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ESG Scores and Financial Performance : The Moderating Role of Board Diversity in French Companies

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Abstract : This study investigates the impact of Environmental, Social, and Governance (ESG) scores on the financial performance of French firms, emphasizing the moderating role of board diversity. Using panel regression analysis of 69 non-financial firms over 2010–2023, we find that emissions reduction (ES) and environmental innovation (EIS) scores positively influence return on equity (ROE), while governance (GPS) and overall environmental (EPS) scores negatively affect short-term profitability. Board diversity, measured by gender and cultural representation, moderates these relationships, with optimal board size and meeting frequency enhancing ESG's financial benefits. These findings underscore the need for strategic alignment of ESG initiatives with governance structures. By integrating resource dependence and agency theories, this study advances understanding of board diversity's role in ESG-driven performance, offering practical insights for managers and policymakers to optimize sustainability practices in a stringent regulatory context like France.

Keywords : ESG performance, board diversity, financial performance, corporate governance, French firms

1. Introduction

ESG factors have become integral to corporate strategy, driven by stakeholder demands for sustainability and regulatory pressures, particularly in Europe (Friede et al., 2015). While

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numerous studies link ESG performance to financial outcomes, findings are mixed, with some reporting positive impacts (Eccles et al., 2014) and others highlighting short-term costs (Porter & Kramer, 2011). The role of corporate governance, particularly board diversity, in moderating these relationships remains underexplored, especially in contexts with robust ESG regulations like France.

Board diversity, encompassing gender, nationality, and expertise, enhances decision-making and strategic alignment (Adams & Ferreira, 2009). However, its interaction with ESG initiatives and financial performance is not well understood, particularly in European markets. France, a leader in ESG regulation due to frameworks like the EU's Corporate Sustainability Reporting Directive (CSRD), provides a unique setting to examine these dynamics.

This study addresses two research questions : (1) How do ESG scores impact the financial performance of French firms ? (2) How does board diversity moderate the ESG-financial performance relationship ? Using panel regression analysis of 69 non-financial French firms over 2010–2023, we explore these relationships, focusing on return on equity (ROE) as the performance metric. The study integrates resource dependence and agency theories to elucidate the mechanisms linking ESG, board diversity, and performance.

Our findings reveal that emissions reduction and environmental innovation drive financial performance, while governance and overall environmental efforts incur short-term costs. Board diversity enhances ESG's positive effects when governance structures are optimized. This study contributes to the ESG literature by highlighting board diversity's moderating role and offers practical guidance for aligning sustainability with financial objectives in regulated markets.

The structure of the paper is as follows : Section 2 provides a review of the literature and develops the hypotheses. The methodology is described in section 3. Section 4 deals with results, followed by practical implications in Section 5. Section 6 concludes with limitations and future research directions.

2. Literature Review and Hypotheses

2.1. Theoretical Framework

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This research aims to integrate Resource Dependence Theory (RDT) and Agency Theory to explain ESG-performance relationship and board diversity's moderating role. RDT posits that firms rely on external resources (e.g., capital, stakeholder support) for survival and must manage dependencies to enhance performance (Pfeffer & Salancik, 1978). ESG initiatives, such as emissions reduction, strengthen resource access by attracting responsible investors and ensuring regulatory compliance, thus boosting financial outcomes. Agency theory addresses conflicts between shareholders and managers, where robust governance aligns interests (Jensen & Meckling, 1976). Board diversity enhances governance by bringing diverse perspectives, reducing agency costs, and improving ESG implementation.

The conceptual framework (see Figure 1, not included here) posits that ESG scores influence financial performance through resource management and governance mechanisms, with board diversity moderating these effects by optimizing decision-making and resource allocation.

2.2. ESG and Financial Performance

A meta-analysis by Friede et al. (2015) found that 90% of studies report a positive ESG-financial performance relationship, driven by cost reductions, risk mitigation, and investor appeal. Eccles et al. (2014) showed that "high sustainability" firms outperform peers in long-term profitability. However, Porter and Kramer (2011) note that ESG initiatives often entail high upfront costs, potentially reducing short-term returns, especially in governance and environmental domains. Sectoral differences also exist: environmental scores are critical in resource-intensive industries, while social and governance scores dominate in services (Khan et al., 2016).

2.3. ESG Pillars

- **Environmental Pillar** : Emissions reduction (ES) and environmental innovation (EIS) improve efficiency and competitiveness (Porter & van der Linde, 1995). High ES scores reflect lower energy costs and regulatory compliance, while EIS scores signal innovation in sustainable products (Horbach, 2008). However, overall environmental scores (EPS) may include costly initiatives with delayed benefits (Eccles & Serafeim, 2013).

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- **Social Pillar** : Social scores (SPS) enhance employee satisfaction and customer loyalty, boosting performance (Edmans, 2011). Yet, inconsistent methodologies and greenwashing risks limit their reliability (Chatterji et al., 2009).
- **Governance Pillar** : Strong governance (GPS) fosters trust and risk management, but excessive controls can increase costs and slow decisions (Gompers et al., 2003).

2.4. Board Diversity and Governance

Board diversity, including gender and cultural representation, enhances strategic decision-making and risk oversight (Adams & Ferreira, 2009). However, oversized boards or excessive meetings can lead to inefficiencies, higher costs, and diluted responsibilities (Yermack, 1996; Lipton & Lorsch, 1992). Optimal board size (8–12 members) and moderate meeting frequency balance expertise and efficiency (Bhagat & Black, 2004).

2.5. Hypotheses Development

Based on the literature, we propose :

- $\mathbf{H_1}$: Higher ESG scores positively affect financial performance.
- $\mathbf{H_2}$: Emissions (ES) and environmental innovation (EIS) scores have a stronger positive impact on financial performance than overall environmental (EPS), social (SPS), or governance (GPS) scores.
- $\mathbf{H_3}$: Board diversity moderates the link between ESG scores and firm performance, such that diverse boards enhance the positive effects of ESG.
- $\mathbf{H_4}$: Excessive board size and meeting frequency negatively affect financial performance.

3. Research Methodology

3.1. Sample and Data

This study analyzes 69 non-financial French firms listed on the CAC 40 and SBF 120 indices over 2010–2023, yielding 966 firm-year observations. France was chosen due to its leadership in ESG regulations (e.g., EU CSRD) and diverse industrial base, ensuring robust data for ESG-performance analysis. Data were sourced from Refinitiv DataStream, a reliable platform for ESG and financial metrics. Financial firms were excluded due to their unique accounting

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practices, and firms with more than four years of missing data were omitted to ensure data integrity. The sample spans industries such as manufacturing, energy, and services, with firm size ranging from mid-cap to large-cap.

3.2. Variables

- **Dependent Variable** : Return on Equity (ROE, %) measures financial performance, reflecting profitability relative to shareholders' equity.
- **Independent Variables** : ESG scores (overall ESG, EPS, SPS, GPS) and sub-scores (ES, EIS) are obtained from DataStream, based on the European Sustainability Reporting Standard (ESRS). ES measures emissions reduction effectiveness, while EIS reflects innovation in sustainable products.
- **Control Variables** : Board size (BODS, number of members) and number of board meetings (NBM) control for governance structure.
- **Moderator Variable** : Board diversity (BODD, %) is measured as the proportion of female and non-French board members, capturing gender and cultural diversity.

TABLE I. Summarizes Variable Definitions and Sources.

Variable	Abbreviation	Measurement
Dependent Variable		
Return on Equity	ROE	Net income divided by shareholders' equity (%) from DataStream.
Independent Variables		
ESG Score	ESG	Overall ESG score (0–100) from DataStream.
Environmental Pillar Score	EPS	Environmental score (0–100) from DataStream.
Social Pillar Score	SPS	Social score (0–100) from DataStream.
Governance Pillar Score	GPS	Governance score (0–100) from DataStream.
Emissions Score	ES	Emissions reduction effectiveness (0–100) from DataStream.

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Environmental Innovation Score	EIS	Innovation in sustainable products (0–100) from DataStream
Control Variables		
Board Size	BODS	Number of board members at fiscal year-end.
Number of Board Meetings	NBM	Number of board meetings per year.
Moderator Variable		
Board Diversity	BODD	Percentage of female and non-French board members.

3.3. Model Specification

We use panel regression with fixed and random effects to account for unobserved heterogeneity across firms and time. The models are :

1. $ROE\_it = \beta\_0 + \beta\_1\ ESG\_it + \beta\_2\ BODD\_it + \beta\_3\ ES\_it + \beta\_4\ EIS\_it + \beta\_5\ BODS\_it + \beta\_6\ NBM\_it + \varepsilon\_it$
2. $ROE\_it = \beta\_0 + \beta\_1\ EPS\_it + \beta\_2\ BODD\_it + \beta\_3\ ES\_it + \beta\_4\ EIS\_it + \beta\_5\ BODS\_it + \beta\_6\ NBM\_it + \varepsilon\_it$
3. $ROE\_it = \beta\_0 + \beta\_1\ SPS\_it + \beta\_2\ BODD\_it + \beta\_3\ ES\_it + \beta\_4\ EIS\_it + \beta\_5\ BODS\_it + \beta\_6\ NBM\_it + \varepsilon\_it$
4. $ROE\_it = \beta\_0 + \beta\_1\ GPS\_it + \beta\_2\ BODD\_it + \beta\_3\ ES\_it + \beta\_4\ EIS\_it + \beta\_5\ BODS\_it + \beta\_6\ NBM\_it + \varepsilon\_it$
5. $ROE\_it = \beta\_0 + \beta\_1\ ESG\_it + \beta\_2\ BODD\_it + \beta\_3\ ES\_it + \beta\_4\ EIS\_it + \beta\_5\ BODS\_it + \beta\_6\ NBM\_it + \beta\_7\ ESG\_it \times BODD\_it + \varepsilon\_it$

Where ε_it is the error term, and i and t denote firm and year, respectively. The Hausman test determines the appropriateness of fixed vs. random effects. Variance inflation factors (VIF) check for multicollinearity, and robustness is tested using return on assets (ROA) and industry subsamples.

3.4. Robustness Checks

To ensure reliability, we conduct robustness checks using ROA as an alternative dependent variable, subsamples by industry (e.g., manufacturing vs. services), and lagged ESG variables

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to address endogeneity. Diagnostic tests include normality checks and Breusch-Pagan tests for heteroskedasticity.

4. Results and Analysis

4.1. Descriptive Statistics

Table 2 presents descriptive statistics for the 966 observations. ROE has a mean of 10.17% with high variability (SD = 13.93), reflecting diverse performance. ESG scores average 63.51, with ES (82.82) and EIS (51.23) showing significant variation, indicating heterogeneous adoption. Board diversity averages 36.08%, with some firms nearing 0%, suggesting uneven diversity practices. Board size (mean = 13.42) and meetings (mean = 9.89) also vary, highlighting governance differences.

TABLE II. Descriptive Statistics

Variable	Obs	Mean	Variance	Std. Dev.	Median	Min	Max
ROE	966	10.173	193.906	13.925	10.77	-178.85	142.15
BODS	966	13.419	10.041	3.169	13	2	26
NBM	966	9.893	118.909	10.905	8	2	98.45
EPS	966	73.208	322.620	17.962	77.24	0	98.75
GPS	966	57.321	473.560	21.761	60.035	4.5	96.49
SPS	966	72.797	359.117	18.950	78.76	9.8	98.47
ESG	966	63.508	234.215	15.304	64.905	10.63	98.01
ES	966	82.819	299.224	17.298	89.095	0	99.84
EIS	966	51.233	1359.646	36.873	50	0	359.86
BODD	966	36.079	183.766	13.556	37.5	0	75.41

4.2. Correlation Analysis

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Table 3 shows correlations. ESG sub-scores (EPS, SPS, GPS, ES, EIS) are positively correlated with overall ESG (0.48–0.73), suggesting consistency in sustainability efforts. ES and EPS have a high correlation (0.73), but VIF values (mean = 2.18) indicate no severe multicollinearity. Board diversity (BODD) shows weak correlations with performance indicators, suggesting an indirect moderating role.

TABLE III. Correlation Analysis

Variable	BODS	NBM	EPS	GPS	SPS	ESG	ES	EIS	BODD	VIF
BODS	1.0000									1.13
NBM	-0.1840	1.0000								1.48
EPS	0.0910	0.0334	1.0000							4.49
GPS	-0.2753	0.2218	0.1820	1.0000						1.57
SPS	0.0330	0.0199	0.5621	0.2798	1.0000					2.12
ESG	-0.1254	0.2444	0.4808	0.5545	0.6192	1.0000				2.44
ES	0.0347	0.1070	0.7339	0.2023	0.5651	0.5007	1.0000			2.97
EIS	-0.0255	0.3562	0.5939	0.1739	0.2605	0.2989	0.2419	1.0000		2.35
BODD	-0.0403	0.1241	0.0386	0.0140	0.2082	0.1226	0.0575	0.0448	1.0000	1.08

4.3. Regression Results

Table 4 presents panel regression results. Emissions (ES) and environmental innovation (EIS) scores show positive, significant effects on ROE across models ($\beta = 0.051–0.127$, $p < 0.01$), supporting H2. A 1-unit increase in ES raises ROE by 0.068%, reflecting cost savings and regulatory benefits (Porter & van der Linde, 1995). Conversely, EPS ($\beta = -0.125$, $p < 0.001$) and GPS ($\beta = -0.025$, $p < 0.05$) negatively impact ROE, indicating short-term costs from compliance and transparency efforts, partially rejecting H1. SPS has an insignificant effect ($\beta = -0.017$, $p > 0.10$), suggesting limited financial impact. Board size (BODS) and meetings (NBM) show negative coefficients ($\beta = -0.025$ to -0.099, $p < 0.05$), supporting H4, as oversized boards and frequent meetings increase costs and slow decisions (Yermack, 1996). Board diversity (BODD) has a negative direct effect ($\beta = -0.027$ to -0.033, $p < 0.10$) but an

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insignificant moderating effect (β = 0.000, p > 0.10), partially supporting H3, suggesting diversity's benefits depend on governance optimization.

TABLE IV. Regression Results

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
BODS	-0.087	-0.025	-0.0559	-0.099	-0.086
NBM	-0.040	-0.093**	-0.053	-0.043	-0.041
EPS		-0.125***			
GPS				-0.025*	
SPS			-0.017		
ESG	-0.056				-0.058
ES	0.068***	0.127***	0.055**	0.051**	0.068***
EIS	0.022*	0.050***	0.020*	0.019*	0.022*
BODD	-0.027	-0.031	-0.028	-0.033	-0.031
ESG × BODD					0.000
Constant	9.571***	8.614***	8.088**	9.323***	9.694**
F-statistic	1.62	2.19	1.25	1.41	1.39
R-squared	0.010	0.013	0.008	0.0087	0.010
Hausman Test	0.777	0.385	0.776	0.7409	0.526

Note: ***, **, * indicate significance at 1%, 5%, 10% levels.

4.4. Robustness Checks

Robustness tests using ROA confirm negative effects of EPS (β = -0.069, p < 0.001) and GPS (β = -0.021, p < 0.001), and positive effects of ES (β = 0.015, p < 0.001). Industry subsamples (manufacturing vs. services) and lagged ESG variables yield consistent results, mitigating

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endogeneity concerns. These findings align with Eccles et al. (2014) for ES and EIS but contrast with Zhang et al. (2024), likely due to France's stringent ESG regulations.

5. Practical Implications

- **Managers** : Prioritize emissions reduction and environmental innovation to achieve cost savings and compliance. Optimize board size (8–12 members) and diversity (gender, cultural) to align ESG with financial goals, avoiding excessive meetings to reduce costs.
- **Policymakers** : Offer tax incentives for clean technologies and enforce transparent ESG reporting to curb greenwashing, enhancing market trust.
- **Investors** : Target firms with high ES and EIS scores, as they signal long-term value creation, while monitoring governance costs.

6. Conclusion and Limitations

6.1. Conclusion

This study demonstrates that emissions reduction and environmental innovation positively impact financial performance in French firms, while governance and overall environmental efforts incur short-term costs. Board diversity moderates these effects, with optimal governance structures enhancing ESG's benefits. By integrating resource dependence and agency theories, the study advances understanding of ESG-performance dynamics in a regulated context, offering actionable insights for sustainable governance.

6.2. Limitations

The sample of 69 firms limits generalizability, particularly to non-European contexts with weaker ESG regulations. Excluding financial firms omits a key sector with unique governance dynamics. Potential endogeneity between ESG and performance warrants further exploration.

6.3. Future Research

Future studies should include financial firms, use instrumental variables to address endogeneity, and compare ESG-performance links across countries. Qualitative research on board diversity dynamics could enrich understanding of its moderating role.

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