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ESG Reporting Practices in the Canadian Mining Industry: The Role of Women Directors

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Abstract

This paper examines the relationship between the presence of women directors, and the environmental, social, and governance (ESG) disclosure scores of Canadian mining firms listed on the Toronto Stock Exchange (TSX) Composite Index over the period 2011–2022. Using Bloomberg ESG disclosure scores, the findings reveal a positive association between women directors and the overall ESG disclosure score as well as the environmental and social disclosure scores, with the environmental pillar demonstrating the strongest relationship. To better understand Canadian mining firms ESG disclosure practices, we develop and use two other sustainability disclosure proxies, the first one is based on the Global Reporting Initiative (GRI) and the second is based on the Sustainability Accounting Standards Board (SASB) framework. These measures assess whether firms disclose sustainability initiatives consistent with GRI and SASB respectively. The results show no significant association between the presence of women directors and GRI and SASB measures of ESG disclosures. Overall, the results demonstrate a significant relationship between ESG disclosure and women directors but such relationship is dependent on how ESG disclosure is measured. The results are robust across alternative measures of women directors and using lead-lag models. This study contributes to the corporate governance literature by shedding light on how ESG disclosures have evolved and the determinants of such disclosures in the mining industry, one of Canada's most environmentally and socially impactful sectors.

JEL:
Keywords: Women directors; Corporate governance; Sustainability; ESG; GRI; SASB; Board of directors

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1. Introduction

Sustainability reporting in the Canadian corporate sector has evolved considerably over the past decades, from the environmental disclosures by the largest chemical and resource companies in the late 1980s to the adoption of ESG reporting by the majority of companies listed on the TSX Composite Index (Cho et al., 2020). However, given that disclosure remains voluntary and that several bodies produce framework and recommendation on sustainability reporting and in the absence of nationwide legislation for mandatory disclosure, firms tend to select reporting methodologies and standards that best fit their goals (Christensen et al., 2021). Hence there is a need for a universal set of harmonized standards and reporting frameworks that ensure consistency, comparability and relevance of sustainability information[1]. Currently, the Canadian Securities Administrators (CSA) are working to establish climate-related disclosures requirements for Canadian publicly traded companies in response to demand from investors and other stakeholders (Canadian Securities Administrators, 2023). On April 7, 2022 the Canadian federal government presented its annual budget, which included a promise of mandatory climate-related reporting requirements to federally regulated banks and insurance companies (Government of Canada, 2022). [2] Although the guidelines focus on reporting requirements for financial institutions, they will also have an impact on other sectors of the economy as banks and other financial institutions will be expected to collect climate risks and emissions from companies they do business with.[3] These guidelines are consistent with sustainability disclosure policies introduced by other countries in this regard. For instance, in 2017, Sweden, and Germany have introduced ESG information disclosure obligations. Therefore, understanding corporate characteristics that can affect sustainability reporting and disclosure is an important research question and can help regulators devise better plans to promote ESG and sustainability disclosure. The goal of this research is to examine the relationship between ESG reporting and disclosure and women directors in the Canadian mining industry.

The theoretical link between ESG and women directors can be attributed to stakeholder, resource dependence, critical mass, legitimacy theories, and the social role theory. Most theories tend to suggest

[1] In 2021, the International Financial Reporting Standards (IFRS) Foundation created the International Sustainability Standard Board (ISSB) to achieve such goal.

[2] These requirements are expected to make sustainability reporting "complete, consistent and comparable" and to address stakeholders' demand that firms take a greater interest in ESG and a more active involvement in the community and the environment they operate in.

[3] In 2017, both Sweden and Germany implemented the EU Non-Financial Reporting Directive (NFRD), which requires large companies (typically with over 500 employees) to disclose information on environmental, social, and governance matters. This was in line with the EU's push to enhance transparency on sustainability matters.

that women presence on boards enhances various aspects of firms' social and environmental activism. Specifically, the social role theory and gender studies associate women with traits such as altruism, honesty, sensitivity and compassion (Eagly et al., 1992; Heilman, 2001) and studies of gender stereotypes in different cultures around the world associate women with such communal traits (Dobbins, 1985; Fox & Faver, 1985; Hanson & Mullis, 1985; Fondas, 1997) and describe women as relationship-oriented; exhibiting greater tendencies to be kind, helpful, sensitive and compassionate to others (Abele, 2003; Bakan, 1966). These traits predispose women to be better listeners and more sensitive to other people's needs, and consequently to be more attune to ESG goals and activities.

A growing empirical literature examines the relationship between board gender diversity and sustainability disclosure. For instance, using a sample of 126 S&P 500 firms over a 5-year period, Boulouta (2013) examine how female directors affect Corporate Social Performance (CSP) and find a significant positive relationship between both. Al-Shaer and Zaman (2016) explore the effects of board gender diversity on a sample of UK firms and provide evidence of a positive association between gender-diverse boards and high-quality sustainability reporting. More recently, using all Canadian TSX/S&P firms over a 2-year period, Khemakhem et al. (2023) examine the impact of women's presence on board committees and the firm's overall ESG disclosure score, and find a positive and significant relationship between female representation on the board and committees and ESG disclosure. Mohsni and Benaissa (2024) study the relationship between board gender diversity and both aggregate ESG disclosure scores and each of the three ESG pillars (environmental, social and governance) for all publicly traded Canadian firms over the period 2010-2021. Their results indicate that gender diverse boards are associated with higher ESG disclosure scores, both in the aggregate and in each ESG pillar, individually. Not all results support a positive impact of women on ESG, for instance using a sample of US firms, Manita et al. (2018) report no significant relationship between board gender diversity and ESG disclosure, except for a partial confirmation of the critical mass theory.

We select the mining sector for three main reasons. First, the mining sector in Canada is a significant contributor to the economy, providing essential minerals like copper, nickel, and cobalt to the global market (Issa, 2023). It also plays a crucial role in supporting local employment, particularly benefiting indigenous communities (Gordon, 2009). According to The Mining Association of Canada[4],

[4] https://mining.ca/resources/press-releases/economic-impacts-and-drivers-for-the-global-energy-transition-report-highlights-state-of-canadas-mining-industry/#:~:text=The%20mining%20industry%20continues%20to,%242%20trillion%20gross%20domestic%20product. Last accessed December 30, 2024.

the mining sector contributed $125 billion or 5% of Canada's GDP in 2021. Canada has also attracted 18% of global investment in mining exploration in 2011 (Hird, 2015). Second, the mining sector in Canada faces challenges related to environmental impacts, especially on Indigenous communities and in the context of climate change (Brunet & Longboat, 2023). The industry has been criticized for not adequately preparing for the changing climate and addressing the socio-environmental impacts on local communities (Brunet & Longboat, 2023). Concerns have also been raised about the industry's regional access and the influence of environmental laws and regulations, with industry organizations advocating for streamlined processes to benefit Canadian firms (Gordon, 2009). Despite these challenges, Canada has positioned itself as a leader in responsible resource extraction, with stringent regulations and innovative practices, including the implementation of hybrid power systems in mining operations (Omole, 2024). Efforts have been made to improve water quality regulations and address the impacts of mining activities on aquatic biodiversity (Atakhanova, 2023; Ribey et al., 2002). There have also been calls for mining operations to develop long-term adaptation strategies to mitigate the effects of climate change (Pearce et al., 2010). Third, the mining sector in Canada has historically been male-dominated, with women facing significant barriers to entry and advancement within the industry (Buchanan et al., 2022). Despite efforts to promote inclusion, women continue to be underrepresented in mining, particularly in leadership positions (Mesquita et al., 2023). The culture of the mining industry, characterized as highly masculine, reinforces the exclusion of women from strategic roles (Brunet & Longboat, 2023).

Given the significant role of mining within the Canadian economy, the environmental, specifically climate-related challenges the sector faces, the multiple initiatives developed to increase sustainability in mining, and its male-dominance, and given the higher sensitivity of women to environmental issues and goals, understanding the role that women directors in mining companies play in the industry's ESG disclosure practices can help the industry devise better plans and strategies to meet its ESG and overall sustainability goals. Therefore, this research aims to answer the following questions:

1) If and how is ESG disclosure related to the presence of women directors?
2) What is the relationship between the three dimensions of ESG disclosure, namely environmental, social, and governance and women directors?
3) How do other types of ESG disclosures relate to the presence of women directors in the mining industry?

To investigate the research questions, we focus on mining firms listed on the TSX Composite Index from 2011 to 2022. To measure ESG reporting, we use ESG disclosure scores provided by Bloomberg. Our results show a positive association between the percentage of women directors and total ESG disclosure and the environmental and social dimensions. To further delve into ESG disclosure practices, we use two other proxies for ESG disclosure. A measure based on a manual content analysis of CSR reports from 2016 to 2022. And a measure based on adherence to Sustainability Accounting Standards Board (SASB) framework for Metals and Mining industry, which was introduced in 2018. Our results based on GRI and SASB measures do not show any association between women directors and these disclosures. Overall, our results show that the relationship between women directors and ESG disclosure is nuanced and is dependent on how ESG disclosure is measured.

Unlike Khemakhem et al. (2023) who investigate the relationship between board and main committees gender diversity and ESG disclosure over a 2-year period (2014-2016), we conduct a longer time-series analysis (2011-2021) on a single sector that has faced challenges related to environmental impacts and is highly relevant in the climate change discussion. In addition, our work expands the industry analysis conducted by Mohsni and Benaissa (2024) by using content analysis to develop two sustainability disclosure proxies, based both on the Global Reporting Initiative (GRI) and the Sustainability Accounting Standards Board (SASB) framework. Our focus on only one industry allows us to conduct a more thorough analysis and provide more targeted recommendations.

Our research contributes to three strands of the literature: the board of directors' characteristics, gender diversity and ESG. More specifically, the paper contributes to the board of directors' characteristics (Birindelli et al., 2019; Manita et al., 2018), ESG reporting (Cho et al., 2020) and women directors (e.g., Birindelli et al., 2019; Manita et al., 2018). Specifically, it contributes to the growing body of literature in corporate governance that investigates the importance of board characteristics on ESG reporting (Pucheta-Martinez et al., 2018; Radu et al., 2022; Khemakhem et al., 2023). It also contributes to the gender diversity literature by adding to the literature that explores how the effect of board gender diversity may vary by industry and corporate culture (Shakil et al., 2020; Fältholm and Norberg, 2017; and Menicucci and Paolucci, 2024). In addition, given the mixed results on the impact of women directors on ESG, this paper adds to our understanding of the impact of board gender diversity on sustainability practices on one important industry within the sustainability discussion, namely the mining industry. The results of this research are of interest to policy makers, ESG advisory and rating agencies, and sustainability boards such

as the Canadian Sustainability Standards Board (CSSB) and the International Sustainability Standards Board (ISSB) which are supportive of enhanced ESG disclosure requirements.

Literature Review and Theoretical Framework

1.1. ESG and Women Directors

The theoretical link between ESG and women directors can be attributed to stakeholder, resource dependence, critical mass, legitimacy theories, and the social role theory. Most theories tend to suggest that women presence on boards enhances various aspects of firms' social and environmental activism. Specifically, the social role theory and gender studies associate women with traits such as altruism, honesty, sensitivity and compassion (Eagly et al., 1992; Heilman, 2001) and studies of gender stereotypes in different cultures around the world associate women with such communal traits (Dobbins, 1985; Fox & Faver, 1985; Hanson & Mullis, 1985; Fondas, 1997) and describe women as relationship-oriented; exhibiting greater tendencies to be kind, helpful, sensitive and compassionate to others (Abele, 2003; Bakan, 1966). These traits predispose women to be better listeners and more sensitive to other people's needs, and consequently to be more attune to ESG goals and activities.

Empirical research on the relationship between ESG and women directors suggests that women board members are more likely to improve governance (Galbreath, 2011), as they can bring different perspectives and are more likely to influence the firm's decision-making processes in a more empathetic way (Lau, 2023). For instance, Adams and Ferreira (2009) show that women directors improve firms' governance and are less likely to have board meeting attendance problems than men. Huse and Solberg (2006) examine the effect of women directors on firm's governance by studying eight Scandinavian women directors who have held over 100 board seats combined and find that women directors demonstrate characteristics such as wisdom and diligence more than their male counterparts. These characteristics lead to greater preparedness in board meetings, more engagement during meetings, and an increased awareness of diversity and social issues. Seto-Pamies (2015) study the role that women directors play in the engagement of social activities and sustainability within a firm. They document a positive relationship between the proportion of women on the board and the firm's overall sustainability score. Similarly, Krüger (2009) find that firms that have a higher number or percentage of women board members tend to achieve better CSR ratings. Cook and Glass (2018) use a sample consisting of all Fortune 500 firms for the period 2001-2010 to examine whether ESG dimensions are affected by the number of women on the

board, and inconsistent with the critical mass theory, they find that the appointment of even one woman director provides immediate benefits to the firms ESG ratings.

Using a sample of non-financial Spanish firms, Pucheta-Martinez et al (2018) examine how independent and institutional women board members influence CSR reporting and document a positive relationship between women directors and the disclosure of CSR information, albeit to a certain threshold. Al-Shaer and Zaman (2016) examine the impact of women directors on the quality of sustainability reporting and provide evidence of a strong correlation between women on boards and high-quality sustainability reporting. Similarly, Issa and Fang (2019) find that even in countries with traditionally high masculinity scores, women are perceived to have greater emotional skills than men, and that having more women on the board of directors leads to a positive statistically significant difference in CSR disclosures.

While most empirical research focuses on the relationship between women directors and aggregate social responsibility or ESG measures, some papers examine the link between women presence on corporate boards and specific dimensions of ESG. For instance, Post et al., (2011) examine how members of the board of directors can affect a firm's environmental CSR (ECSR) activity and find that having at least three women directors on the board results in higher ECSR and Kinder Lydenberg Domini (KLD) scores. Liu (2018) examines the relationship between women representation on the board and the likelihood of the firm to incur environmental lawsuits. She finds that firms with high women representation on the board are less likely to be involved in environmental lawsuits. Braun (2010) finds that women business owners are stronger advocates of green entrepreneurship ideas than their male counterparts, providing further evidence that women are more likely to play a stronger role in designing and advancing firms' environmental commitments. More recently, Elmaghri et al., (2019) examine a sample of Chinese listed companies and find that the presence of women board members positively impacts the firms' environmental strategy and performance. Several researchers document the likely influential power of women board members on various aspects of sustainability, even when under-represented. For instance, Naveed et al., (2021) find that including a single woman director on a corporate board improves the firm's environmental and social risks connected with corporate social performance.

Certain studies examine the impact of women directors on ESG and sustainability reporting in certain sectors or industries. In the context of the U.S. banking sector, Shakil et al. (2020) highlight a significant positive effect of women directors on ESG performance, contributing to the growing literature on women directors and sustainability within financial institutions. Fältholm and Norberg (2017) explore women directors and innovation in the mining industry, and Menicucci and Paolucci (2024) investigate women's impact on ESG performance in the Italian utilities sector. They both shed light on the importance

of women in traditionally male-dominated industries. Specifically, Fältholm and Norberg (2017) highlight the potential for women to drive innovation within the mining sector. On the other hand, Menicucci and Paolucci (2024) delves into the specific context of the Italian utilities sector, examining how the presence of women on boards influences various ESG dimensions. They find a significant positive effect of female directors on ESG performance when a critical mass of women (at least three) is present on the board of directors. They also document that the presence of a critical mass of women on the board of utilities firms positively impacts individual ESG dimensions, particularly the environmental and social aspects.

Contrary to the common belief that women directors positively influence ESG performance, there are studies that provide evidence of a different narrative where an increase in women on boards may not necessarily lead to improved ESG outcomes. This negative correlation challenges the conventional wisdom surrounding the benefits of women directors in enhancing sustainability practices within organizations. Findings from Manita et al. (2018) suggest that the link between women directors and ESG performance, as measured by ESG disclosure scores, is weak, indicating that the presence of women on boards may not always translate into significant improvements in ESG practices. This aligns with the results from Menicucci and Paolucci (2022), who reveal a non-linear correlation between women directors on the board and ESG performance, emphasizing that only a gender-balanced board positively impacts a bank's sustainability performance. Additionally, Cucari et al. (2017) noted a negative correlation between women on boards and ESG performance in Italian listed companies, further contributing to the body of evidence suggesting a nuanced relationship between women and sustainability outcomes. Paolone (2024) found that the combined effect of women directors and board cultural diversity negatively impacts ESG performance within European banks. Similarly, Setiani (2024) discovered a negative relationship between women directors and ESG performance in the South African context.

Some papers find insignificant or no relationship between women directors and ESG. For instance, Manita et al., (2018) investigate the relationship between women directors and ESG disclosure using firms from the S&P 500 index over the period 2010-2015. Their results indicate no significant relationship between women on boards and ESG disclosure. Using a sample of Fortune 500 firms in 2011, Giannarakis (2014) find that increased presence of women on the board is insignificant to the level of CSR disclosure (as measured by ESG scores). Overall, the literature on the relationship between women directors and ESG outcomes based on data from various countries and time frames provides mixed results so far.

1.2. ESG Reporting and Women Directors in Canada

A burgeoning body of the literature examines the link between women directors and sustainability reporting in Canada. While it mainly focuses on CSR, which is less comprehensive than the broader concept of ESG, to quantitatively assess sustainability related risks and opportunities, it still sheds light on the expected relationship between women directors and sustainability disclosure. Using a sample of 80 publicly listed Canadian firms over the period 2008-2014, Ben-Amar et al., (2017) examine the impact of women directors on carbon disclosure and find that when women members have an active voice, disclosures improve and that women directors are more likely to engage in discourse with stakeholders and to push for sustainable initiatives than their male peers. Radu et al., 2022 investigate the relationship between board characteristics, including the percentage of women directors on board, and ESG disclosure using a sample of Canadian firms from 2012 to 2018. They find a significant and positive relationship between women directors and environmental and social dimensions of ESG disclosures using Bloomberg data. In a recent study, Khemakhem et al., (2023) investigates the relationship between women directors on board and board committees in Canadian firms listed on the TSX Composite Index from 2014 to 2016. Similarly, they find a positive and significant relationship between women directors and ESG disclosures. Mohsni and Benaissa (2024) study the relationship between board gender diversity and both aggregate ESG disclosure scores and each of the three ESG pillars (environmental, social and governance) for all publicly traded Canadian firms over the period 2010-2021. Their results indicate that gender diverse boards are associated with higher ESG disclosure scores, both in the aggregate and in each ESG pillar, individually.

Our study adds to this literature and sheds lights on the impact of women directors on ESG disclosure in a historically male-dominated industry, in which ESG is critical to its viability. In addition, we study a comprehensive set of ESG disclosure practices. Unlike Khemakhem et al. (2023) who investigate the relationship between board and main committees gender diversity and ESG disclosure over a 2-year period and while focusing on board committee members, we conduct a longer time-series analysis over 11 years (2011-2021) on a single sector that has faced challenges related to environmental impacts and is highly relevant in the climate change discussion. In addition, our work expands the industry analysis conducted by Mohsni and Benaissa (2024) by using content analysis to develop two sustainability disclosure proxies, based both on the Global Reporting Initiative (GRI) and the Sustainability Accounting Standards Board (SASB) framework. Our focus on only one industry allows us to conduct a more thorough analysis and provide more targeted recommendations.

2. Data and Methods

2.1. Sample and Variables Measurement

We start our sample section by creating a list of all mining firms listed on the TSX Composite Index as of end of 2023. We then collect data for ESG disclosure, firm characteristics and governance variables from Bloomberg database from 2011 to 2022 for these firms. This resulted in 516 observations. We then drop 197 observations due to at least one missing variable. Our final sample has 319 observations and 35 unique firms. With approximately 95% coverage of the Canadian equities market, the TSX Composite Index serves as the main benchmark for companies listed on the Toronto Stock Exchange.[5] Data used in the study is obtained from Bloomberg and all data was collected in Canadian dollar. We start our sample with 2011 as data on women representation on boards and other board-level control variables, were relatively thin prior to that year.

To measure ESG disclosure, which is our main dependent variable, we use the following proxies. First, we use the proprietary Bloomberg ESG disclosure scores as the primary measure of firms' ESG reporting. The Bloomberg ESG disclosure score ranges from 0 (for firms with no ESG disclosure) to 100 (for firms that disclose all ESG data). In accordance with Eccles et al. (2011), we also consider the three-dimensional components of ESG: Environmental, Social, and Governance disclosure scores. Specifically, we measure ESG disclosure using the ESG overall score (ESG_0) and scores on ESG dimensions (namely, the environmental ESG_1, social ESG_2 and governance ESG_3 dimensions). Annual ESG disclosure scores are collected from Bloomberg database for each mining firm.

Given the controversies related to the use of ESG disclosure scores and to test the robustness of our results, we develop two other proxies of ESG Disclosure. Our second proxy for ESG Disclosure is based on a manual content analysis of corporate social responsibility (CSR) reports. We dub this proxy, GRI Score, and it is an index that represents the level of compliance with the Global Reporting Initiative (GRI) framework. To build this proxy, we collect CSR reports from each firm's website. We were able to find CSR reports for 75% of the observations in our sample from 2016 to 2022 (untabulated). GRI guidelines and standards have changed several times during our sample period and in order to develop a broad Index that can be used to code all the CSR reports, we had to limit our sample to 2016-2022. To code the data, two of the co-authors independently coded an initial sample of observations. We then compared the results between the two coders. The agreement rate at this stage was 85%. This is in an acceptable range for content analysis (Beattie et al. 2004). The differences were discussed and resolved, and the Index was further refined based on the results of this stage. Subsequently, one of the co-authors

[5] https://tmxinfoservices.com/benchmarks-and-indices/sp-tsx-indices?lang=en&indexinfo=%5ETSX#tsx Last accessed on December 30, 2024.

coded all the CSR reports, following which, another co-author reviewed all coding for accuracy and any issues were resolved. We then built a measure based on GRI which takes a value of zero for companies that never mention GRI in their CSR reports to a value of 100 for companies that prepare their CSR reports in accordance with GRI and also have assurance and internal review for their CSR reports. Appendix A provides a clear description of the GRI Score and the definition of each category.

[PLEASE INSERT APPENDIX A HERE]

Our third proxy for ESG disclosure is based on SASB framework. SASB developed a specific standard for firms in the Metals & Mining industry which was released in 2018 and therefore for this measure, our data covers 2018 to 2022. To collect data based on SASB, we use data from Bloomberg database given that Bloomberg matches its data with data items recommended by SASB. Bloomberg reports two broad level SASB measures. One which considers only items that can be matched exactly with SASB items (SASB Score Exact), and another one which considers both exact and proximate matches (SASB Score Proximate). These two measures take a value between 0 and 100. This data has been used in the literature (e.g. Grewal et., 2021) to measure ESG disclosure.

For women directors (FEPER), our main independent variable, similar to Adams and Ferreira (2009), we calculate the percentage of women board members as the number of women on the board divided by the total number of directors. As an alternate measure, we also use the number of women on board (FENUM). To mitigate potential omitted variables bias (Gujarati, 2003; Elmagrhi et al., 2018), we control for various board and firm-level characteristics that may influence ESG activities and reporting. At the board level, we control for CEO duality, board independence, board age, and board size. At the firm level, we control for firm size, earnings growth, leverage, and return on assets. All control variables are obtained from Bloomberg. Appendix B provides a summary of all variables used in our empirical analysis.

[PLEASE INSERT APPENDIX B HERE]

2.2. Methodology

We use a panel regression setup to examine the relationship between women directors and ESG reporting of Canadian mining companies. Specifically, we estimate the following multivariate regression model:

$$ESG_{it} = \alpha_0 + \beta_1 WD_{it} + \sum \beta_j CV_{jit} + \tau_t + \varepsilon_{it}$$

where ESGit represents our dependent variable and is measured using one of the following variables: the ESG total score (ESG_0), the three environmental (ESG_1), social (ESG_2), governance (ESG_3) scores, a GRI based measure (GRI Score) and two SASB based measures (SASB Score Exact and SASB Score Proximate) (for firm i at time t). WD_{it} is the main independent variable. It includes the percentage of women on board (FEPER) and the number of women on board (FENUM). The term CV_{jit} represents board-level, and firm-level control variables. All variables are described in Appendix B. The expression $\tau t + \varepsilon it$ refers to time effects, and random disturbance respectively. The model is estimated using an unbalanced panel data set (Campbell & Minguez-Vera, 2008), firm fixed effects and clustered standard errors (at the firm level). To mitigate the impact of outliers, we winsorize all continuous variables at 1% and 99% levels.

3. Empirical Results

3.1. Univariate Analysis

Table 1 (Appendix C) reports the descriptive statistics of the variables used in the main model of the study. As can be seen, the percentage of women board members (WD) has a mean of 18.11 with a standard deviation of 12.18 and a range of 0-50. This indicates that, on average, women constitute more than 18% of board members, with variability across mining companies ranging from no woman director to the highest ratio of 50%. In terms of the number of women on boards, this value has a mean of 1.7 and a standard deviation of 1.12, indicating that companies typically have between one to two women directors, though the actual number can range from zero to a maximum of four. Examining the binary variable which indicates the presence of at least one-woman board member, the mean is 0.83 revealing that 83% of the observations have at least one woman on their board (untabulated). These statistics suggest that while a majority of companies have some level of women representation, the overall number and proportion of women on boards remain relatively low.

The overall ESG score, represented by ESG0, has a mean of 50.04 with a standard deviation of 13.92. When breaking down the ESG components, distinct patterns emerge: ESG1 (Environmental) has a mean score of 33.02 and a standard deviation of 25.07, with scores ranging from 0 to 79.61. This suggests significant disparities in environmental reporting practices, with some companies excelling while others show little to no transparency. ESG2 (Social) has a mean of 30.53 and a standard deviation of 15.99, with scores from 0 to 62.73, indicating variability and, on average, lower performance compared to environmental disclosure. The ESG3 (Governance) dimension stands out with a notably higher mean score of 86.46 and a relatively small standard deviation of 4.15, with scores ranging from 76.97 to 100. This reflects a more consistent and stronger adherence to governance reporting across the firms in the sample with little variations. The overall trend reveals that while companies tend to have well-established governance disclosures, there is significant room for improvement in both environmental and social areas, highlighting an uneven approach to comprehensive ESG transparency. Finally, the average for the GRI score, GRI Score, is 31.71 with a standard deviation of 30.18 with a range from 0 to 100. SASB based measures have an average of 56.25 (SASB Score Proximate) and 51.42 (SASB Score Exact) with a standard deviation of 22.92 and 25. 37 respectively, indicating SASB based scores that are on average consistent with ESG scores and GRI scores that are lower on average than ESG scores. Descriptive statistics of the firm-level and board-level control variables are summarized in Table 1 (Appendix C).

[PLEASE INSERT TABLE 1 HERE]

Table 2 (Appendix C) presents the correlation coefficients. The correlations between the proportion of women on boards and aggregate ESG, Environmental, Social, and Governance disclosure scores are 0.53, 0.48, 0.55, and 0.27 respectively. All correlations are statistically significant at the 1% level.

[PLEASE INSERT TABLE 2 HERE]

Figure 1 (Appendix C) presents data on the Average Annual ESG Disclosure Score and the Average Annual Percentage of Women on the Board from 2011 to 2022. It highlights a notable trend in corporate governance among Canadian mining companies during the study period. Over this period, there has been a marked increase in the average ESG Disclosure Score, rising from 42.55% in 2011 to 59.53%

in 2022. This improvement suggests that Canadian mining companies have become more committed to transparency and comprehensive reporting on environmental, social, and governance (ESG) issues. This trend may be driven by growing regulatory requirements, increased investor demand for sustainable practices, and a broader societal push for responsible mining activities.

At the same time, the representation of women on corporate boards within these companies has seen a considerable increase, with the percentage growing from 5.11% in 2011 to 33.05% in 2022. This rise reflects an increasing emphasis on having women in leadership roles, which is particularly notable in the traditionally male-dominated mining sector.

[PLEASE INSERT FIGURE 1 HERE]

3.2. **Multivariate Analysis: Women Directors and ESG Reporting**

In this section, we explore the link between women directors and ESG disclosure of the mining firms, using Bloomberg's ESG disclosure scores as our dependent variable. Beyond the overall ESG score (ESG_0), we also analyze the relationship between women directors and each of the three ESG components separately: environmental, social, and governance disclosure scores (ESG_1, ESG_2, and ESG_3 respectively). Table 3 of Appendix D shows the regression results with ESG disclosure scores (ESG_0, ESG_1, ESG_2, and ESG_3) as the dependent variables and the percentage of women on boards (FEPER) as the main independent variable. In all models, we control for board-level characteristics, namely the board size, board independence, CEO duality, and the average age of board members, and firm-level characteristics, including firm size, leverage, ROA, and earnings per share growth. When the aggregate ESG score is used as the dependent variable (Model 1), we observe a positive and significant association between the aggregate ESG measure and percentage of women directors. Specifically, the results indicate that, when accounting for board and firm-level characteristics, the coefficient of percentage of women directors (FEPER) is positive and statistically significant at 5 precent (0.142). These findings are consistent with the recent study by Khemakhem et al. (2023), which identifies a positive and significant relationship between women on board committees and aggregate ESG disclosure scores of Canadian firms. Our results also align with Nuhu and Alam (2023), who documents a positive relationship between women directors and ESG disclosure in the energy industry of emerging economies.

When the environmental disclosure score is used as the dependent variable (Model 2), the coefficient for the percentage of women on boards (FEPER) is 0.332 ($p < 0.05$), indicating a strong positive association with environmental disclosure scores (ESG1). Similarly, when the social disclosure score is use as the dependent variable (Model 3), the coefficient for FEPER is 0.132 ($p < 0.1$), revealing a significant positive relationship between women directors and the social disclosure score (ESG2). These results are consistent with prior studies that investigate the link between women directors and ESG disclosures (e.g. Radu et al., 2022), albeit not specifically focused on the mining sector or specifically looking at all three components of the ESG score. For instance, research by Nicolò et al. (2021), and Qureshi et al. (2019) have highlighted the positive association between women directors and ESG disclosure practices within European and international firms.

Interestingly, when the governance disclosure score is used as the dependent variables (Model 4), the coefficient for FEPER is -0.051 ($p < 0.1$), indicating a possible negative link between the percentage of women on the board and the governance disclosure score (ESG3). This may imply that mining firms with poor governance reporting tend to be more active in appointing women directors on their board as a mitigating mechanism. Overall, these findings illustrate that having women directors on corporate boards is associated with higher ESG disclosure across most dimensions, with the most substantial effects observed in environmental reporting.

[PLEASE INSERT TABLE 3 HERE]

3.3.Multivariate Analysis: Women Directors and GRI/SASB Based Measures

As part of their ESG disclosure, Canadian mining companies use other frameworks of sustainability reporting, such as Global Reporting Initiative (GRI) and Sustainability Accounting Standards Board (SASB). These frameworks serve as critical benchmarks: GRI provides a comprehensive, widely recognized standard and guidelines for sustainability reporting, while SASB offers industry-specific guidelines, enabling more detailed analysis for the Metals and Mining sector, which is the focus of this study. In this section, we examine how women directors may affect different forms of sustainability reporting. Specifically, we analyze how women on board may affect mining firms' adherence to GRI and SASB frameworks in their sustainability reporting.

For GRI, we develop a GRI score based on a manual content analysis of CSR (or ESG) reports when available. If a company does not have a CSR report, we collect their annual reports, or Management Discussion and Analysis (MD&A) and apply the content analysis to such reports. The GRI score, is constructed based on the level of compliance with GRI guidelines (or standards). In addition, to capture the quality of the reports at a high level, we look for disclosure about internal review and external assurance for CSR reports. The GRI Score takes a value of zero for companies that never mention GRI in their CSR/ESG reports and can go up to a value of 100 for companies that prepare their CSR/ESG reports in accordance with GRI and also have assurance and internal review for their CSR reports. Appendix A provides a detailed description on how we calculate our GRI Score.

For the SASB framework, we rely on an existing Bloomberg template that tracks two SASB compliance measures. These measures are: SASB Score Proximate defined as " the percentage disclosure of SASB fields with Bloomberg match including proxies" and SASB Score Exact " the percentage disclosure of SASB fields with Bloomberg match excluding proxies." We collect data on these two measures for all mining firms listed on the TSX Composite Index during the period 2018–2022.

We employ the same model as in the previous section, using the GRI Score, SASB Score Proximate, and SASB Score Exact as the dependent variables in Models 1, 2, and 3, respectively. These variables capture different aspects of sustainability reporting quality: the GRI Score measures adherence to GRI standards and guidelines, while SASB Score Proximate and SASB Score Exact measure the percentage of disclosure in SASB fields (with and without proxies, respectively).

Table 4 (Appendix D) reports regression results using GRI Score and SASB scores (Proximate and Exact) as dependent variables. We include the same board-level and firm-level control variables used in the earlier models to ensure consistency and account for potential confounding factors. Our findings show no statistically significant associations between the percentage of women on board and GRI Score and SASB Score Proximate. We find a slightly negative relationship between percentage of women directors and SASB Score Exact, although the results are very week with a p-value of 0.097. While our earlier findings suggest that women on the board are positively associated with Bloomberg ESG disclosure scores, their presence does not appear to significantly associate with the quality of sustainability reporting, as measured by adherence to GRI standards or SASB.

There are at least three possible explanations for these findings. First, these models cover a relatively shorter period compared to our previous models. SASB standard for Metals and Mining industry was introduced in 2018. It may take time for firms to properly comply with these standards. Similarly,

GRI standards and guidelines are very long and comprehensive, and it may take several years for firms to fully comply with them. Second, the number of observations for these models are smaller and it is possible that the lack of significance is due to a small sample size. Future research can extend our sample to include more data to investigate whether our findings are due to a small sample size or a relatively short period. Third, our data shows that the variation in the number of women on board declines as we move toward 2022. By 2020, every firm in our sample has at least one woman on their board. By 2022, every firm has at least two women (most have three). It is possible that due to this low variation in the number of women directors in later years of our data, these models that rely on later years are not significant.

[PLEASE INSERT TABLE 4 HERE]

3.4.Robustness Checks:

We acknowledge that we have only established an association so far (and not a causal relationship), as it is possible that both ESG reporting decisions and the decision to nominate women directors are driven by other unknown variables or that endogeneity and reverse casualty may drive our results.

To ensure the robustness of our findings, we re-estimate our regression model using alternative measures of women directors. To alleviate issues of reverse causality and examine the temporal impact of women directors on ESG disclosure, we use lagged specifications. Table 5 (Models 1 to 12) presents the regression results, where we use the number of women on the board (FENUM). Additionally, we include lagged measures of FENUM, specifically lagging it by one year (FENUM1L) and two years (FENUM2L), to assess and capture the temporal impact of women directors on ESG disclosures. We analyze these relationships using ESG0 (the aggregate ESG disclosure score) as well as the three ESG dimensions: ESG1 (Environmental), ESG2 (Social), and ESG3 (Governance). The regression results in Table 5 -for the most part- align with our earlier findings, indicating a consistent positive association between women directors and ESG disclosures, particularly for the aggregate ESG score and the Environmental and Social dimensions. However, the results also confirm a negative association between the number of women on the board and the Governance disclosure score (ESG3).

We also test our main models using lagged measures of percentage of women on board (FEPER) to examine the temporal impact of women on boards on ESG disclosures. Specifically, we lag FEPER by one year (FEPER1L) and two years (FEPER2L). This approach helps mitigate concerns related to reverse causality and captures the delayed effects of women on ESG disclosures. Table 6 presents the regression results, which are consistent with our earlier findings in our main models. The results reinforce the robustness of our conclusions, suggesting that the presence of women on boards continues to positively associate with Bloomberg ESG disclosure scores over time.

[PLEASE INSERT TABLE 5 HERE]

[PLEASE INSERT TABLE 6 HERE]

1. Conclusion and Limitations

We examine the relationship between women on boards and ESG disclosure for Canadian mining firms. Our sample includes all mining firms listed on the TSX Composite Index from 2011 to 2022. We employ two measures of women directors—percentage of women on the board, and number of women on the board. To measure ESG disclosure, we use Bloomberg ESG disclosure scores, a GRI score based on manual content analysis of CSR reports (from 2016 to 2022) and SASB scores based on Bloomberg data (from 2018 to 2022). Our findings reveal mixed results regarding the impact of women directors on ESG disclosure. For Bloomberg ESG disclosure scores, the percentage of women on board has a predominantly positive effect, particularly on the aggregate ESG score, environmental score, and social score. However, our analysis shows a negative relationship between women directors and the governance score. Furthermore, we find no significant association between women directors and GRI and SASB scores.

This research contributes to two key strands of the literature: women directors (e.g., Birindelli et al., 2019; Manita et al., 2018) and ESG performance and disclosure (e.g., Cho et al., 2020). By focusing on the mining sector, a highly sensitive industry, this study provides new insights into the dynamics of ESG reporting and board composition and how they have evolved over time. Given the critical role of ESG activities and transparency in addressing societal challenges such as carbon emissions, climate change, and sustainable finance, our findings offer valuable implications for policymakers and stakeholders. A deeper understanding of how mining firms socially perform, disclose ESG data, and how

these aspects relate to board characteristics can guide efforts to enhance and standardize ESG reporting, ultimately supporting better organizational reporting practices in sustainability. To control for omitted variables and possible reverse causality, we have used firm fixed effects and have also applied lead-lag models.

To better understand the effect of women directors on mining firms ESG disclosure, and given the effect of education and work experience on decision taking processes, future research needs to examine the effect of differences in education and work experience between men and women directors and how this affects sustainability disclosure and decisions.

Appendix A: Measure for GRI Score

The following Index was developed and used to manually construct our measure for GRI Score.

Item	Score	Description
Compliance with GRI:		This section measures if and how a firm complies with GRI.
In accordance with GRI	2	A score of two is assigned if a firm prepares its CSR report in accordance with GRI.
Refers to GRI	1	A score of one is assigned if a firm only refers to GRI in its CSR report.
No mention of GRI	0	A score of zero is assigned if there is no mention of GRI in a CSR report.
In accordance with G4 Mining and Metals Sector Disclosures (supplement) or GRI 12 Coal Sector (Beginning 2022)	1	A score of one is assigned if a firm complies with G4 Mining and Metals Sector Disclosure framework or beginning 2022 with the GRI 12 for Coal Sector Standard.
Assurance and Review of the CSR Report:		
Both Internal Review and External Assurance	3	A score of three is assigned if the CSR report is audited by external auditors and also reviewed internally by the board or the management team.
Only External Assurance	2	A score of two is assigned if the CSR report is audited by external auditors.
Only Internal Review	1	A score of one is assigned if the CSR report is reviewed internally by the board or the management team.
No Review or External Assurance	0	A score of zero is assigned if the CSR report has not been audited and has not been reviewed by the board or the management team.
Total Possible Score	6	

We first collected CSR stand-alone reports of firms in our sample from 2016 to 2022 from their websites when available. We then used this Index to manually code the CSR reports. A total score was calculated based on this table for each observation. The scores were normalized to range from 0 to 100 to make them consistent with other measures of ESG discourses.

Appendix B. Variable Definitions

All data are collected from Bloomberg. CSR reports are collected from each firm website. The GRI score is based on a manual content analysis of CSR reports.

1. Dependent variable – ESG Score	
ESG0	A score developed by Bloomberg to measure a firm's total environmental, social and governance disclosure (out of 100)
ESG1	The first dimension of ESG score and it measures the environmental disclosure (out of 100). Environmental aspects considered include resources use, emissions and innovation.
ESG2	The second dimension of ESG score and it measures the social disclosure (out of 100). Social aspects considered include workforce, human rights, community and product responsibility.
ESG3	The third dimension of ESG score and it measures the governance disclosure (out of 100). Governance aspects considered include management, stakeholders, and CSR strategies.
GRI Score	A measure based on content analysis of CSR reports.
SASB Score Proximate	A measure based on SASB framework collected from Bloomberg database. This measure shows the percentage of items in Bloomberg ESG data that can exactly or proximately be matched with items recommended by SASB.
SASB Score Exact	A measure based on SASB framework collected from Bloomberg database. This measure shows the percentage of items in Bloomberg ESG data that can be exactly matched with items recommended by SASB.
2. Independent variable – Women Directors	
FEPER	Percentage of women on board: Number of women divided by total number of board members.
FENUM	Number of women on board.
3. Control variables – firm, board and individual characteristics	
B_SIZE	Number of board members in the firm.
IND_DIR	Percentage of independent directors on the board.
CEO_DUAL	CEO Duality dummy: 1 if the CEO and board chair are the same person, and 0 otherwise.
B_AGE	The board age is the average age of the board members.
F_SIZE	Firm size: measured by the natural logarithm of firm's total balance sheet assets value.
LEVERAGE	The financial leverage of the firm, calculated as the percentage of total liabilities to total assets.
EPSG	The percentage of annual growth in Earnings per Share.
ROA	Return on Assets: net income divided by total assets.

Appendix C. Statistics

Table 1 - Descriptive Statistics

Variable	Obs	Mean	Std. dev.	Min	Max
ESG0	319	50.042	13.918	27.100	78.383
ESG1	319	33.019	25.074	0.000	79.613
ESG2	319	30.532	15.990	0.000	62.727
ESG3	319	86.455	4.151	76.972	100.000
FEPER	319	18.110	12.178	0.000	50.000
FENUM	319	1.668	1.123	0.000	4.000
B_AGE	319	61.618	3.440	51.000	67.818
B_SIZE	319	9.078	2.012	5.000	15.000
CEO_DUAL	319	0.060	0.237	0.000	1.000
IND_DIR	319	79.085	10.486	54.545	92.308
F_SIZE	319	8.005	1.407	5.373	10.961
LEVERAGE	319	30.338	16.557	0.932	66.633
EPSG	319	-66.118	474.627	-2866.602	1723.042
ROA	319	-0.971	10.515	-39.457	23.710
GRI Score	216	31.713	30.179	0.000	100.000
SASB Score Proximate	134	56.248	22.920	13.559	91.525
SASB Score Exact	128	51.418	25.370	3.704	92.593

All variables are defined in Appendix B.

All continuous variables are winsorized at the 1% and 99% level.

Table 2 - Correlation Matrix

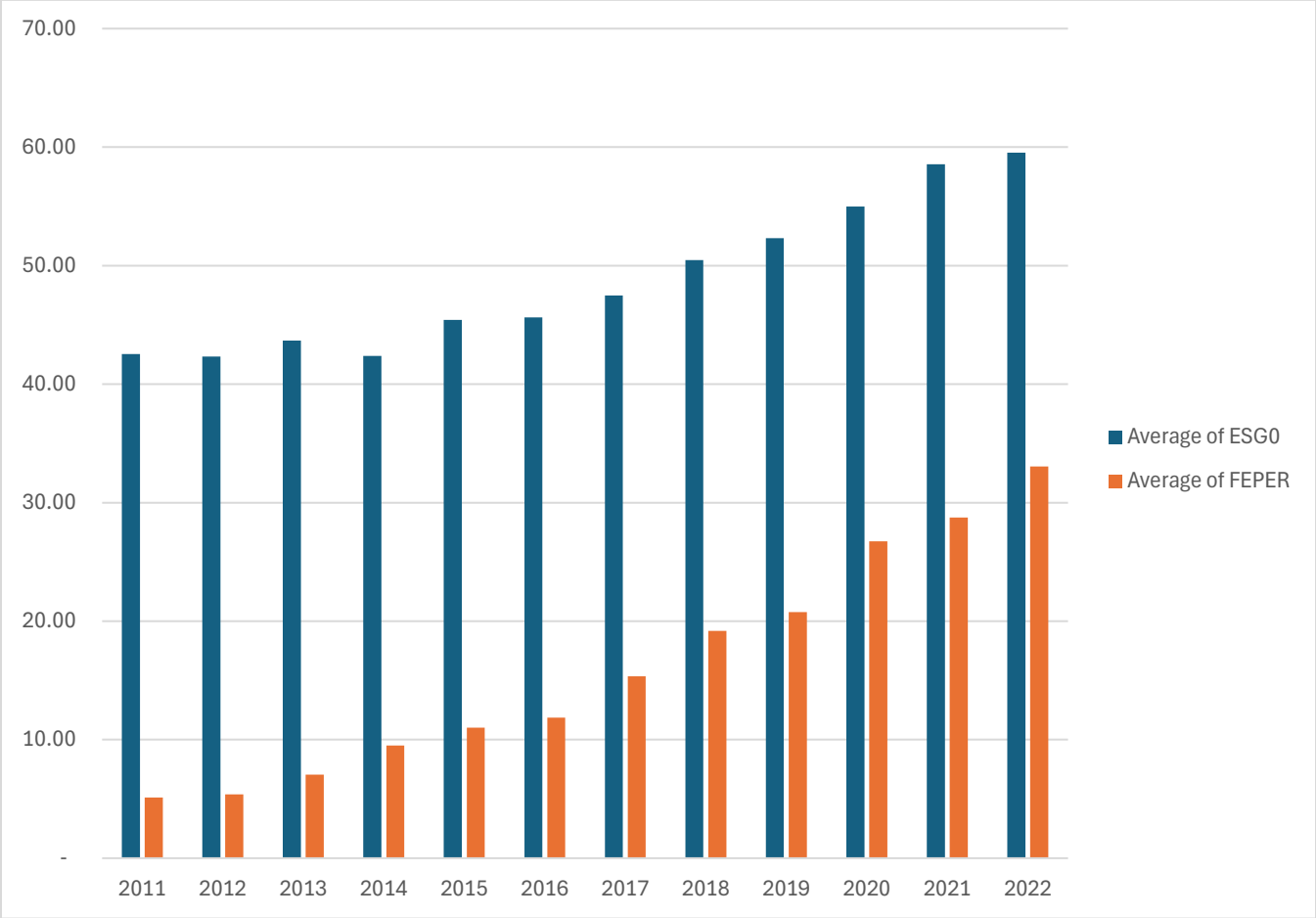
	ESG0	ESG1	ESG2	ESG3	FEPER	FENUM	B_AGE	B_SIZE	CEO_DUAL	IND_DIR	F_SIZE	LEVERAGE	EPSG	ROA	GRI SCORE	SASB SCORE PROXIMATE
ESG0	1															
ESG1	.974**	1														
ESG2	.939**	.851**	1													
ESG3	.546**	.460**	.444**	1												
FEPER	.529**	.484**	.548**	.273**	1											
FENUM	.630**	.583**	.632**	.364**	.934**	1										
B_AGE	.194**	.207**	.153**	0.100	0.008	0.068	1									
B_SIZE	.441**	.419**	.407**	.346**	0.097	.396**	.183**	1			.					
CEO_DUAL	-0.082	-0.034	-.120*	-.165**	-0.039	-0.067	0.044	-0.063	1							
IND_DIR	.303**	.281**	.329**	0.078	.383**	.390**	.234**	0.046	-.140*	1						
F_SIZE	.689**	.678**	.636**	.379**	.184**	.348**	.317**	.519**	.181**	.224**	1					
LEVERAGE	.392**	.405**	.366**	0.094	.145**	.225**	0.046	.266**	0.098	0.102	.372**	1				
EPSG	-0.033	-0.032	-0.017	-0.073	-0.017	-0.038	0.003	-0.038	-0.013	-0.080	0.042	-0.011	1			
ROA	.264**	.246**	.272**	0.090	0.109	.128*	-0.037	0.079	0.091	0.048	.253**	-.147**	0.000	1		
GRI SCORE	.638**	.596**	.575**	.497**	.197**	.316**	.138*	.367**	-.132	.048	.542**	.204**	-.082	.248**	1	
SASB SCORE PROXIMATE	.920**	.901**	.873**	.236**	.228**	.351**	.149	.233**	.013	.255**	.678**	.335**	-.059	.484**	.583**	1
SASB SCORE EXACT	.811**	.811**	.766**	.115	.118	.232**	.118	.205*	0.056	.251**	.651**	.283**	.016	.413**	.411**	.876**

All variables are defined in Appendix B.

**. Correlation is significant at the 0.01 level.

*. Correlation is significant at the 0.05 level..

Figure 1 – Evolution of The Annual Averages of Percentage of Women on Board (FEPER) and Aggregate ESG Disclosure (ESG0) for TSX Index mining firms over the Period 2011-2022



Appendix D. Multiple Regression Analysis Results

Table 3 – Women Directors and Bloomberg ESG Disclosure Scores (ESG_0, ESG_1, ESG_2, ESG_3)

This table presents panel regression results (firm fixed-effects) of the relationship between percentage of women on board (FEPER) and ESG disclosure scores (ESG0 is the aggregate disclosure score, ESG1 is the environmental disclosure score, and ESG2 is the social disclosure score, and ESG3 is the governance disclosure score).

VARIABLES	(1) ESG0	(2) ESG1	(3) ESG2	(4) ESG3
FEPER	0.142**	0.332**	0.132*	-0.051*
	(0.066)	(0.150)	(0.075)	(0.027)
B_AGE	0.196	0.432	0.100	-0.013
	(0.205)	(0.453)	(0.255)	(0.134)
B_SIZE	0.722*	0.643	1.654**	-0.136
	(0.405)	(0.728)	(0.607)	(0.185)
CEO_DUAL	-4.806***	-8.129	-5.322	-0.864
	(1.169)	(7.501)	(8.088)	(0.604)
IND_DIR	0.011	0.029	-0.012	0.018
	(0.069)	(0.137)	(0.087)	(0.045)
F_SIZE	6.397***	12.737***	5.890**	0.596
	(1.708)	(2.920)	(2.765)	(0.694)
LEVERAGE	-0.022	-0.119	0.095	-0.039
	(0.053)	(0.123)	(0.080)	(0.026)
EPSG	0.000	0.001	0.000	-0.000
	(0.001)	(0.002)	(0.001)	(0.000)
ROA	0.025	0.021	0.093	-0.044*
	(0.055)	(0.106)	(0.071)	(0.023)
Constant	-28.270	-112.447**	-49.919**	81.204***
	(18.316)	(42.704)	(20.537)	(11.621)
Observations	319	319	319	319
R-squared (within)	0.752	0.666	0.665	0.293
Number of firms	35	35	35	35
Year Dummies	Yes	Yes	Yes	Yes
Firm Fixed Effect	Yes	Yes	Yes	Yes

All variables are defined in Appendix B.
Standard errors clustered at firm level in parentheses.
*** p<0.01, ** p<0.05, *p<0.1

Appendix D. Multiple Regression Analysis Results

Table 4 – Women Directors and GRI and SASB Scores

This table presents panel regression results of the relationship between percentage of women on board (FEPER) and GRI and SASB scores.

VARIABLES	(1) GRI Score	(2) SASB Score Proximate	(3) SASB Score Exact
FEPER	-0.007	0.093	-0.449*
	(0.196)	(0.201)	(0.263)
B_AGE	0.090	0.546	-1.632**
	(0.487)	(0.425)	(0.636)
B_SIZE	2.890***	-0.065	-2.382
	(0.829)	(1.207)	(1.686)
CEO_DUAL	-5.235	-7.237*	-3.078
	(5.101)	(3.748)	(3.840)
IND_DIR	-0.059	0.191	0.667*
	(0.208)	(0.186)	(0.378)
F_SIZE	4.988	1.086	2.636
	(5.060)	(3.673)	(5.948)
LEVERAGE	-0.277	0.023	-0.060
	(0.179)	(0.075)	(0.148)
EPSG	-0.002	0.001	0.001
	(0.003)	(0.001)	(0.001)
ROA	0.071	0.165	0.144
	(0.143)	(0.110)	(0.215)
Constant	-28.966	-6.197	112.547
	(43.338)	(54.145)	(72.927)
Observations	216	134	128
R-squared (within)	0.172	0.276	0.303
Number of firms	35	34	34
Year Dummies	Yes	Yes	Yes
Firm Fixed Effect	Yes	Yes	Yes

All variables are defined in Appendix B.

Standard errors clustered at firm level in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Appendix D. Multiple Regression Analysis Results

Table 5 – Robustness: Alternative Measure for Women on Board: FENUM

This table presents panel regression results of the relationship between women on board (using FENUM as an alternative measure) and ESG disclosure scores (ESG0 is the aggregate disclosure score, ESG1 is the environmental disclosure score, ESG2 is the social disclosure score, and ESG3 is the governance disclosure score). We also use FENUM lag variables by 1 year and 2 years (FENUM1L and FENUM2L respectively).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
VARIABLES	ESG0	ESG0	ESG0	ESG1	ESG1	ESG1	ESG2	ESG2	ESG2	ESG3	ESG3	ESG3
FENUM	1.091			2.931			0.674			-0.496*		
	(0.777)			(1.764)			(0.832)			(0.280)		
B_AGE	0.163	0.178	0.283	0.372	0.300	0.569	0.054	0.145	0.251	-0.005	0.040	0.002
	(0.210)	(0.228)	(0.262)	(0.455)	(0.551)	(0.626)	(0.269)	(0.271)	(0.285)	(0.135)	(0.120)	(0.136)
B_SIZE	0.590	0.785*	0.978*	0.251	0.717	1.377	1.607**	1.723***	1.765**	-0.067	-0.089	-0.217
	(0.423)	(0.398)	(0.517)	(0.779)	(0.743)	(1.006)	(0.611)	(0.574)	(0.674)	(0.176)	(0.161)	(0.178)
IND_DIR	0.026	0.040	0.055	0.059	0.087	0.142	0.007	-0.011	-0.036	0.014	0.043	0.064
	(0.068)	(0.062)	(0.068)	(0.134)	(0.131)	(0.146)	(0.087)	(0.081)	(0.090)	(0.046)	(0.052)	(0.064)
CEO_DUAL	-3.896***	-6.193***	-6.502***	-6.365	-10.171	-10.625*	-4.142	-7.165	-7.478	-1.097**	-1.157*	-1.208**
	(1.037)	(1.083)	(1.718)	(7.940)	(6.985)	(5.667)	(7.711)	(8.523)	(8.112)	(0.534)	(0.642)	(0.582)
F_SIZE	6.452***	7.647***	7.685***	12.943***	15.615***	15.230***	5.872**	6.642**	7.347**	0.556	0.690	0.478
	(1.719)	(1.783)	(1.896)	(2.932)	(3.063)	(3.476)	(2.779)	(3.113)	(3.334)	(0.698)	(0.791)	(0.802)
LEVERAGE	-0.017	-0.029	-0.025	-0.108	-0.131	-0.141	0.098	0.083	0.116	-0.041	-0.038	-0.053**
	(0.053)	(0.056)	(0.065)	(0.122)	(0.132)	(0.146)	(0.080)	(0.093)	(0.101)	(0.026)	(0.025)	(0.023)
EPSG	0.000	-0.000	-0.000	0.001	-0.000	0.000	0.000	-0.000	-0.001	-0.000	-0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
ROA	0.026	0.009	-0.042	0.024	-0.029	-0.117	0.094	0.090	0.033	-0.044*	-0.039*	-0.046*
	(0.056)	(0.046)	(0.056)	(0.110)	(0.106)	(0.134)	(0.072)	(0.066)	(0.066)	(0.023)	(0.021)	(0.024)
FENUM1L		1.679**			3.387**			2.036***			-0.519*	
		(0.675)			(1.503)			(0.724)			(0.288)	
FENUM2L			1.938*			3.332			2.380**			-0.126
			(0.975)			(2.031)			(0.944)			(0.304)
Constant	-26.690	-39.627*	-49.008*	-109.325**	-133.394**	-155.833**	-47.928**	-58.582**	-69.830**	80.784***	75.998***	79.947***
	(18.893)	(19.716)	(25.158)	(43.708)	(49.876)	(60.093)	(20.916)	(24.108)	(30.974)	(11.665)	(13.044)	(15.422)
Observations	319	284	249	319	284	249	319	284	249	319	284	249
R-squared (within)	0.747	0.746	0.711	0.660	0.649	0.614	0.661	0.657	0.627	0.290	0.291	0.292
Number of firms	35	35	33	35	35	33	35	35	33	35	35	33
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors clustered at firm level in parentheses, *** p<0.01, ** p<0.05, * p<0.1. All Variables are defined in Appendix B.

Appendix D. Multiple Regression Analysis Results
Table 6 – Robustness, Lag of Percentage of Women on Board (FEPER)

This table presents panel regression results of the relationship between one and two year lags of percentage of women on board (FEPER1L and FEPER2L respectively) and ESG disclosure scores (ESG0 is the aggregate disclosure score, ESG1 is the environmental disclosure score, ESG2 is the social disclosure score, and ESG3 is the governance disclosure score).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	ESG0	ESG0	ESG1	ESG1	ESG2	ESG2	ESG3	ESG3
FEPER1L	0.151**		0.303**		0.183**		-0.043	
	(0.060)		(0.128)		(0.075)		(0.032)	
FEPER2L		0.164*		0.284		0.203**		-0.014
		(0.090)		(0.189)		(0.092)		(0.034)
B_AGE	0.200	0.311	0.344	0.617	0.171	0.285	0.033	0.001
	(0.234)	(0.268)	(0.566)	(0.636)	(0.267)	(0.283)	(0.118)	(0.136)
B_SIZE	0.864**	0.920*	0.879	1.274	1.820***	1.692**	-0.117	-0.211
	(0.417)	(0.532)	(0.778)	(1.012)	(0.596)	(0.711)	(0.168)	(0.171)
IND_DIR	0.038	0.057	0.083	0.145	-0.014	-0.034	0.043	0.064
	(0.062)	(0.069)	(0.131)	(0.147)	(0.081)	(0.092)	(0.051)	(0.064)
CEO_DUAL	-6.340***	-6.341***	-10.448	-10.374*	-7.340	-7.295	-1.158	-1.189*
	(1.051)	(2.105)	(7.222)	(5.163)	(8.313)	(8.714)	(0.695)	(0.593)
F_SIZE	7.548***	7.739***	15.410***	15.334***	6.521**	7.419**	0.734	0.462
	(1.802)	(1.927)	(3.145)	(3.554)	(3.117)	(3.384)	(0.792)	(0.802)
LEVERAGE	-0.035	-0.026	-0.142	-0.143	0.077	0.114	-0.037	-0.053**
	(0.055)	(0.065)	(0.132)	(0.146)	(0.091)	(0.101)	(0.025)	(0.023)
EPSG	-0.000	-0.000	-0.000	0.000	-0.000	-0.001	-0.000	-0.000
	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.000)	(0.000)
ROA	0.001	-0.046	-0.044	-0.124	0.081	0.028	-0.037*	-0.046*
	(0.046)	(0.056)	(0.107)	(0.132)	(0.066)	(0.066)	(0.021)	(0.025)
Constant	-40.550**	-50.607*	-135.247**	-158.619**	-59.700**	-71.813**	76.259***	80.094***
	(19.872)	(25.472)	(50.379)	(61.062)	(23.808)	(30.846)	(12.932)	(15.284)
Observations	284	249	284	249	284	249	284	249
R-squared (within)	0.746	0.710	0.649	0.613	0.657	0.625	0.290	0.292
Number of firms	35	33	35	33	35	33	35	33
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors clustered at firm level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All variables are defined in Appendix B.

REFERENCES

Abele, A. E. (2003). The Dynamics of Masculine-Agentic and Feminine-Communal Traits: Findings From a Prospective Study. Journal of Personality and Social Psychology, 85(4), 768–776.

Adams, R. & Ferreira, D. (2009). Women in the boardroom and their impact on governance and performance. Journal of Financial Economics, 94(2), 291–309.

Al-Shaer, H. & Zaman, M. (2016). Board gender diversity and sustainability reporting quality. Journal of Contemporary Accounting & Economics, 12(3), 210–222.

Atakhanova, Z. (2023). Water impacts and effluent quality regulations of Canadian mining. Sustainability, 15(22), 16086. https://doi.org/10.3390/su152216086

Bakan. D. (1966). The duality of human existence : isolation and communion in Western man. Beacon Press.

Beattie, V., McInnes, B., & Fearnley, S. (2004, September). A methodology for analyzing and evaluating narratives in annual reports: a comprehensive descriptive profile and metrics for disclosure quality attributes. In *Accounting forum* (Vol. 28, No. 3, pp. 205-236). No longer published by Elsevier.

Ben-Amar, W., Chang, M., & McIlkenny, P. (2017). Board Gender Diversity and Corporate Response to Sustainability Initiatives: Evidence from the Carbon Disclosure Project. Journal of Business Ethics, 142(2), 369–383.

Birindelli, A. P., & Savioli, M. (2019). The impact of women leaders on environmental performance: Evidence on gender diversity in banks. Corporate Social-Responsibility and Environmental Management, 26(6), 1485–1499. https://doi.org/10.1002/csr.1762

Braun, P. (2010). Going green: Women entrepreneurs and the environment. International Journal of Gender and Entrepreneurship, 2, 245259.

Brunet, N. & Longboat, S. (2023). Local communities and the mining industry.. https://doi.org/10.4324/9781003182375

Buchanan, C., Markey, S., & Breen, S. (2022). Breaking down barriers. Canadian Planning and Policy / Aménagement Et Politique Au Canada, 2022, 71-87. https://doi.org/10.24908/cppapc.v2022i1.14818

Campbell, K. & Mínguez-Vera, A. (2008). Gender diversity in the boardroom and firm financial performance. Journal of Business Ethics, 83(3), 435–451.

Canadian Securities Administrators. (2023). Canadian Securities Administrators statement on proposed climate-related disclosure requirements. Retrieved December 30, 2024, from https://www.securities-administrators.ca/news/canadian-securities-administrators-statement-on-proposed-climate-related-disclosure-requirements/

Cho, C. H., Bohr, K., Choi, T. J., Partridge, K., Shah, J. M., & Swierszcz, A. (2020). Advancing sustainability reporting in Canada: 2019 report on progress. Accounting Perspectives, 19(3), 181-204.

Christensen, H. B., Hail, L., & Leuz, C. (2021). Mandatory CSR and sustainability reporting: economic analysis and literature review. Review of Accounting Studies, 26(3), 1176–1248. https://doi.org/10.1007/s11142-021-09609-5

Cook, A. & Glass, C. (2018). Women on corporate boards: Do they advance corporate social responsibility? Human Relations (New York), 71(7), 897–924.

Cucari, N., Falco, S., & Orlando, B. (2017). Diversity of board of directors and environmental social governance: evidence from italian listed companies. Corporate Social Responsibility and Environmental Management, 25(3), 250-266. https://doi.org/10.1002/csr.1452

Dobbins, G. H. (1985). Effects of gender on leaders' responses to poor performers: An attributional interpretation. Academy of Management Journal, 28, 587-598.

Eagly, Makhijani, M. G., & Klonsky, B. G. (1992). Gender and the Evaluation of Leaders: A Meta-Analysis. Psychological Bulletin, 111(1), 3–22. https://doi.org/10.1037/0033-2909.111.1.3

Elmagrhi, M. H., Ntim, C. G., Malagila, J., Fosu, S., & Tunyi, A. A. (2018). Trustee diversity, governance mechanisms, capital structure and performance in top UK charities. Corporate Governance, 18(3), 478–508. https://doi.org/10.1108/CG-08-2017-0185Fiske and Stevens, 1993

Elmagrhi, Ntim, C. G., Elamer, A. A., & Zhang, Q. (2019). A study of environmental policies and regulations, governance structures, and environmental performance: The role of female directors. Business Strategy and the Environment, 28(1), 206–220. https://doi.org/10.1002/bse.2250

Fältholm, Y. and Norberg, C. (2017). Gender diversity and innovation in mining – a corpus-based discourse analysis. International Journal of Gender and Entrepreneurship, 9(4), 359-376. https://doi.org/10.1108/ijge-06-2017-0029

Fondas, N. (1997). Feminization unveiled: Management qualities in contemporary writings. Academy of Management Review, 22, 257282.

Fox, F. & Faver, C. A. (1985). Men, Women, and Publication Productivity: Patterns Among Social Work Academics. Sociological Quarterly, 26(4), 537–549. https://doi.org/10.1111/j.1533-8525.1985.tb00243.x

Galbreath, J. (2011). Are there gender-related influences on corporate sustainability? a study of women on boards of directors. Journal of Management &Amp; Organization, 17(1), 17-38. https://doi.org/10.1017/s1833367200001693

Giannarakis, Grigoris. "Corporate Governance and Financial Characteristic Effects on the Extent of Corporate Social Responsibility Disclosure." Social responsibility journal 10.4 (2014): 569–590. Web.

Gordon, T. (2009). Canada, empire and indigenous people in the americas. Socialist Studies/Études Socialistes, 2(1). https://doi.org/10.18740/s4gs38

Government of Canada. (2022). Budget 2022: Chapter 3 - A fair and responsible government. Retrieved from https://www.budget.canada.ca/2022/report-rapport/chap3-en.html#wb-cont

Grewal, J., Hauptmann, C., & Serafeim, G. (2021). Material sustainability information and stock price informativeness. *Journal of Business Ethics*, *171*(3), 513-544

Gujarati, D. N. (2003). Basic econometrics. New York, NY: McGraw-Hill.

Hanson, R., & Mullis, R. L. (1985). Age and gender differences in empathy and moral reasoning among adolescents. Child Study Journal, 15, 181188.

Heilman. M. (2001). Description and Prescription: How Gender Stereotypes Prevent Women's Ascent Up the Organizational Ladder. Journal of Social Issues, 57(4), 657–674.

Hird, M. (2015). Waste, environmental politics and dis/engaged publics. Theory Culture & Society, 34(2-3), 187-209. https://doi.org/10.1177/0263276414565717

Huse, M. & A. G. Solberg, A. (2006). Gender-related boardroom dynamics: How Scandinavian women make and can make contributions on corporate boards. Women in Management Review (Bradford, West Yorkshire, England : 1992), 21(2), 113–130.

Issa, A., & Fang, H.-X. (2019). The impact of board gender diversity on corporate social responsibility in the Arab Gulf states. Gender in Management, 34(7), 577–605. https://doi.org/10.1108/GM-07-2018-0087

Issa, M. (2023). Renewable energy and decarbonization in the canadian mining industry: opportunities and challenges. Energies, 16(19), 6967. https://doi.org/10.3390/en16196967

Khemakhem, H., Arroyo, P., & Montecinos, J. (2023). Gender diversity on board committees and ESG disclosure: evidence from Canada. *Journal of Management and Governance*, *27*(4), 1397-1422.

Krüger, P. (2009). Corporate social responsibility and the board of directors. Working Paper (Job Market Paper). Toulouse School of Economics, Toulouse, 31 May 2010.

Lau, T. L. C. (2023). Research on the influence of female director ratio on business performance -- explanation from the symbolism theory. Advances in Economics, Management and Political Sciences, 21(1), 339-345. https://doi.org/10.54254/2754-1169/21/20230272

Liu, Chelsea (2018). Are women greener? Corporate gender diversity and environmental violations. Journal of Corporate Finance (Amsterdam, Netherlands), 52, 118–142. https://doi.org/10.1016/j.jcorpfin.2018.08.004

Manita, R., Bruna, M. G., Dang, R., & Houanti, L. (2018). Board gender diversity and ESG disclosure: evidence from the USA. Journal of Applied Accounting Research, 2, 206–224.

Menicucci, E. and Paolucci, G. (2022). Board diversity and esg performance: evidence from the italian banking sector. Sustainability, 14(20), 13447. https://doi.org/10.3390/su142013447

Menicucci, E. and Paolucci, G. (2024). Women on board and esg performance: insights from the italian utilities sector. International Journal of Business and Management, 19(3), 73. https://doi.org/10.5539/ijbm.v19n3p73

Mesquita, R. F. de, Larsimont, A. D. S. M. C., Xavier, A. M., & Matos, F. R. N. (2023). Peasant women and the gendered inequalities in the industry of mining. Revista Katálysis, 26(2), 255–266. https://doi.org/10.1590/1982-0259.2023.e90496

Naveed, Voinea, C. L., Ali, Z., Rauf, F., & Fratostiteanu, C. (2021). Board Gender Diversity and Corporate Social Performance in Different Industry Groups: Evidence from China. Sustainability (Basel, Switzerland), 13(6), 3142–.

Nicolò, G., Zampone, G., Sannino, G., & Iorio, S. D. (2021). Sustainable corporate governance and non-financial disclosure in europe: does the gender diversity matter?. Journal of Applied Accounting Research, 23(1), 227-249. https://doi.org/10.1108/jaar-04-2021-0100

Nuhu, Y. and Alam, A. (2023). Board characteristics and ESG disclosure in energy industry: evidence from emerging economies. Journal of Financial Reporting and Accounting, 22(1), 7-28. https://doi.org/10.1108/jfra-02-2023-0107

Omole, F. (2024). Hybrid power systems in mining: review of implementations in canada, usa, and africa. Engineering Science & Technology Journal, 5(3), 1008-1019. https://doi.org/10.51594/estj.v5i3.954

Paolone, F. (2024). Cultural and gender diversity for esg performance towards knowledge sharing: empirical evidence from european banks. Journal of Knowledge Management, 28(11), 106-131. https://doi.org/10.1108/jkm-05-2023-0445

Pearce, T., Ford, J., Prno, J., Duerden, F., Pittman, J., Beaumier, M., … & Smit, B. (2010). Climate change and mining in canada. Mitigation and Adaptation Strategies for Global Change, 16(3), 347-368. https://doi.org/10.1007/s11027-010-9269-3

Post, Rahman, N., & Rubow, E. (2011). Green Governance: Boards of Directors' Composition and Environmental Corporate Social Responsibility. Business & Society, 50(1), 189–223.

Pucheta-Martínez, M. C., Bel-Oms, I., & Olcina-Sempere, G. (2018). The association between board gender diversity and financial reporting quality, corporate performance and corporate social responsibility disclosure: A literature review. Academia (Consejo Latinoamericano de Escuelas de Administración), 31(1), 177–194. https://doi.org/10.1108/ARLA-04-2017-0110.

Qureshi, M. A., Kirkerud, S., Theresa, K., & Ahsan, T. (2019). The impact of sustainability (environmental, social, and governance) disclosure and board diversity on firm value: the moderating role of industry sensitivity. Business Strategy and the Environment, 29(3), 1199-1214. https://doi.org/10.1002/bse.2427

Radu, C., Smaili, N., & Constantinescu, A. (2022). The impact of the board of directors on corporate social performance: a multivariate approach. *Journal of Applied Accounting Research*, *23*(5), 1135-1156.

Ribey, S., Munkittrick, K., McMaster, M., Courtenay, S., Langlois, C., Munger, S., … & Whitley, G. (2002). Development of a monitoring design for examining effects in wild fish associated with discharges from metal mines. Water Quality Research Journal, 37(1), 229-249. https://doi.org/10.2166/wqrj.2002.015

Setiani, E. (2024). Exploring the impact of board attributes on esg scores of indonesian companies. Nominal Barometer Riset Akuntansi Dan Manajemen, 13(1), 131-143. https://doi.org/10.21831/nominal.v13i1.72362

Setó-Pamies. D. (2015). The Relationship between Women Directors and Corporate Social Responsibility. Corporate Social-Responsibility and Environmental Management, 22(6), 334–345.

Shakil, M. H., Tasnia, M., & Mostafiz, I. (2020). Board gender diversity and environmental, social and governance performance of us banks: moderating role of environmental, social and corporate governance controversies. International Journal of Bank Marketing, 39(4), 661-677. https://doi.org/10.1108/ijbm-04-2020-0210