findings indicate only tentative support for any link between the two trends. A more likely interpretation in line with the above is that the positive correlation found between ESG disclosure scores and board gender diversity in the pooled models is the result of endogenous effects such as the increasing pressure on companies to perform better in terms of both these aspects.

This research thus adds to the growing body of research on the topic of female board representation, as well as ESG, specifically in South Africa as an interesting case of an emerging economy with a well-developed governance and disclosure framework. Specifically, this relationship has not, to the authors' knowledge, previously been examined in South Africa, where both more equitable gender board representation, as well as increasing ESG disclosure, are topics of great practical and academic importance.

Future research could build on this research by testing whether, for South African firms, greater female representation at both board and top management level is positively correlated to the level of actual ESG activities, as opposed to disclosure. Furthermore, as the findings of this study are not conclusive, it may be beneficial to also address this question through a survey approach – for example, to test whether there is a correlation between specific demographic (e.g. gender, cultural and educational) backgrounds and views on ESG and ESG disclosure. Following on from this study's results, it would further be interesting to test whether, in South Africa, men and women do indeed think and act similarly in the board context in accordance with gender leadership role theories, or not. Lastly, the divergent findings on the topic in different countries may point to the role of possible historical and evolving cultural differences related to gender roles, which could be worth further investigation.

Acknowledgements

Competing interests

The authors have declared that no competing interest exists.

Authors' contributions

All authors contributed to the article, including writing the draft, collecting data, applying statistical techniques, analysing the results and writing, reviewing and editing the article.

Ethical considerations

This article followed all ethical standards for research without direct contact with human or animal subjects.

Funding information

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Data availability

The data was obtained from Bloomberg and is available from the corresponding author on reasonable request.

Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of any affiliated agency of the authors.

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