SBIR
SMALL BUSINESS INTERNATIONAL REVIEW

JOURNAL: Small Business International Review
ISSN: 2531-0046
SECTION: Research Articles
VOLUME: 8; ISSUE: 2; ELOCATION-ID: e693
DOI: https://doi.org/10.26784/sbir.v8i2.693
SUBMITTED: 2024-09-26
ACCEPTED: 2024-11-23
PUBLISHED: 2024-12-03

Evaluating ESG performance: The influence of firm size and gender diversity

Evaluación del desempeño ESG: Influencia del tamaño de la empresa y diversidad de género

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Abstract
This study examines the relationship between firm size and Environmental, Social, and Governance (ESG) scores, with a focus on the growing importance of sustainability and corporate social responsibility (CSR). Drawing on data from 4,525 U.S. companies, an Ordinary Least Squares (OLS) regression analysis reveals a significant positive association between firm size and ESG performance, suggesting that larger firms are better positioned to allocate resources toward sustainability initiatives. Furthermore, the findings indicate that board gender diversity has a positive impact on ESG scores, underscoring the importance of diverse perspectives in corporate governance. The results highlight the need for standardized ESG reporting and provide insights into how firm characteristics shape sustainability outcomes. This research offers practical guidance for corporate leaders and policymakers seeking to advance sustainability practices across organizations.

Keywords: ESG score; firm size; corporate boards; OLS; small businesses
JEL Classification: M00; M14

Resumen
Este estudio analiza la relación entre el tamaño de la empresa y las puntuaciones de los factores Ambientales, Sociales y de Gobernanza (ESG), con un enfoque en la creciente importancia de la sostenibilidad y la responsabilidad social corporativa (RSC). A partir de datos de 4.525 empresas estadounidenses, el análisis de regresión por Mínimos Cuadrados Ordinarios (MCO) revela una relación positiva y significativa entre el tamaño de la empresa y el desempeño ESG, lo que sugiere que las empresas más grandes están mejor posicionadas para destinar recursos a iniciativas de sostenibilidad. Además, los resultados indican que la diversidad de género en los consejos de administración tiene un impacto positivo en las puntuaciones ESG, resaltando la importancia de perspectivas diversas en la gobernanza corporativa. Los hallazgos destacan la necesidad de una estandarización en los informes ESG y ofrecen información sobre cómo las características de las empresas influyen en los resultados de sostenibilidad. Esta investigación proporciona orientación práctica para líderes corporativos y responsables de políticas que buscan promover prácticas sostenibles en las organizaciones.

Palabras clave: puntuación ESG; tamaño de la empresa; consejos de administración corporativos; MCO; pequeñas empresas
Clasificación JEL: M00; M14

How to cite this article
Gómez Martínez, R., Medrano-Garcia, M. L., & Amo Navas, D. (2024). Evaluating ESG performance: The influence of firm size and gender diversity. *Small Business International Review*, *8*(2), e693. https://doi.org/10.26784/sbir.v8i2.693

1. Introduction

In recent years, the importance of sustainability and corporate social responsibility (CSR) has grown significantly within the corporate sector, driven by evolving regulatory frameworks that emphasize sustainability reporting. The European Union's Non-Financial Reporting Directive (NFRD), implemented in 2014, marked a pivotal moment by requiring large corporations to disclose non-financial information relevant to stakeholders. This directive sought to enhance transparency regarding environmental, social, and governance (ESG) practices. However, the non-binding nature of the NFRD led to inconsistencies in defining and measuring ESG performance. To address these challenges, further reforms were introduced, including the Corporate Sustainability Reporting Directive (CSRD) in 2022, which aims to strengthen sustainability reporting standards and align them with the EU's broader sustainability objectives.

Research consistently demonstrates a positive correlation between robust ESG practices and improved financial performance, suggesting that organizations prioritizing sustainability may also gain competitive advantages in the marketplace. However, the existing literature presents a more nuanced picture, highlighting significant disparities in ESG ratings among evaluators. Firm size, in particular, emerges as a critical factor influencing ESG performance by shaping resource allocation and stakeholder scrutiny. Larger firms typically possess the financial capacity and expertise to develop and implement comprehensive ESG strategies, whereas smaller companies often face resource constraints that limit their sustainability initiatives.

Research also suggests that larger firms with higher revenues tend to exhibit more robust ESG practices compared to small and medium-sized enterprises (SMEs). This disparity is often attributed to the greater resources, formalized processes, and heightened scrutiny that larger firms experience from investors and regulators. Additionally, larger firms are typically subject to stricter regulations and elevated stakeholder expectations regarding transparency and sustainability, which drive the adoption of more comprehensive ESG reporting and initiatives.

Larger firms can allocate dedicated resources to ESG initiatives, whereas SMEs often lack the financial and human capital necessary to implement extensive ESG strategies. Moreover, larger firms face greater pressure from stakeholders, including investors and customers, to adopt sustainable practices. In contrast, SMEs often operate in less scrutinized environments, which may lead to a lower emphasis on formal ESG practices. Additionally, larger firms benefit from access to expertise and networks that facilitate the integration of ESG considerations, whereas SMEs may lack the same level of access or awareness.

Several studies have examined the relationship between gender diversity in leadership and ESG performance. The prevailing theory posits that diverse leadership teams are better equipped to understand and address the complexities of ESG issues. Research further suggests that companies with greater gender diversity in management often achieve superior ESG outcomes, as diverse teams contribute a wider range of perspectives and tend to adopt more innovative approaches to sustainability (Kerneïs, 2022).

Much of the existing research focuses primarily on large corporations, leaving a significant gap in understanding how SMEs adopt and implement ESG practices and how gender diversity influences this process (Nielsen & Huse, 2010; Robinson & Dechant, 1997). Consequently, there is a lack of studies examining the interplay between firm size and gender diversity in shaping ESG outcomes, particularly within the SME context.

The dataset for this study comprised 6,386 observations of board characteristics from 352 U.S. companies, sourced via BoardEx, along with 4,556 ESG ratings obtained from Asset4, spanning the years 2010 to 2022. Financial metrics were drawn from Amadeus, resulting in a total of 4,525 observations.

This paper examines the relationship between firm size and ESG scores, positing that smaller companies tend to exhibit lower ESG scores compared to their larger counterparts. Using an Ordinary Least Squares (OLS) regression model, the study analyzes various factors influencing ESG performance, including gender diversity and governance characteristics. Through this analysis, it aims to provide valuable insights into how firm size impacts ESG outcomes, offering guidance for future corporate strategies in sustainability practices. The findings are expected to enhance understanding of the dynamics shaping ESG performance and emphasize the importance of adopting comprehensive sustainability frameworks in the corporate sector.

This paper contributes to the understanding of the relationship between firm size, gender diversity, and ESG performance. It demonstrates that larger firms typically achieve higher ESG scores, driven by superior resources and greater stakeholder pressure. Additionally, the findings reveal that board gender diversity positively influences ESG scores. By employing an Ordinary Least Squares (OLS) regression model, this research offers valuable insights into these dynamics, providing guidance for the development of effective corporate sustainability strategies.

2. Theoretical framework and hypotheses

Sustainability and corporate social responsibility (CSR) have become increasingly prominent, particularly due to evolving sustainability reporting regulations. The European Union's Non-Financial Reporting Directive (NFRD), enacted in 2014, requires large corporations to disclose non-financial information relevant to investors and stakeholders. These disclosures include environmental impact, social issues, labor practices, human rights, board diversity, and anti-corruption measures (European Commission, 2014). However, the non-binding nature of the NFRD has led to inconsistencies in how ESG (Environmental, Social, and Governance) performance is defined and measured.

Agencies such as MSCI (2020), Asset4, and Sustainalytics evaluate ESG performance using distinct frameworks, often resulting in significant differences in the quality and comparability of sustainability reports (Christensen et al., 2022). To address the challenges exacerbated by the COVID-19 pandemic, the European Parliament introduced the Corporate Sustainability Reporting Directive (CSRD) in 2022 (European Parliament, 2022). The CSRD strengthens the sustainability reporting requirements established by the NFRD (EFRAG, 2022). Taking effect in 2024, the CSRD provides comprehensive coverage of key ESG aspects, aiming to improve the transparency and standardization of sustainability reporting across organizations.

This directive builds on the European Sustainability Reporting Standards (ESRS), developed by the European Financial Reporting Advisory Group (EFRAG), which outline standards across core ESG domains. These domains include pollution, climate change, biodiversity, water management, and the circular economy (Environmental); workforce issues, value chain workers, impacted communities, and consumers (Social); and corporate governance, risk management, internal controls, and ethical business conduct (Governance). Together, the CSRD and ESRS aim to standardize and enhance the quality of sustainability reporting, aligning with the EU's sustainability objectives while addressing stakeholders' demands for greater transparency and accountability.

Improved transparency in sustainability reporting is expected to enhance decision-making for investors and stakeholders, positively affecting both financial and non-financial company performance (Eccles et al., 2014; Khan et al., 2016). A substantial body of literature on the financial implications of ESG ratings indicates that approximately 90% of studies report a non-negative impact, with more than half identifying a positive correlation between ESG ratings and financial performance (Friede et al., 2015). Research by Shanaev and Ghimire (2022), Kang and Jung (2020), and Berg et al. (2022) further demonstrates that higher ESG ratings are associated with greater abnormal returns, whereas lower ratings often result in significant declines in stock value. These findings highlight the financial market's sensitivity to ESG ratings and their critical role in shaping investor perceptions.

The absence of a standardized framework among ESG evaluators diminishes the benefits of sustainability reporting, emphasizing the need for unified and transparent standards (Eccles et al., 2014). The positive correlation between ESG ratings and corporate financial performance also mediates the relationship between ESG practices and firm value (Zhou et al., 2022). Companies with higher ESG ratings tend to improve their reputation and market credibility while enhancing financial performance through risk mitigation, operational efficiencies, and stronger stakeholder relationships (Clark et al., 2014).

2.1. Firm size and ESG performance

The relationship between firm size and ESG (Environmental, Social, and Governance) scores is multifaceted and can be examined through various theoretical lenses. This framework explores the key concepts, theories, and factors that influence how firm size impacts ESG performance.

Larger firms typically possess greater financial and human resources, which facilitate investments in sustainable practices and compliance with ESG standards (Barney, 1991). These resources enable them to adopt advanced technologies, implement comprehensive ESG strategies, and hire specialized personnel dedicated to sustainability initiatives. Consequently, larger firms often achieve higher ESG scores due to their ability to allocate resources effectively toward sustainability efforts. In contrast, small businesses face greater challenges in reaching these goals, often due to resource constraints and limited capacity for ESG-related investments (Wernerfelt, 1984).

Conversely, the stakeholder theory highlights the importance of addressing the needs and concerns of all stakeholders, including shareholders, employees, customers, suppliers, and the broader community (Jones, 1995). Larger firms are typically subject to greater scrutiny from this diverse stakeholder base. Due to their higher visibility and broader operational impact, they are often compelled to adopt responsible business practices to meet stakeholder expectations. This increased pressure frequently translates into higher ESG performance, as larger firms are driven to implement more comprehensive and effective sustainability policies. Consequently, these efforts often result in improved ESG scores.

Another perspective is the legitimacy theory, which suggests that organizations strive to align their operations with the norms and values of their societal context to maintain legitimacy and stakeholder support. Larger firms, unlike smaller companies, are often viewed as representatives of their industries and are therefore held to higher standards of accountability. To preserve their legitimacy, these firms may prioritize ESG initiatives to meet societal expectations, resulting in better ESG performance (Deegan, 2002). The drive for legitimacy compels larger firms to adopt and report on ESG practices, contributing to their higher ESG scores.

Regulatory compliance and risk management frameworks play a critical role in maintaining corporate governance and minimizing financial risks. Smaller firms often have less comprehensive compliance mechanisms, making it challenging for them to meet ESG-related regulations and reporting standards. In contrast, larger companies are better equipped to absorb risks associated with environmental and social issues, enabling them to adopt proactive management strategies that improve their ESG performance. The focus on regulatory compliance and risk mitigation in larger firms often leads to higher ESG scores compared to smaller firms, which may lack the necessary resources to effectively address these areas (Hull & Rothenberg, 2008).

Economies of scale refer to the cost advantages that firms gain as their production increases. Larger firms, unlike smaller companies, often benefit from economies of scale in their sustainability initiatives, enabling them to implement more efficient and cost-effective practices (Lepoutre & Heene, 2006). For example, they may invest in renewable energy technologies or waste reduction programs that are financially inaccessible to smaller firms. By spreading costs over a larger output, larger firms can enhance their environmental performance, ultimately contributing to improved overall ESG scores.

The relationship between firm size and ESG scores is shaped by a combination of resource availability, stakeholder pressures, regulatory requirements, and risk management practices. Larger firms typically possess greater resources and are subject to heightened scrutiny, driving them to implement more effective ESG strategies. As a result, larger firms often achieve higher ESG scores compared to smaller firms, which may face resource constraints and lower visibility.

Therefore, based on previous research, we argue that smaller companies tend to have worse ESG performance than larger companies due to the following factors:

- **Financial resources**: Larger companies often possess more substantial financial resources, enabling them to implement comprehensive ESG initiatives. These resources facilitate investments in sustainable practices, employee welfare, and corporate governance, all of which contribute to higher ESG scores. In contrast, smaller companies may lack the necessary capital and expertise to enhance their ESG performance effectively.
- **Stakeholder expectations**: Investors increasingly demand transparency and accountability in ESG practices, often prioritizing larger firms perceived as more committed to sustainable development. This expectation creates competitive pressure on larger firms to maintain high ESG standards, which can lead to superior ESG scores compared to smaller firms.
- **Regulatory compliance**: Larger companies typically have more robust compliance frameworks to meet regulatory standards associated with ESG. Smaller firms, on the other hand, may struggle to comply with these regulations due to limited resources, negatively impacting their ESG ratings.

In summary, with the growing emphasis on sustainable practices in corporate governance, understanding the factors that influence ESG performance has become increasingly important. Accordingly, this study aims to evaluate whether smaller companies exhibit lower ESG scores compared to their larger counterparts.

The primary hypothesis is as follows:

H1: *Smaller companies have worse ESG scores than larger companies*.

2.2. Gender diversity on boards and ESG performance

In addition to firm size, this study examines other significant factors influencing ESG scores, including gender diversity on corporate boards. Research on gender diversity dates back to the late 20th century, with foundational studies by Siciliano (1996) and Elgart (1983) highlighting early gender imbalances. Elgart (1983) reported that, in 1980, only 2.8% of executive positions in Fortune 500 companies were held by women, estimating that achieving gender parity would take centuries. Over the years, female representation has steadily increased, reaching 30.6% of board seats in the largest listed EU companies by 2021 (Kerneïs, 2022).

One effective strategy for improving gender diversity has been the implementation of mandatory gender quotas. Since 2012, the European Commission has encouraged EU Member States to adopt measures aimed at achieving gender balance on corporate boards (European Commission, 2012). By 2021, 16 of the 27 EU countries had introduced some form of gender diversity measures. These efforts have led to significant

variations in female board representation: countries with mandatory quotas reported an average of 35% female directors, compared to 29% in countries with flexible measures and only 17% in those without any measures (Kerneïs, 2022).

In the United States, despite a balanced gender demographic overall, female representation on corporate boards was only 27.7% in 2022 (CBS, 2023). From 2013 to 2020, the U.S. operated a "comply or explain" system, requiring boards to aim for at least 30% representation for each gender among non-executive directors. However, compliance was low, with only 16 of 89 publicly traded companies meeting these standards (Lückerath-Rovers, 2021). As a result, new legislation, effective January 1, 2022, mandates that publicly traded companies appoint at least one-third male and one-third female non-executive directors. Similar requirements apply to the largest non-public firms (Dutch Government, 2021; SER, 2019).

This legislative change underscores the need for more stringent measures to address gender disparities in corporate leadership, as previous voluntary systems have proven inadequate. Research indicates that quota policies can significantly increase female representation on boards (Joecks et al., 2013; Terjesen et al., 2009). However, despite high levels of female participation in education and the workforce, barriers such as gender biases, limited professional networks, and a lack of female role models in leadership positions continue to impede women's access to board roles (Adams & Ferreira, 2009; Carter et al., 2010).

The new legislation not only establishes minimum gender representation requirements but also mandates that companies develop action plans to achieve these targets. This proactive approach seeks to create inclusive environments that promote gender diversity across organizations. Research demonstrates that diverse boards enhance decision-making, drive innovation, and improve financial performance (Nielsen & Huse, 2010; Robinson & Dechant, 1997). Additionally, board diversity has been shown to positively influence corporate social responsibility (Bear et al., 2010; Bernardi et al., 2009).

The implementation of these laws aligns with broader European efforts to enhance gender diversity on boards, building on the successful mandatory quotas introduced in countries such as Norway and France (Labelle et al., 2010; Teigen, 2015). Moreover, recent studies indicate that boards with greater female representation tend to achieve higher performance on environmental, social, and governance (ESG) metrics (Galbreath, 2018; Rao & Tilt, 2016). Enhanced gender diversity can lead to increased transparency and accountability, strengthening stakeholder relationships while bolstering corporate reputation and sustainability initiatives (Bear et al., 2010).

Based on this, the second hypothesis is formulated as follows:

H2: *Gender diversity on boards positively affects ESG scores*.

3. Sample and methodology

This chapter outlines the data sources and methods used to test the research hypotheses. It begins with a description of the sample selection process and data collection methods, followed by an explanation of the econometric model employed to analyze the hypotheses.

3.1. Sample selection and descriptive statistics

Data on board characteristics was sourced from BoardEx through Wharton Research Data Services (WRDS, 2024). The initial U.S. BoardEx dataset provided "organizational summary" data, which, after filtering for board-specific details, yielded 6,386 observations from 352 U.S. companies. ESG (Environmental, Social, and Governance) ratings were obtained from Asset4 (2024), part of Thomson Reuters, via the Erasmus Data Service Center (EDSC, 2024). Following the removal of missing values, the filtered Asset4 dataset included 4,556 observations for U.S. companies.

The data spans the period from 2010 to 2022, selected based on Asset4 availability, and includes periods both before and after the implementation of the Non-Financial Reporting Directive (NFRD). Additional variables, such as *Director Network Size* and *Nationality Mix*, are included to capture the dynamics of board composition. Financial metrics, including *Return on Assets (ROA)*, *Leverage*, and *Firm Size* (log of total assets), provide insights into operational profitability and financial risk.

The variables selected for this study are as follows:

- ***FemaleFreq***: The frequency or proportion of females on the board.
- ***NatMix***: The national mix or diversity, reflecting the number or proportion of different nationalities on the board.
- ***NoDirector***: The total number of directors on the board.
- ***Time Retirement***: The time remaining until a board member's retirement.

- ***Time Role***: The duration an individual has held their current role or position.
- ***Time Board***: The total length of time an individual has served as a board member.
- ***Time In Co***: The total time a board member has been with the company.
- ***Avg Time in Co***: The average tenure of board members within the company.
- ***No Quals***: The number of qualifications held by a board member.
- ***Network Size***: The size of a board member's professional network, potentially measured by connections, affiliations, or influence.
- ***ROA (Return on Assets)***: A financial performance metric calculated as net income divided by total assets, indicating how efficiently a company utilizes its assets to generate profit.
- ***Leverage***: The level of financial leverage or debt within a company, often expressed as the ratio of total debt to equity or assets.
- ***Firm Size***: The size of the company, measured by total revenue.

The careful selection of variables and the maintenance of data integrity are critical to ensuring the validity of this research. While the exclusion of data due to missing values limits the scope of the analysis, it enhances the robustness of the dataset and helps mitigate potential biases, aligning with empirical research standards (Allison et al., 2019; Kline, 2015). Table 1 presents the statistical summaries of the board characteristics.

Table 1. Variables and main descriptive statistics

Variable	Number of Observations	Average	Std. Error	Min.	Max.
Dependent Variable					
ESG_Score	4,225	59.455	17.398	7.629	92.264
Independent Variables					
FemaleFreq	4,225	0.885	0.172	-	1.199
NatMix	4,225	0.821	0.788	-	0.918
NoDirector	4,225	10.247	3.463	4.147	20.427
Time Retirement	4,225	10.387	3.364	1.243	23.363
Time Role	4,225	4.801	2.839	-	10.644
Time Board	4,225	6.641	2.626	-	13.919
Time In Co.	4,225	7.587	4.028	-	16.156
Avg Time In Co.	4,225	3.366	2.078	-	9.031
No Quals	4,225	2.411	0.645	1.604	4.181
Network Size	4,225	1,229,566	716,129	106,738	3,215,141
ROA	4,225	4.778	10.892	-83.845	45.752
Leverage	4,225	0.765	0.495	0.000	2.016
Firm Size	4,225	23.168	2.190	14.012	25.938

3.2. Methodology

This study employs a linear regression methodology, similar to the approaches used by Ahern and Dittmar (2012) to analyze the influence of female directors on *Tobin's Q* and by Velte (2016) to examine the effects of gender-diverse boards on *ESG Performance* in German and Austrian firms.

The dependent variable in this regression is the *ESG Score* of a company. The primary independent variables are *Firm Size*, expressed as the log of *Total Assets*, and *Gender Diversity* on the board of directors, measured as the proportion of women on the board.

The model used to test the proposed hypotheses is:

$$ESG_{i,t} = \alpha + \sum \beta_k X_{k,i,t} + e_{i,t} \quad (1)$$

Where:

- $\boldsymbol{ESG_{s,i,t}}$: Represents the ESG score s, where s=1 (environmental), s=2 (social), s=3 (governance), and s=4 (global), for company i during the period t.
- $\boldsymbol{\sigma}$: The intercept, measuring the mean value independent of the other variables in the regression.
- $\boldsymbol{\beta_k}$: The weight associated with each independent variable.
- $\boldsymbol{X_{k,i,t}}$: The value of each independent variable k for company i during the period t.
- $\boldsymbol{e_{i,t}}$: The random error term for company i in period t.

The use of linear regression as a methodological approach is well-established in the literature due to its ability to control for unobserved variables that may vary over time but remain consistent across entities (Wooldridge, 2013). This approach is particularly suited for studies exploring relationships between dependent variables, such as the link between *Gender Diversity* and *ESG Scores* (Ahern & Dittmar, 2012; Velte, 2016). Additionally, the inclusion of control variables and the logarithmic transformation of *Total Assets* enhances the robustness of the model, thereby improving the reliability and validity of the results (Greene, 2024). To validate our hypotheses, this study employs an Ordinary Least Squares (OLS) regression model, with *ESG Score* as the dependent variable and independent variables including *Firm Size*, *Gender Diversity*, *Nationality Mix*, and *Director Characteristics*.

To evaluate our hypotheses, we will focus on the parameter estimates derived from the regression analysis, particularly the coefficients associated with *Firm Size* and *Gender Diversity*. The hypotheses will be validated if the coefficients for *Firm Size* and *Gender Diversity* are positive and statistically significant ($p < 0.05$). Positive coefficients would indicate that as *Firm Size* and/or *Gender Diversity* increase, the *ESG Score* also increases. This would support the assertion that smaller companies tend to have worse *ESG Scores* and that firms with greater female representation on boards achieve better *ESG Scores*. By analyzing the regression parameters, particularly the coefficients for *Firm Size* and *Gender Diversity* (*FemaleFreq*), this study aims to provide empirical evidence to either support or refute these hypotheses. The results will contribute to a broader understanding of how *Firm Size* and *Gender Diversity* influence *ESG Performance*, offering valuable insights to guide future corporate strategies in sustainability practices.

4. Results

The results of the linear regressions are presented in Table 2.

Table 2. Linear regression results (endogenous variable: ESG score)

Variable	OLS Coefficient
FemaleFreq	39.983*** (7.334)
Nat Mix	-10.085** (3.358)
No Director	1.501*** (0.548)
Time Retirement	-0.782 (0.351)
Time Role	0.384 (0.505)
Time Board	1.950* (0.369)
Time in Co	-0.783 (0.665)
Avg Time in Co	0.346 (0.714)
No Quals	4.833** (2.924)
Network Size	-0.165*** (0.132)
ROA	0.178 (0.672)
Leverage	-1.631 (4.613)
Firm Size	2.534*** (0.602)
Constant	52.017*** (15.762)
	M2
Number of Observations	4,525
R^2	0.676
Adjusted R^2	0.61
Sum of Squared Residuals	11.579
Joint Test F	22.936
P-Value (F-Stat)	0.000***

Notes: Standard errors are shown in parentheses. Column 1 represents single-variable regressions, while Column 2 represents multiple-variable regressions, including fixed effects for year and industry (one-digit SIC code). All standard errors are clustered at the firm level. Significance levels: *p < 0.1; **p < 0.05; **p < 0.01

The Ordinary Least Squares (OLS) regression analysis provides valuable insights into the relationship between the independent variables and the *ESG Score* as the dependent variable. The variable of interest, *Firm Size*, exhibits a significant positive effect on the *ESG Score*, with a coefficient of 2.534 and a standard error of 0.602. This indicates that as *Firm Size* (measured by the logarithm of *Total Assets*) increases, the *ESG Score* also increases. This relationship is statistically significant at the 1% level ($p<0.01$), denoted by (***) in the results, underscoring a strong and reliable impact.

Similarly, *Gender Diversity* demonstrates a significant positive effect on the ESG score, with a coefficient of 39.983 ($p<0.01$, ***). This finding suggests that a higher proportion of female directors is associated with improved ESG performance. These results support the hypotheses that larger companies and those with greater gender diversity on their boards tend to achieve better ESG scores.

Moreover, the analysis of control variables reveals additional insights. *Nationality Mix* has a negative effect on the ESG score ($\beta=-10.085$) and is significant at the 5% level ($p<0.05$, **), suggesting that diverse national representation on the board may introduce challenges to achieving strong ESG performance. Similarly, *Network Size* exhibits a highly significant negative coefficient ($\beta=-0.165$, $p<0.01$, ***), indicating that larger director networks might dilute focus or reduce decision-making efficiency related to ESG initiatives.

Regarding model fit, the regression results show $R^2=0.676$ and Adjusted $R^2=0.610$, indicating that approximately 61% of the variance in *ESG scores* is explained by the model. The overall model is highly significant ($p<0.001$) as indicated by the *F*-statistic, underscoring the reliability of the findings.

In summary, these results highlight the significant roles of *Firm Size*, *Gender Diversity*, and *Network Characteristics* in shaping *ESG Outcomes*, while also illustrating the potential challenges associated with *Nationality Mix* and *Network Size*.

5. Discussion and conclusions

This study provides valuable insights into the factors influencing ESG performance, with a focus on firm size and gender diversity on corporate boards. The results of the OLS regression analysis reveal significant relationships between these firm characteristics and ESG scores, shedding light on the dynamics of corporate governance and sustainability practices.

Firm size emerges as a strong positive determinant of ESG performance. Larger firms, equipped with superior financial and human resources, are better positioned to implement and sustain robust sustainability initiatives. These findings align with stakeholder theory and legitimacy theory, which suggest that larger firms face heightened scrutiny from stakeholders. This increased accountability drives them to adopt and disclose effective ESG practices, thereby enhancing their ESG performance, strengthening their reputation, and ensuring long-term competitiveness.

Gender diversity on corporate boards also significantly and positively influences ESG scores. The findings underscore the role of diverse perspectives in fostering better decision-making and more innovative sustainability strategies. These results reinforce existing literature that advocates for gender balance as a catalyst for improved organizational outcomes and more effective corporate governance.

However, the results also highlight complexities in the relationship between diversity and ESG outcomes. A diverse nationality mix among directors negatively correlates with ESG scores, suggesting potential governance challenges, such as misaligned priorities or communication barriers. Similarly, larger director networks appear to hinder effective decision-making, reflecting the trade-offs inherent in complex governance structures. These findings suggest that while diversity is a valuable asset, it requires careful management to maximize its benefits and mitigate inefficiencies.

The study's findings align with existing research advocating for robust ESG strategies as critical to fostering financial performance and building stakeholder trust. By demonstrating strong explanatory power, the model underscores the importance of firm characteristics in shaping ESG performance, offering valuable insights for both policymakers and corporate leaders seeking to enhance sustainability practices.

The discussion in this study aligns closely with the theoretical framework by supporting and expanding upon established concepts related to sustainability, stakeholder theory, legitimacy theory, and the role of diversity in corporate governance. The findings reaffirm the importance of regulatory frameworks, such as the NFRD and CSRD, in shaping ESG outcomes. The positive relationship observed between firm size and ESG scores highlights the critical role of resource availability, consistent with the framework's emphasis on larger firms' capacity to implement comprehensive sustainability practices. Larger firms benefit from economies of scale and are better equipped to meet regulatory standards, as highlighted by Barney (1991) and Lepoutre and Heene (2006).

Additionally, the findings on firm size and ESG performance resonate with stakeholder theory, which posits that larger firms face greater scrutiny from diverse stakeholders. This increased visibility pressures larger firms to adopt more robust ESG practices to maintain stakeholder trust, aligning with the theoretical insights of Jones (1995). Furthermore, the discussion emphasizes how stakeholder expectations drive higher ESG performance in larger firms, supporting the view that firm size amplifies both visibility and accountability.

The study's findings align with legitimacy theory, which suggests that organizations must conform to societal norms to maintain legitimacy (Deegan, 2002). Larger firms, due to their heightened visibility and role as industry representatives, are incentivized to adopt ESG practices that align with societal and stakeholder expectations. Additionally, the positive correlation between board gender diversity and ESG scores underscores the critical role that diverse perspectives play in fostering effective decision-making and innovation. These results align with the framework's emphasis on the benefits of diversity, as supported by research from Galbreath (2018) and Rao and Tilt (2016).

The main contribution of this study lies in its empirical support for stakeholder theory and legitimacy theory, demonstrating how firm size and stakeholder scrutiny drive higher ESG performance. This reinforces the theoretical connection between corporate visibility, stakeholder expectations, and sustainability practices. The findings highlight the significant positive impact of firm size on ESG scores, emphasizing that larger firms benefit from superior resources, economies of scale, and more robust compliance mechanisms. These structural advantages enable larger firms to achieve better sustainability outcomes compared to smaller firms.

Additionally, the study underscores the positive correlation between gender diversity on corporate boards and ESG performance. By providing evidence that diverse perspectives enhance decision-making and corporate governance, it contributes to ongoing discussions on the importance of gender-inclusive policies in driving sustainability and corporate responsibility.

In conclusion, this study highlights several key findings. It provides compelling evidence that firm characteristics, particularly size and board composition, play a critical role in shaping ESG performance. Larger firms demonstrate superior sustainability outcomes due to their greater resources and capabilities, while gender diversity on boards emerges as a significant driver of effective ESG practices. Conversely, the negative associations with nationality mix and director network size underscore the complexity and multifaceted nature of governance dynamics.

The findings have practical implications for corporate leaders and policymakers, emphasizing the importance of fostering organizational environments that support sustainable practices. Promoting gender diversity on boards and addressing the governance challenges associated with diverse nationalities and expansive networks are essential for improving ESG outcomes and advancing corporate sustainability goals.

The limitations of this study primarily concern data availability and scope. The analysis relies on publicly available ESG scores and firm characteristics, which may not comprehensively capture all dimensions of sustainability performance. Furthermore, the dataset is constrained to specific geographic regions and industries, potentially limiting the generalizability of the findings.

Another limitation lies in the sectoral and regulatory differences. This study does not account for variations across industries or differences in regulatory environments, both of which may significantly influence the relationship between firm characteristics and ESG outcomes. These contextual factors could affect the applicability of the findings to diverse sectors and regions, underscoring the need for caution when generalizing the results.

Future research should investigate industry-specific dynamics to better understand how sectoral factors shape the relationship between firm size and ESG performance. Additionally, expanding diversity metrics to encompass dimensions such as age, educational background, and professional experience could provide deeper insights into their impact on ESG outcomes. Exploring these areas will contribute to the development of more targeted and effective strategies for advancing corporate sustainability practices.

Acknowledgements

We would like to express our gratitude to the organizers of the ICSF 2024 conference, held in Málaga (Spain), for their efforts in supporting research in this field.

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