Exploring the relationship between environmental, social and governance, carbon emission control, and financial performance in Asean-6

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RESEARCH ARTICLE-

EXPLORING THE RELATIONSHIP BETWEEN ENVIRONMENTAL, SOCIAL AND GOVERNANCE, CARBON EMISSION CONTROL, AND FINANCIAL PERFORMANCE IN ASEAN-6

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─Abstract─

Business activities that focus on environmental, social, and governance (ESG) factors have gained increasing prominence, contributing to the dual objectives of economic growth and environmental sustainability. This article seeks to examine the relationship between ESG practices, carbon emission control, and financial performance in enterprises across Singapore, Thailand, Indonesia, Malaysia, the Philippines, and Vietnam (ASEAN-6). The study employs Generalised Method of Moments (GMM) regression, quantile regression, and the Oaxaca-Blinder decomposition method to analyse data sourced from Refinitiv Eikon for the period 2016-2022. The findings suggest that ESG practices have a positive effect on financial performance but a

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negative impact on financial stability. Additionally, the study reveals that carbon emission control positively influences financial performance, with the impact of ESG on carbon emission control varying significantly. The effect of ESG on financial performance is also found to be uneven across different contexts. Based on these results, the authors recommend policies aimed at promoting sustainable development within companies. These findings provide empirical evidence regarding the impact of ESG practices and carbon emission control on financial performance within the emerging regional context, offering valuable insights for managers to inform strategic decisions on ESG matters. Furthermore, they assist investors in evaluating ESG-related risks and opportunities to foster sustainable and responsible development.

Keywords: ASEAN-6, Carbon Emission Control, ESG, Financial Performance, Sustainable Development.

JEL Classification: C82, O16, M14

INTRODUCTION

ESG practices represent an emerging global trend that is experiencing rapid growth, including within the Association of Southeast Asian Nations (ASEAN). Regulatory reforms, international pressures, and the region's fast-expanding economy have positioned ASEAN as an increasingly recognised ESG hotspot (Setiarini et al., 2023). The sustainable development goals (SDGs) scores of most ASEAN-6 countries have consistently risen from 2016 to 2023 (Figure 1), reflecting ongoing efforts to implement the 17 UN SDGs. Similarly, ESG scores across the region have shown annual improvements between 2016 and 2022, although Singapore experienced a decline from 2016 to 2017, followed by a steady increase through to 2022 (Figure 2).

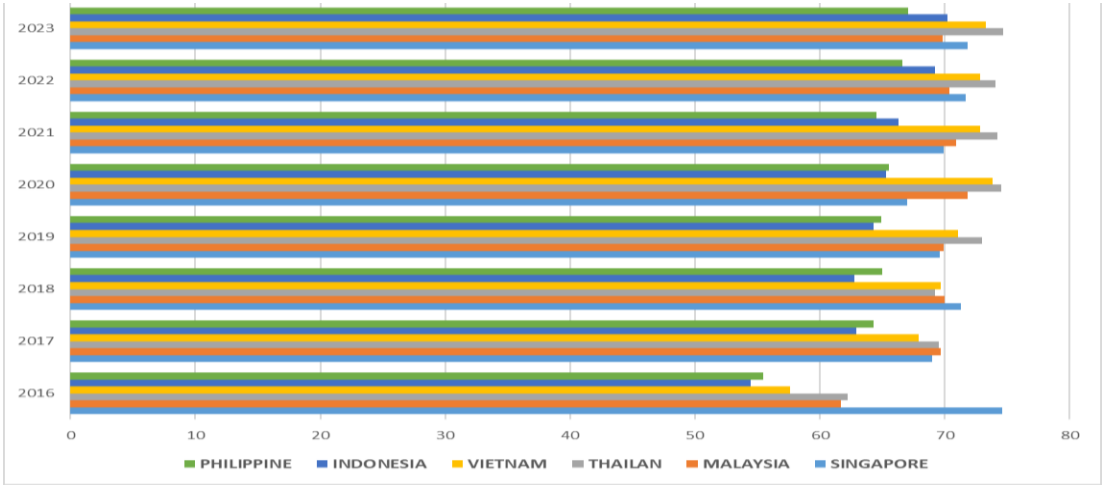

Figure 1: SDGs Score from 2016 to 2023. (Statista, 2024)

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The inflow of foreign investment into ASEAN has increased Ab Aziz et al. (2024), highlighting the region's growing appeal to investors. However, this business expansion has also led to a rise in environmental pollution (Long & Feng, 2024). ASEAN countries are particularly vulnerable to the impacts of climate change, experiencing numerous natural disasters each year, which result in significant economic and human losses. Furthermore, climate change, driven by carbon dioxide (CO2) emissions, has emerged as a global challenge, prompting investors and businesses to reassess their capital allocation strategies in support of ESG practices, thus contributing to the reshaping of financial markets (Maaloul et al., 2023). ASEAN's economies are notably open to foreign trade and investment, with this exposure to international markets and investors serving as a key driver for the adoption of ESG-related practices (Shastry, 2021).

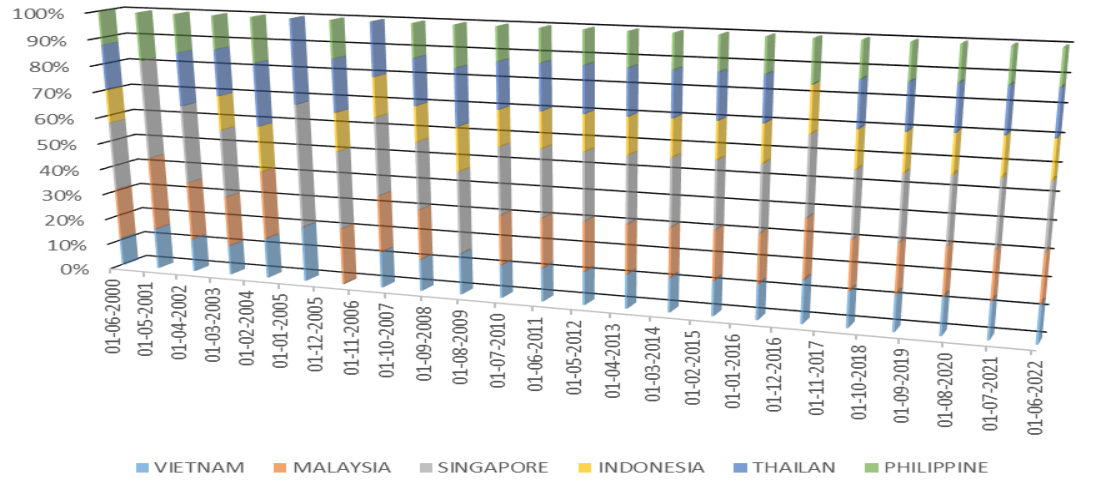

Figure 2: ESG Scores by Country from 2016 to 2023.

Research on ESG and financial performance has garnered increasing attention from scholars (Gillan et al., 2021). The diversity of methodologies and research contexts has produced a substantial body of empirical evidence, but it has also underscored the complexity and multidimensional nature of the subject. While previous studies have laid the foundation for understanding ESG's impact on financial performance, subsequent research reveals that this impact is influenced by a variety of complex factors, including cultural, institutional, and industry-specific variables. Notably, most prior studies have focused on developed countries, where robust legal systems and comprehensive databases facilitate the application of various research methods. However, directly applying these findings to emerging economies, with their distinct economic, social, and cultural contexts, requires further investigation. ESG initiatives in emerging countries are often in the early stages of development, and the legal framework remains incomplete, presenting significant challenges in measuring and evaluating the effects of ESG activities (Korzeb et al., 2024).

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Numerous studies have highlighted a positive relationship between ESG practices and financial performance (Del Gesso & Lodhi, 2024; Duque-Grisales & Aguilera-Caracuel, 2021). However, the nature of this relationship remains a subject of ongoing debate. Validating this impact in emerging markets, such as the ASEAN region, is crucial, especially as ASEAN faces pressures from domestic policies, the international financial system, and global supply chains that strongly encourage the integration of ESG into business activities. The socio-economic diversity across ASEAN countries has created a complex and varied ESG landscape, which presents both opportunities and challenges for businesses in the region. ASEAN economies are geographically, culturally, and economically diverse, with approximately 3,000 companies in the region publishing sustainability-related reports.

In contrast, companies of similar size and market capitalisation outside the region report at rates 14% and 70% higher, respectively. Over the past two decades, ASEAN economies have experienced phenomenal growth, advancing from the 11th to the 5th largest economy by 2022. With a real GDP growth rate averaging 5% per year, the region's composite GDP surpassed $3 trillion in 2021 and reached $3.5 trillion in 2022, accounting for 3.5% of global GDP. This success is the result of economic convergence, reform, and stability following the 1997 financial crisis, alongside a dynamic business sector. ASEAN is now a global hub for production, trade, and consumption, attracting significant investment and holding immense consumer market potential. Given the region's achievements over the past two decades, ASEAN is making solid strides towards becoming a dynamic, prosperous economic zone and contributing positively to global development. Therefore, there is a pressing need for more in-depth research, along with the development of suitable theoretical models and research methodologies, to provide empirical evidence on the impact of ESG practices on financial performance within the specific context of the ASEAN-6 countries.

A significant research gap exists in assessing the role of individual ESG component indicators, particularly the impact of carbon emission control on ESG's effect on financial performance. While numerous studies have explored the relationship between ESG and financial performance at both the corporate and country levels, there is limited research specifically addressing the separate impact of carbon controls within the ASEAN-6 context. Given the intensifying challenges of climate change and the increasing demand for sustainable development, it is crucial to evaluate the influence of ESG practices, particularly carbon emission control, on financial performance. The findings will offer a scientific basis for businesses, policymakers, and investors to make more informed decisions, fostering a transition towards a green and sustainable economy. Furthermore, the study will propose governance implications to encourage more effective implementation of ESG practices and carbon emission control, while also raising public awareness about the significance of sustainable development. This research will contribute to the achievement of the Sustainable Development Goals

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(SDGs), specifically addressing action against climate change and fostering economic growth. The remainder of the article is structured as follows: the second section presents the literature review, the third section outlines the research methodology, the fourth section discusses the research findings, and the fifth section offers conclusions and policy implications.

LITERATURE REVIEW

To examine the relationship between ESG, carbon emission control, and financial performance, this research is grounded in four fundamental theories: legitimacy theory, stakeholder theory, agency theory, and signalling theory. Legitimacy theory is commonly applied in ESG research to explain or predict sustainability reporting practices within management (Del Gesso & Lodhi, 2024). According to legitimacy theory, organisations voluntarily engage in ESG activities to align with societal expectations and maintain their legitimacy. Stakeholder theory is critical in this context, as it enables companies to identify and engage with the various stakeholders impacted by their ESG practices (Talan et al., 2024). Businesses are not only accountable to shareholders but also have a responsibility to be transparent and disclose relevant information to all stakeholders (Freeman & Reed, 1983). ESG factors are particularly significant for potential investors, as companies with strong ESG performance are perceived as better equipped to manage future risks and seize opportunities. Previous research supports the notion that companies adhering to ESG principles tend to experience lower operational risks and demonstrate greater sustainability, even in less favourable financial conditions (Aydoğmuş et al., 2022).

According to agency theory Shapiro (2005), ESG involvement reflects a relationship between managers and shareholders, where ESG spending may not align with shareholders' interests, as it involves direct cash flows that could reduce profits (Suttipun, 2021). This study also draws on signalling theory, which suggests that emissions disclosures send a positive signal to customers, indicating a company's commitment to environmental responsibility. Such actions aim to attract investors, enhance reputation, increase profits, boost market prices, and reduce financial constraints (Friske et al., 2023). ESG has evolved into a key term that highlights how businesses integrate environmental, social, and governance factors across their operations (Del Gesso & Lodhi, 2024). Environmental criteria assess a company's management of pollution, waste, climate change, and natural resources (Molnár et al., 2024). Social criteria evaluate the company's relationships with employees, communities, and stakeholders (Molnár et al., 2024). Governance criteria focus on shareholders, leadership, executive rights, remuneration policies, and internal controls (Del Gesso & Lodhi, 2024). ESG performance is commonly measured using ESG scores (Del Gesso & Lodhi, 2024), as shown in Table 1.

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Table 1: ESG Score Classification

Score Threshold	Percentiles	Explain	Sources
0 - 25	First Percentile	Scores within this range indicate relatively poor ESG performance and insufficient transparency in publicly reporting ESG data.	(Aabo & Giorici, 2023; D'Amato et al., 2024)
> 25 - 50	Second Percentile	Results within this threshold indicate relatively satisfactory ESG performance and a moderate level of transparency in publicly reporting ESG data.	(Aabo & Giorici, 2023; D'Amato et al., 2024)
> 50 - 75	Third Percentile	Scores in this range indicate relatively good or better ESG performance, and an average level of transparency in publicly reporting ESG data.	(Aabo & Giorici, 2023; D'Amato et al., 2024)
> 75 - 100	Fourth Percentile	Scores in this range indicate relatively excellent ESG performance and a high level of transparency in publicly reporting ESG data.	(Aabo & Giorici, 2023; D'Amato et al., 2024)

Financial performance refers to the efficiency with which capital is mobilised and utilised to maximise enterprise value. It is typically assessed across four dimensions: accounting, finance, market, and market value, using metrics such as ROA, ROE, and Tobin's Q ratio (Hussain et al., 2022). Return on assets (ROA) measures how effectively companies use assets to generate profits, serving as an accounting-based performance indicator (Del Gesso & Lodhi, 2024). Return on equity (ROE) is calculated by dividing net income by shareholders' equity (Aydoğmuş et al., 2022). Tobin's Q, a market-based performance measure, is derived by dividing the total market value by the total asset value. The financial performance of a business can be measured through either accounting or market-based metrics (Habib & Mourad, 2024).

To evaluate the advantages and limitations of each approach, this study uses accounting-based measures (ROA and ROE) alongside Tobin's Q, a market-based financial performance indicator. Based on stakeholder theory, Tobin's Q reflects investors' future expectations, which is crucial as it captures long-term value rather than short-term outcomes, particularly when assessing the effectiveness of social responsibility initiatives. According to legitimacy theory, signalling theory, resource-based theory, and stakeholder theory, businesses have an obligation to be transparent and disclose information to all stakeholders, not just shareholders. Consequently, effective ESG implementation enhances stakeholder satisfaction and financial performance, while also mitigating risks (Korzeb et al., 2024).

The growth in business activity leads to increased carbon emissions, contributing significantly to global CO2 levels. To mitigate this, it is essential to establish a comprehensive allocation mechanism linked to carbon quotas and raise the initial free allocation rate (Paraschiv & Paraschiv, 2020). Typically, CO2 emissions can be reduced through energy savings and adjustments in the fuel mix (Hapsoro & Falih, 2020). Carbon emissions data can be sourced from Refinitiv Eikon, which includes emissions

scores and total CO2 scores. These scores are designed to transparently and objectively assess ESG performance, commitment, and effectiveness across 10 key themes, based on auditable and publicly available data.

Companies engaging in ESG practices influence overall emissions (Talan et al., 2024). Data from 406 U.S. companies, analysed using the Generalised Method of Moments (GMM), indicates that their participation contributes to reduced carbon emissions and supports sustainable development (Habib & Mourad, 2024). A study of Indian companies using random effects panel regression demonstrates that measures to reduce environmental impact can create a competitive advantage and enhance operational efficiency (Wang et al., 2021). Panel regression analysis of S&P 500-listed companies reveals that those more engaged in responsible activities exhibit better financial performance. Furthermore, companies in Europe and Turkey involved in ESG activities tend to respond negatively to increases in global carbon emissions, demonstrating a strong commitment to environmental protection (Zehir & Aybars, 2020).

The financial market plays a crucial role in encouraging businesses to engage in social activities (Habib & Mourad, 2024). Transparent and comprehensive disclosure of ESG information to stakeholders is essential for attracting investors and enhancing corporate accountability (In et al., 2024). Strong ESG performance signals a company's commitment to compliance and sustainability, reducing short-termism in its development strategy (Dong et al., 2024). From the perspectives of legitimacy theory and stakeholder theory, businesses are obliged to disclose information to all stakeholders, not just shareholders. Consequently, effective ESG implementation improves stakeholder satisfaction and financial performance, while also helping to mitigate risk.

The relationship between ESG and financial performance has been extensively studied from both theoretical and empirical perspectives. Numerous studies have been conducted to validate this connection (Aabo & Giorici, 2023; Christensen et al., 2021), though some have reported negative effects (Avramov et al., 2022; Christensen et al., 2021), or found no significant relationship (Zehir & Aybars, 2020). However, the majority of empirical research has demonstrated a positive impact of ESG implementation on financial performance (Alareeni & Hamdan, 2020; Busch et al., 2022). Therefore, the relationship between ESG and financial performance varies across different contexts. Climate change, driven by CO2 emissions, has become a global challenge, prompting investors and businesses to reallocate capital in support of ESG and reshape financial markets (Avramov et al., 2022). In response, governments worldwide have adopted stringent policies and action plans to reduce CO2 emissions and facilitate a low-carbon transition. Businesses play a crucial role in reducing carbon emissions, particularly through the energy used in the production of goods and services. Government and policy pressures have driven corporations to enhance their

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environmental performance and reduce carbon emissions (Alam et al., 2019).

Companies with superior environmental performance are theoretically expected to have a competitive advantage over those lacking environmental policies and initiatives (Christensen et al., 2021). However, proponents of neoclassical economic theory contend that improving environmental efficiency increases costs, which may hinder financial performance (Aydoğmuş et al., 2022). The contrasting views presented by different theories have spurred further empirical research in this area. Some studies have indicated a positive impact of environmental performance on corporate value (Alareeni & Hamdan, 2020), while others have highlighted a positive relationship between carbon emission control and financial performance (Aydoğmuş et al., 2022). Conversely, other research suggests that companies with lower carbon emissions exhibit better financial performance (Busch et al., 2022). Reducing carbon emissions can benefit businesses by lowering energy costs, enhancing brand image, and attracting environmentally-conscious customers. Moreover, studies examining the relationship between carbon emission reduction and financial efficiency yield varied results, influenced by factors such as industry, geography, and research methodology (Gillan et al., 2021; Korzeb et al., 2024). Despite the extensive theoretical and empirical research, the relationship between environmental performance and financial efficiency remains inconclusive (Partridge & Medda, 2020). However, in terms of sustainable development strategies, ethical businesses are likely to yield long-term benefits. Based on this, the following hypothesis is proposed,

H1: *Carbon emission control has an impact on financial performance.*

Environmental legislation can increase costs, as companies may be required to disclose more information to the government and pay additional taxes on excess emissions. Consequently, the introduction of new carbon regulations may reduce the value of companies directly affected by these regulations, compared to those that are not impacted. Representative theory offers a different perspective on the relationship between ESG and financial performance. Managers may be reluctant to prioritise ESG activities, fearing that they could reduce profits and affect shareholder interests. However, with increasing investor interest in ESG factors, managers are increasingly compelled to balance short-term benefits with long-term business sustainability (Del Gesso & Lodhi, 2024). Additionally, pressure from stakeholders such as customers, suppliers, local communities, and governments also influences a company's decision to adopt sustainable practices (Talan et al., 2024). As businesses face rising expectations from stakeholders regarding social and environmental responsibility, those with varying levels of financial performance may respond differently to the impact of ESG and carbon emission control.

The impact of ESG regulations and carbon emission controls on financial performance is not always negative. For businesses with strong financial performance, investing in

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sustainable practices can yield numerous long-term benefits, such as enhancing brand image and attracting ESG-conscious customers and investors. In contrast, businesses with lower financial performance may face challenges in implementing these initiatives due to limited resources. Consequently, each business will adopt its own strategy for ESG practices and carbon control policies, tailored to its specific characteristics. Based on this, the article proposes the following hypothesis,

H2: *The impact of carbon emission control on financial performance varies by level of financial performance.*

With rapid population and economic growth, ASEAN has become one of the regions significantly contributing to global climate change. The medium-term climate ambitions of ASEAN countries, particularly the goal of achieving net-zero emissions, have created urgent demands for businesses in the region. In this context, companies will need to adapt their business strategies to meet carbon emission reduction targets. However, the capacity and motivation of businesses to implement carbon emission control measures may vary depending on their size, industry, and financial performance. Firms with higher financial efficiency typically have greater resources to invest in clean technologies and innovate production processes (Dong et al., 2024). In contrast, small and medium-sized enterprises may struggle to access the necessary financial resources and technologies (Alareeni & Hamdan, 2020). Furthermore, pressure from investors, customers, and partners can influence decisions to adopt sustainable practices (Talan et al., 2024). Investors, increasingly focused on ESG factors, are more inclined to invest in businesses demonstrating a strong commitment to sustainable development. Therefore, to attract investment and enhance their reputation, businesses will be motivated to improve their ESG performance (Wang et al., 2021). Based on this, the article proposes the following hypothesis:

H3: *Carbon emission control plays a role in moderating the effect of ESG implementation on financial performance.*

This study focuses on evaluating the impact of implementing social responsibility through ESG practices on financial performance. The findings offer empirical evidence regarding the effect of ESG and carbon emission control on corporate financial performance in emerging regions. Drawing on the theoretical foundations and the results discussed above, the article proposes a theoretical research framework, as illustrated in Figure 3.

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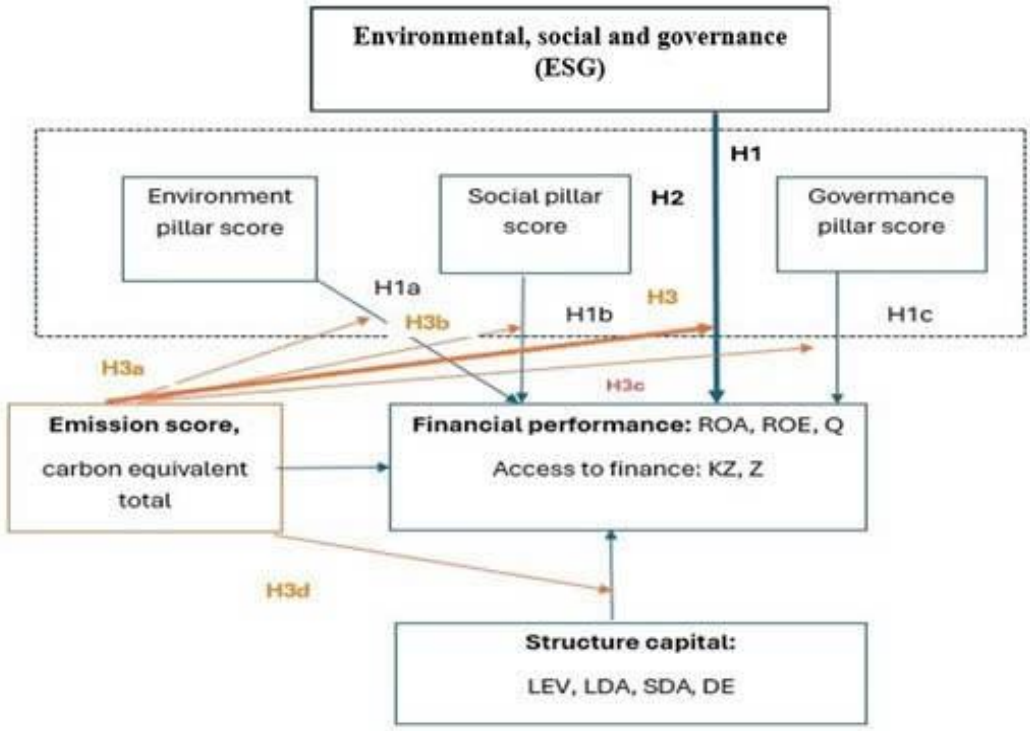

Figure 3: Theoretical Research Framework

METHODOLOGY

This article aims to explore the relationship between ESG, carbon emission control, and financial performance in the ASEAN-6 region. The paper proposes to test three research models, as outlined below:

$$CFP_{it} = \delta_1 + \sum_{i=1}^{k} \delta_j X_{jit} + u_{it} \quad (1)$$

Where CFP_{it} is a dependent variable, these variables include ROA, ROE, Q, KZ, Z, which represents financial performance i in the t year; δi is the regression coefficient; X_{jit} is a set of independent variables. These variables include ESG, ESGCon, CSRStra, CSRCS, CSR Report, Emission, Carbon Total, ENV, SOC, GOV, CSR Audit, CSR Committee.

$$CFP_{it} = \beta_0^{(\rho)} + \sum_{i=1}^{k} \beta_j^{(\rho)} X_{jit} + \sum_{l=1}^{m} \alpha_l^{(\rho)} Z_{lit} + u_{it} \quad (2)$$

ρ is the percentile of the dependent variable (percentiles 10, 25, 50, 75, and 90). Corresponding to the 10th percentile of the dependent variable, this threshold represents a point where 90% of the dependent variable values exceed it, and 10% of the values fall below it. At this percentile, the low value of ROA, ROE, Q, and Z is expressed, for

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KZ, the lower the value, the less financial constraints. $\beta_j^{(\rho)}$ denoting the coefficient of the impact of the independent variable, controlling the dependent variable at the percentile ρ, and β can vary through different percentile values. X_{jit} is a set of independent variables; Z_{jit} are control variable.

$$FP_{it} = \delta_1 + \sum_{i=1}^{k} \delta_j X_{jit} + \sum_{l=1}^{m} \lambda_l Z_{lit} + u_{it} \quad (3)$$

λ_l is a dummy variable, denoting carbon emission control, getting a value of 0 if the emission score value is higher than the median and vice versa. The description of the measurement of the variables in the research model is provided in Appendix 1.

This article utilises data from Refinitiv Eikon, covering the period from 2016 to 2022 for companies in the ASEAN-6 countries. The data was selected for several key reasons. Firstly, Refinitiv Eikon is a widely used tool by investors and financial professionals, a key audience interested in the relationship between ESG and financial performance. Secondly, Refinitiv collects data from publicly available sources such as company websites, annual reports, and other accessible platforms, as well as directly from companies. The data is audited, standardised, and ESG scores are calculated accordingly. Thirdly, this dataset was developed with future exploration in mind, using a weighted balanced method, ensuring thorough analysis without significant changes over time. These factors contribute to the consistency, reliability, and objectivity of the data (Alareeni & Hamdan, 2020).

The six countries selected for the study sample are Singapore, Thailand, Indonesia, Malaysia, the Philippines, and Vietnam. These countries were chosen due to their high growth rates in the region and the establishment or clear roadmap for carbon credit markets. Additionally, regulations and taxes on carbon emissions have been enacted in these countries. Vietnam has issued a decision to achieve zero greenhouse gas emissions by 2050, outlining a roadmap for the implementation of the Emissions Trading System (ETS). The buying and selling of greenhouse gas emission quotas and carbon credits will occur on the carbon credit exchange. Malaysia is considering the use of a domestic ETS and carbon taxes to meet long-term Nationally Determined Contributions and decarbonisation targets. The country also issued National Guidelines on the International Voluntary Carbon Market Mechanism to guide Malaysian entities engaged in carbon market activities, with minimum reporting requirements and project design, accounting, and verification protocols. In December 2022, Malaysia's stock exchange launched the Bursa Carbon Exchange, the world's first Sharia-compliant voluntary carbon market platform, which held its first carbon credit auction in 2023.

Indonesia is working towards a mandatory domestic ETS for the power sector as part of its policy to promote sustainable development with a low carbon footprint. Thailand has initiated a voluntary ETS in two phases and announced rules and guidelines for

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trading carbon credits in 2022, launching a carbon credit trading platform. Singapore applies a carbon tax to all establishments with annual direct GHG emissions of 25 ktCO2e or more, with no exemptions. Non-financial data, including annual metrics on ESG scores, environmental pillar scores, social pillar scores, governance, and controversy ESG scores, were collected for each company within the set time frame. The ESG score represents an overall calculation, incorporating the environmental, social, and governance pillar scores, as well as the controversial ESG score. This composite score offers a comprehensive overview of a company's performance from an ESG perspective.

The environmental, social, and governance pillar scores are calculated by Refinitiv using over 300 individual data points, including emissions ratings, gender pay equity, and board diversity. The controversial ESG score reflects the negative press received by a company, with 23 key incidents representing negative social impacts of poor performance in a given year. This score serves as a reliable indicator for investors. Refinitiv's data is regarded as one of the least biased in the industry, ensuring that no single metric is disproportionately weighted, unlike some ESG rating agencies that may emphasise certain areas, such as environmental factors. Additionally, the study utilises World Bank data on GDP growth and inflation as the foundation for statistical analysis. Data from sustainability reports, the IPCC, Statista, OECD, and the Environmental Performance Index (EPI) were also integrated into the research. All data was provided with the support of the Ho Chi Minh City University of Economics Data Centre.

This study employs panel data regression to assess the impact of independent variables on dependent variables. To validate the model, the study uses three regression methods: Pooled Ordinary Least Squares (OLS), Fixed Effects Model (FEM), and Random Effects Model (REM). The Generalised Method of Moments (GMM) is utilised to address the potential endogeneity issues in the model [34]. To examine the influence of variables across different percentiles of the dependent variable, percentile regression is applied at the 10th, 25th, 50th, 75th, and 90th percentiles [35]. Additionally, the Oaxaca–Blinder decomposition method is employed to identify which factors significantly contribute to the differences in the mean value of the dependent variable between groups. Data processing is conducted using Stata 15.0 statistical software.

RESEARCH RESULTS

Statistical Description

Table 2 shows that the data is right-skewed. The maximum and minimum values for ROA are 0.85 and -0.67, respectively, with a rightward skew. ROE has a maximum value of 4.9 and a minimum of -0.33. The Q variable ranges from a minimum of -1.91 to a maximum of 3.11, also with a rightward skew. The KZ variable ranges from -3.3 to -0.56, showing a rightward skew, while the Z variable ranges from -1.01 to 3.29 with

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a similar skew.

Table 2: Statistical Description

Variable	Obs	Mean	Std. Dev.	Min	Max	Skewness	Kurtosis
ROA	1,451	0.06	0.08	-0.67	0.85	3.40	25.820
ROE	1,462	0.16	0.31	-0.33	4.90	4.60	7.300
Z	1,339	4.09	1.37	-1.01	3.29	2.39	3.395
KZ	1,402	7.50	0.23	-3.30	0.56	16.60	3.170
Q	1,598	2.08	2.80	-1.91	3.11	5.63	40.520
ESG	1,533	5.38	1.82	6.40	91.80	-0.38	2.800
ESGCon	1,533	9.62	1.36	5.55	100.00	-4.01	16.300
CSRStra	1,533	5.32	3.11	0.00	9.95	-0.24	1.807
CSRCS	1,533	4.65	2.79	0.00	8.65	-0.91	2.190
CSR Report	1,533	4.97	1.83	0.00	75.00	-2.13	6.238
Emission	1,533	5.33	2.87	0.00	9.91	-0.33	20.190
Carbon Total	1,072	5.89	9.10	83.00	2.90E	3.06	9.800
Envir~nScore	1,538	4.72	2.42	0.00	97.30	-0.16	2.380
SOC	1,538	5.88	0.20	2.42	97.51	-0.37	2.660
GOV	1,538	5.26	2.25	1.45	98.70	-0.08	1.995
CSRAudit	878	0.57	0.50	0.00	1.00	-0.29	0.108
CSRCommittee	1,538	0.75	0.43	0.00	1.00	-1.14	0.230
SDA	1,468	0.20	0.18	0.00	0.98	1.60	8.470
LEV	1,468	0.28	0.19	0.00	0.91	0.45	2.700
LDA	1,530	0.69	0.26	0.00	1.00	-0.11	3.480
DE	1,598	1.04	3.69	-1.08	1.22	2.68	8.400

Results of Regression Analysis

Results of Regression Analysis by GMM Method

This study uses panel data and applies Pool OLS, REM, and FEM regression methods. The Breusch and Pagan Lagrangian test yielded a p-value < 0.05, rejecting the H0 hypothesis and confirming that the appropriate model is not Pool OLS. The Hausman test was then used to choose between FEM and REM, with the FEM model being selected. To check for multicollinearity, the VIF was applied. If multicollinearity or heteroscedasticity was detected, the GMM was used to address the issues. The GMM regression analysis results (Table 3) indicate that ESG scores positively impact financial performance (ROA, ROE, Q), confirming hypothesis H1. This supports the stakeholder theory, which suggests that ESG implementation builds shareholder trust and adds long-term value. These findings align with previous research (Ikram et al., 2020; Yang et al., 2024). Additionally, ESG implementation is shown to reduce financial stability risks (Z), consistent with prior studies (Butt et al., 2023; Habib & Mourad, 2024). Companies adhering to ESG principles experience lower operational risks, greater sustainability, and reduced information asymmetry, which enhances future cash flow, lowers equity costs, and mitigates corporate risks (D, 2020; Li et al., 2024).

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Table 3: GMM Method with ROA

	ROA	ROE	Q	Z	KZ
ESG	0.00989***	0.0157*	0.207***	0.119*	0.316
	(3.37)	(2.13)	(5.31)	(2.57)	(0.84)
ESGCon	-0.000230	-0.00149	0.0183***	0.0306***	-0.0867*
	(-0.51)	(-1.02)	(3.50)	(5.02)	(-2.03)
CSRStra	0.00216***	0.0131***	0.0216***	0.00811	0.0734*
	(3.83)	(8.82)	(4.03)	(1.18)	(2.03)
CSRCS	-0.000776	-0.00477	-0.0278***	-0.0145	-0.0412
	(-0.80)	(-1.86)	(-3.68)	(-1.28)	(-0.56)
CSRReport	0.00113	0.00173	0.0330**	0.0602***	0.229**
	(1.18)	(0.58)	(2.90)	(4.03)	(2.96)
Emission	0.00220*	-0.00474*	-0.0100*	0.0186**	0.0381
	(2.45)	(-2.25)	(-2.22)	(3.01)	(0.57)
Carbon Total	-6.61e-11	-4.80e-10***	1.06e-09*	-1.07e-09	1.20e-09
	(-1.48)	(-4.50)	(2.48)	(-1.60)	(0.39)
ENV	-0.00488***	-0.0139***	-0.0324**	-0.0342*	-0.0361
	(-3.86)	(-4.64)	(-2.61)	(-2.04)	(-0.29)
SOC	-0.00451**	0.00415	-0.0813***	-0.0552*	-0.210
	(-2.85)	(0.95)	(-4.78)	(-2.43)	(-1.11)
GOV	-0.00381***	-0.00634*	-0.0994***	-0.0266	-0.183
	(-3.90)	(-2.42)	(-7.44)	(-1.85)	(-1.69)
CSRAudit	-0.0392	-0.255**	-0.528	-0.566*	-4.880*
	(-1.33)	(-3.01)	(-1.86)	(-2.03)	(-2.49)
CSRCommittee	-0.0108	0.0993	1.933***	-0.284	7.321
	(-0.16)	(0.67)	(3.88)	(-0.42)	(1.75)
SDA	0.0329	-0.0671	1.106***	-2.895***	9.017***
	(0.98)	(-1.03)	(4.15)	(-4.23)	(3.96)
LEV	-0.124	-0.548***	-2.779***	-11.08***	0.229
	(-1.87)	(-3.49)	(-4.52)	(-14.66)	(0.05)
LDA	-0.00351	-0.0580	-2.455***	-0.340	-7.621*
	(-0.08)	(-0.49)	(-7.13)	(-0.58)	(-2.51)
DE	0.00336*	0.0914***	0.0823	0.0817*	1.768***
	(2.10)	(20.31)	(1.89)	(2.56)	(4.02)
N	731	664	599	479	556
Statistics t in parentheses					
* p<0.05, ** p<0.01, *** p<0.001					

Source: Calculation Results using Stata Software

Furthermore, ESGCon negatively impacts KZ, indicating that addressing arising issues enhances financial performance and reduces financial constraints. Companies actively addressing environmental and social concerns tend to attract socially responsible investors (Avramov et al., 2022). Additionally, businesses effectively managing environmental risks are more likely to access capital (Setiarini et al., 2023). The relationship between ESGCon and access to finance demonstrates a one-way effect, as investors expect businesses to manage financial and operational risks well, particularly

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in a volatile business environment.

The CSR Strategy Score (CSRStra) demonstrates that strategies related to ESG implementation positively influence financial performance (ROA, ROE, Q). According to stakeholder theory, a company's success relies on the collaboration of its stakeholders, who provide both tangible and intangible resources crucial to the company's survival. These resources may include financial support (shareholders), operating environment and public services (government agencies), and the workforce (employees). Consequently, companies are responsible for providing comprehensive information about their business activities to stakeholders, rather than merely reporting to owners (Freeman & Reed, 1983). Effective ESG management not only enhances stakeholder satisfaction but also improves financial performance. By integrating ESG strategies into corporate development plans, businesses can ethically and responsibly guide their practices. Over time, these practices become embedded in the corporate culture, promoting persistent, ethical, and responsible behaviour. This, in turn, enhances the company's market reputation and reliability, facilitating better access to finance. Conversely, CSRCS has an inverse and statistically significant impact on Q.

CSRReport positively impacts financial performance (Q), reduces financial stability risk (Z), and mitigates financial restriction risk (KZ). Signal theory suggests that voluntary disclosure reflects a business's social responsibility and desire to build a positive image, attracting ESG-focused investors and improving reputation, which in turn opens new business opportunities and reduces financial risks. The findings also confirm that carbon emission reduction positively affects financial efficiency, consistent with studies linking environmental performance (EP) and financial success (Afeef & S. Jan Kakakhel, 2022; Clark & Dixon, 2024). A statistically significant relationship shows that companies with lower emissions tend to perform better financially. However, CarbonTotal negatively affects ROE, supporting prior research that suggests carbon emissions control may lead to lower revenue growth and profitability (Long & Feng, 2024; Oyewo, 2023). Furthermore, some studies highlight the complex ways in which reducing carbon footprints can impact financial performance (Treepongkaruna et al., 2024).

Environmental Score (ENV), Social Score (SOC), and Governance Score (GOV) negatively impact financial performance (ROA, ROE, Q). Some studies suggest an inverse correlation between environmental performance and financial efficiency [26]. This aligns with findings that environmental issues increase management costs and reduce efficiency. Companies with stronger governance may experience lower short-term profits but potentially higher long-term returns by building a strong reputation. These investments, while yielding lower immediate returns, can be more profitable over time, explaining the negative correlation between environmental indicators and ROE. The negative relationship between GOV and ROE may result from a trade-off between

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compliance with governance policies and short-term profits. These findings deepen our understanding of the complex relationship between governance and financial outcomes, emphasising the importance of governance for investors, policymakers, and practitioners. Previous research also highlights how cultural and institutional differences globally affect the effectiveness of governance practices in enhancing corporate performance.

The negative relationship between the Social Score (SOC) and ROE suggests that companies with higher social performance scores tend to have lower ROE. This may be because companies focusing more on ESG initiatives are less focused on maximising short-term profits, often investing in long-term projects that yield lower immediate returns. The results highlight a potential trade-off between ESG commitments and profitability. While short-term profits may be lower, companies with strong ESG reputations may be more profitable in the long run. These insights reveal the impact of social factors and other financial variables on profitability at different percentile levels.

The CSR Audit has a negative and statistically significant impact on ROE, financial stability (Z), and financial constraints (KZ), while the CSR committee has a similar effect on Q. Short-term debt (SDA) negatively affects KZ and ROE, while long-term debt (LDA) negatively impacts Q and KZ. The debt-to-equity (DE) ratio impacts ROA, ROE, Z, and KZ in the same direction. Additionally, the debt ratio (LEV) negatively affects ROE, Q, and Z. These results reinforce the finding that financial leverage (LEV) has a negative relationship with financial performance indicators such as Q, ROA, and ROE. Excessive use of leverage can reduce firm performance, consistent with previous studies showing an inverse relationship between capital structure and financial performance (Alareeni & Hamdan, 2020; Hapsoro & Falih, 2020; Korzeb et al., 2024).

The regression results provide evidence of a significant co-directional relationship between financial structure, as measured by ROA and ROE. The findings highlight the positive contribution of capital restructuring decisions to financial performance, particularly with respect to short-term debt. However, long-term debt is found to have an inverse and statistically insignificant effect on both ROA and ROE. These results support the hierarchical order theory, which presents empirical evidence of an inverse relationship between corporate profits and capital structure {Alareeni, 2020 #30}. Previous studies have indicated a negative correlation between ROA, ROE, and financial leverage, while observing a positive correlation between Tobin's Q and financial leverage. The interplay between ESG, corporate value, and profitability presents numerous promising avenues for future research.

Results of Quantile Regression and Oaxaca – Blinder Decomposition Method

The results of the Oaxaca–Blinder decomposition method and quantile regression for percentiles 10, 25, 50, 75, and 90 are presented in Tables A2 to A7 in the appendix.

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Analysis of these percentiles reveals that the impact of the explanatory variables on financial performance varies at different levels. The findings highlight significant differences in the effects at each level of financial performance. The results support hypothesis H2, indicating that the influence of ESG and carbon emission control differs significantly across varying levels of financial performance. This suggests that businesses at different stages of development respond differently to the implementation of ESG activities. Furthermore, the results show a disparity in the role of carbon emission control within the ESG-financial performance relationship. The analysis of differences due to characteristic effects further explores the unexplained variance arising from substantial differences between the explanatory variables in the model. An investigation into the differences between businesses with varying levels of emissions shows that the impact of ESG on financial performance is uneven. Specifically, for companies with high emission control indicators, the positive impact of ESG on financial performance is more pronounced compared to those with lower emission indicators. This demonstrates that reducing waste and adopting ESG practices can yield significant economic benefits for businesses that already possess a sustainable foundation.

This paper employs the Oaxaca-Blinder decomposition method to distinguish between the explanatory and unexplained components of the set of explanatory variables, assessing their impact on the dependent variable. The aim of this method is to examine the detailed effect of ESG on financial performance, considering the moderating role of the emission score. The findings indicate that the financial structure of businesses plays a crucial role in explaining this variance. Specifically, the financial structure of businesses with high and low emission indices exerts different impacts on financial performance. This highlights the importance of capital structure optimisation in enhancing financial performance, particularly for companies implementing ESG activities. These results provide confirmation for hypothesis H3.

The results raise important questions regarding the optimal level of ESG investment and the strategy of employing an appropriate capital structure to support emission reduction activities and enhance financial performance. Understanding the relationship between ESG investment, capital structure, and financial performance is essential for businesses to make more informed investment decisions while promoting sustainable development. Consequently, future research should focus on determining the ideal level of ESG investment, devising strategies for utilising a suitable capital structure to support ESG initiatives, and exploring effective measures for reducing and controlling carbon emissions.

CONCLUSION AND GOVERNANCE IMPLICATIONS

This study examines the impact of ESG and carbon emission control on financial performance in the ASEAN6 region. The findings indicate that the implementation of

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ESG positively affects financial performance (ROA, ROE, Q) and reduces the risk of financial instability (Z-score). Additionally, efforts to reduce emissions also contribute positively to corporate financial performance. However, the impact of the environmental, social, and governance (E, S, and G) dimensions on financial performance varies, highlighting the complexity and diversity of the relationship between ESG and financial outcomes. Strengthening ESG practices is a long-term process that requires the collective effort of the entire organisation. Companies must shift their mindset regarding business objectives and develop comprehensive ESG strategies, focusing on minimising environmental impacts, enhancing working conditions, improving employee welfare, and ensuring greater transparency in corporate governance. Such efforts not only help attract investors, customers, and talent but also reduce legal risks and long-term costs. Moreover, businesses should capitalise on opportunities from free trade agreements to enhance their "green" brand, improve competitiveness, and increase their value within the global supply chain.

Businesses should collaborate to share experiences and promote sustainable development, investing in carbon reduction, process optimisation, and waste elimination to enhance productivity and product quality. The Corporate Social Responsibility Committee must oversee ESG activities, ensuring responsible operations. Companies should align their ESG strategy with business goals, engage stakeholders, and provide transparent reporting. Integrating ESG is essential for long-term success and sustainability. Staying informed on trends is key to remaining competitive and positively impacting society. ESG drives the green economy transition through carbon reduction, renewable energy investment, and social justice initiatives. Strong governance ensures transparency, reduces risks, and builds stakeholder trust, while regular ESG reporting meets market expectations and promotes long-term business value.

LIMITATIONS OF THE STUDY

Despite its contributions, this article has several limitations that open avenues for future research. Firstly, the data sample, focused on enterprises within the ASEAN6 region, is limited in size as it exclusively includes companies with ESG scores. Secondly, while the study demonstrates the impact of ESG and carbon emission control on financial performance, other factors may also play a significant role in explaining financial outcomes. Furthermore, due to data constraints, the study was unable to test the impact using alternative methodologies, which could offer a more comprehensive understanding of the relationships from different perspectives.

DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors.

DATA AVAILABILITY

The data are available from the authors upon reasonable request (phuongdnt@ueh.edu.vn)

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AUTHOR CONTRIBUTIONS STATEMENT

All authors contributed equally to this work, the contributions of each author are as follows:

Duong Nguyen Thanh Phuong is responsible for the following contents: Conceptualization, Software, Data Curation, Resources, Writing – Review & Editing, Funding Acquisition.

Tang My Sang is responsible for the following contents: Visualization, Methodology, Investigation, Formal Analysis, Writing – Original Draft.

Nguyen Quoc Anh is responsible for the following contents: Conceptualization, Investigation, Resources, Supervision, Project Administration, Funding Acquisition.

Ho Viet Tien is responsible for the following contents: Conceptualization, Investigation, Resources, Supervision, Project Administration, Funding Acquisition.

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APPENDIX

Table A1: Variables description

Variable name	Explain	Source
Q	$= \frac{Equity\ market\ price\ +\ Total\ Debt}{Total\ asset}$	Financial Statement
ROA	Return on Total Assets	Refinitiv
ROE	Return on Equity	Refinitiv
KZ	Financial constraints. The higher the KZ variable, the more financial constraints the enterprise has.	
Z	Financial exhaustion. The higher the value of Z, the less risk of financial exhaustion. Z-Score: Enterprises with a low Z-score show financial limitations.	Refinitiv
ESG	Integrated ESG Score	Refinitiv
ESGCon	The problematic ESG score is calculated based on 23 controversial topic ESGs. During the year, if a scandal occurs, the company involved will be fined, and this affects their overall ESGC score and rating. The default value of all problematic measures is 0 – All recent issues are counted in the most recent closed fiscal year and none are counted twice – Controversial issues are benchmarked by industry group – Non-problematic companies receive a score of 100.	Refinitiv
ENV	Environmental score	Refinitiv
SOC	Social score	Refinitiv
GOV	Governent Score	Refinitiv
CSRStra	The CSR strategy score reflects a company's activities in communicating that it integrates economic, social, and environmental aspects into its day-to-day decision-making process.	Refinitiv
CSRC	Does the company have a CSR committee or team? - The board of directors or senior management is responsible for making decisions on CSR strategies.	Refinitiv
CSRS	Does the company publish its own CSR/Sustainability report or publish part of it in its annual report on CSR/ Sustainability??	Refinitiv
CSRAudit	Does the company have an external auditor for CSR/Sustainability reporting? - within the scope of the external audit data review against the company's CSR data or supplementary financial statements - audit review in the form of an audit conducted by a university, academic, expert, external board or research center - web-based CSR externally audited report - integrated annual report has External audit reports on environmental and social data. Dummy varibale, TRUE: 0. FALSE: 1	Refinitiv
CSRSCommittee	Does the company have a CSR committee or team? Dummy varibale, TRUE: 0. FALSE: 1	Refinitiv
Emissions	The Emissions Score measures the company's commitment and effectiveness in reducing emissions to the environment during production and operations. The higher the score, the better the effectiveness of emission control.	Refinitiv
Total carbon	CO2 emissions data is collected from their most recent fiscal year (FY0) and compared to their CO2 emissions in the previous three years (FY-3). Refinitiv follows the greenhouse gas (GHG) protocol for all emission classifications by type. Therefore, Total Emissions CO2 = direct (scope 1) + indirect (scope 2).	Refinitiv

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Variable name	Explain	Source
LEV	Total debt to total assets	Financial Statement
DE	Debt to Equity	Financial Statement
SDA	Short-term liabilities to total assets	Financial Statement
LDA	Long-term debt to total assets	Financial Statement

Table A2: Regression results for the percentile 10

	PERCENTILE 10				
	ROA	**ROE**	**Q**	**KZ**	**Z1**
ESG	0.000535	0.00156	-0.0106*	0.00391	0.0616**
	(1.03)	(1.23)	(-2.14)	(0.09)	(2.64)
ESGCon	0.000133	0.000372	-0.00143**	0.00275	-0.00102
	(1.73)	(1.85)	(-2.69)	(0.85)	(-0.48)
CSRStra	0.0000580	-0.0000171	0.00142	0.00271	0.00657
	(0.60)	(-0.09)	(1.56)	(0.58)	(1.62)
CSRCS	0.000152	0.000470	0.000923	-0.0000800	0.0182**
	(0.61)	(1.74)	(0.53)	(-0.01)	(2.67)
CSRReport	0.000279	-0.000660	-0.00103	0.0109	0.00311
	(0.69)	(-0.75)	(-0.42)	(0.73)	(0.27)
Emission	0.0000825	-0.000426	-0.00393***	-0.00484	0.00368
	(0.89)	(-1.76)	(-6.91)	(-1.44)	(1.11)
CabonTotal	1.02e-11	4.40e-11	1.38e-10	7.54e-11	2.49e-10
	(0.04)	(0.06)	(0.05)	(0.01)	(0.11)
ENV	-0.0000578	0.00000627	0.00580***	0.00352	-0.0210*
	(-0.37)	(0.02)	(4.22)	(0.23)	(-2.40)
SOC	-0.000534*	-0.00119*	0.0041 9	-0.00244	-0.0199*
	(-2.23)	(-2.31)	(1.94)	(-0.14)	(-2.11)
GOV	-0.000275	-0.000771	0.00714***	-0.00364	-0.0276***
	(-1.45)	(-1.82)	(4.59)	(-0.27)	(-3.67)
CSRAudit	-0.000424	0.0210*	-0.0658*	0.285	-0.0741
	(-0.13)	(2.58)	(-2.38)	(1.64)	(-0.49)
CSRCommittee	-0.0112	-0.0431**	-0.155	0.0705	-1.152*
	(-0.68)	(-2.66)	(-1.42)	(0.09)	(-2.37)
SDA	0.0230	0.106**	0.373***	0.425	-0.182
	(1.46)	(2.62)	(3.71)	(0.53)	(-0.40)
LEV	-0.0113	-0.143*	-0.343*	-0.118	-2.122
	(-0.95)	(-2.14)	(-2.40)	(-0.12)	(-1.63)
LDA	-0.00448	-0.00125	-0.156***	-0.112	-1.431***
	(-0.84)	(-0.11)	(-3.67)	(-0.28)	(-4.92)
DE	-0.00613***	-0.00473	0.0755*	3.139***	-0.136
	(-3.85)	(-0.20)	(2.00)	(19.79)	(-0.46)
_cons	0.00163	0.105	0.963***	-1.161	2.656**
	(0.07)	(1.92)	(5.17)	(-1.01)	(3.05)

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Table A3: Regression results for the percentile 25

	PERCENTILE 25				
	ROA	**ROE**	**Q**	**KZ**	**Z1**
ESG	-0.000389	-0.00110	-0.00405	0.0378	0.0154
	(-1.02)	(-1.01)	(-0.68)	(0.88)	(0.68)
ESGCon	0.000114*	0.000362*	0.000530	0.00497	0.00409**
	(2.08)	(2.24)	(0.62)	(1.61)	(2.98)
CSRStra	0.0000806	-0.000219	-0.00145	-0.000355	0.00444
	(1.56)	(-1.26)	(-1.34)	(-0.11)	(1.75)
CSRCS	0.000239	0.000250	0.00192	-0.00424	0.0126**
	(1.92)	(0.54)	(0.76)	(-0.53)	(3.06)
CSRReport	0.0000615	0.000477	0.000242	0.00440	0.00285
	(0.34)	(0.69)	(0.05)	(0.33)	(0.41)
Emission	0.000192***	0.000129	-0.00234**	0.00752	0.00224
	(3.84)	(0.66)	(-2.82)	(1.71)	(1.02)
CabonTotal	2.81e-12	6.38e-12	7.75e-11	4.60e-11	2.31e-10
	(0.03)	(0.01)	(0.05)	(0.01)	(0.33)
ENV	-0.0000121	0.000105	0.00247	-0.0233	-0.00276
	(-0.12)	(0.34)	(1.30)	(-1.49)	(-0.35)
SOC	-0.0000423	0.000146	0.00154	-0.0153	-0.00668
	(-0.26)	(0.30)	(0.63)	(-0.87)	(-0.71)
GOV	0.000115	0.000420	0.00677**	-0.0108	-0.0101
	(0.94)	(1.24)	(3.21)	(-0.91)	(-1.48)
CSRAudit	-0.000927	0.0149*	-0.0632	-0.0541	-0.286**
	(-0.38)	(2.06)	(-1.59)	(-0.37)	(-2.65)
CSRCommittee	-0.0148	-0.00274	-0.0884	0.913	-0.447
	(-1.81)	(-0.08)	(-0.51)	(1.52)	(-1.66)
SDA	0.0595***	0.135***	0.776***	2.428***	-0.0146
	(8.91)	(5.15)	(5.38)	(3.67)	(-0.04)
LEV	-0.00955	-0.246***	-0.435*	-2.417*	-4.066***
	(-0.77)	(-3.45)	(-2.43)	(-2.50)	(-7.69)
LDA	-0.000257	0.0251*	-0.0137	-0.00415	-1.376***
	(-0.08)	(2.01)	(-0.27)	(-0.01)	(-6.14)
DE	-0.00417	0.0364	0.0763*	3.199***	0.00990
	(-1.47)	(1.66)	(2.26)	(21.94)	(0.11)
_cons	0.00460	0.0104	0.670*	-0.353	2.989***
	(0.36)	(0.21)	(2.33)	(-0.34)	(5.95)

Table A4: Regression results for the percentile 50

	PERCENTILE 50				
	ROA	**ROE**	**Q**	**KZ**	**Z1**
ESG	-0.00125*	-0.000731	0.00873	0.105***	0.0533*
	(-2.45)	(-0.58)	(0.78)	(4.84)	(2.30)
ESGCon	0.0000937	0.000270	0.00120	0.00371	0.00790***
	(1.82)	(1.26)	(0.93)	(0.84)	(5.37)
CSRStra	0.000115	-0.000473*	-0.000300	-0.00777	0.00588

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	PERCENTILE 50				
	ROA	**ROE**	**Q**	**KZ**	**Z1**
	(1.56)	(-2.51)	(-0.23)	(-1.73)	(1.92)
CSRCS	0.000162	0.000210	0.00314	-0.0252**	0.0178**
	(0.90)	(0.55)	(1.29)	(-2.89)	(3.21)
CSRReport	-0.000123	0.000537	0.00601	0.0122	0.00849
	(-0.38)	(0.67)	(1.08)	(1.10)	(0.95)
Emission	0.000276***	0.000395**	-0.00178	0.00820	0.00363
	(4.01)	(2.59)	(-1.35)	(1.94)	(1.58)
CabonTotal	-1.92e-12	-3.53e-11	6.95e-11	4.66e-11	1.51e-10
	(-0.02)	(-0.07)	(0.02)	(0.01)	(0.04)
ENV	0.0000684	-0.000205	-0.00338	-0.0598***	-0.0208*
	(0.45)	(-0.51)	(-1.16)	(-6.74)	(-2.21)
SOC	0.000349	-0.0000932	-0.00670	-0.0429***	-0.0220*
	(1.67)	(-0.20)	(-1.52)	(-4.64)	(-2.52)
GOV	0.000353*	0.000370	0.00383	-0.0330***	-0.0167**
	(2.13)	(0.86)	(1.00)	(-4.97)	(-2.75)
CSRAudit	-0.00698	0.0200*	-0.205**	0.361	-0.454**
	(-1.84)	(2.44)	(-3.10)	(1.67)	(-3.21)
CSRCommittee	-0.00201	0.0220	0.0243	2.955***	-0.362
	(-0.17)	(0.87)	(0.15)	(4.64)	(-0.96)
SDA	0.106***	0.287***	1.918***	5.654***	-0.298
	(8.40)	(8.28)	(5.74)	(4.90)	(-0.50)
LEV	-0.0290	-0.397***	-1.054***	-4.677***	-5.642***
	(-1.54)	(-7.15)	(-3.49)	(-5.35)	(-5.56)
LDA	-0.00786	0.0138	-0.103	-1.566*	-2.282***
	(-1.32)	(0.89)	(-0.92)	(-2.51)	(-5.25)
DE	0.000277	0.0977***	0.0921	3.268***	0.0162
	(0.05)	(5.07)	(1.31)	(15.12)	(0.08)
_cons	0.0272	0.0217	0.700*	2.217*	3.893***
	(1.58)	(0.42)	(2.30)	(2.00)	(5.66)

Table A5: Regression results for the percentile 75

	PERCENTILE 75				
	ROA	**ROE**	**Q**	**KZ**	**Z1**
ESG	-0.000844	0.000412	0.0225	0.122	0.0627
	(-0.73)	(0.16)	(1.04)	(0.66)	(0.92)
ESGCon	0.000273*	0.000673*	0.00533	0.00939	0.0154
	(2.26)	(2.34)	(1.72)	(0.55)	(1.04)
CSRStra	0.000232	-0.000335	-0.00478	-0.0127	0.00280
	(1.28)	(-0.90)	(-1.32)	(-0.89)	(0.47)
CSRCS	-0.000103	-0.000212	-0.00577	-0.0150	0.00742
	(-0.24)	(-0.56)	(-0.89)	(-0.36)	(0.51)
CSRReport	0.000394	0.00169	0.0250*	-0.0216	0.0187
	(0.50)	(1.03)	(2.06)	(-0.29)	(0.82)
Emission	0.000261	0.000772	-0.00150	0.00940	0.00241
	(1.87)	(1.66)	(-0.49)	(0.64)	(0.30)

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	PERCENTILE 75				
	ROA	**ROE**	**Q**	**KZ**	**Z1**
CabonTotal	-3.36e-12	-6.78e-11	-1.42e-11	3.37e-11	1.15e-10
	(-0.02)	(-0.06)	(-0.00)	(0.00)	(0.00)
ENV	-0.000190	-0.000932	-0.0134*	-0.0730	-0.0269
	(-0.60)	(-1.21)	(-2.10)	(-1.03)	(-0.95)
SOC	0.000506	0.000298	-0.00725	-0.0420	-0.0212
	(1.05)	(0.28)	(-0.79)	(-0.63)	(-0.93)
GOV	0.000244	-0.000140	-0.00234	-0.0279	-0.0170
	(0.66)	(-0.17)	(-0.32)	(-0.54)	(-0.94)
CSRAudit	-0.0204*	-0.00258	-0.0300	-0.499	-0.498*
	(-2.39)	(-0.15)	(-0.23)	(-0.69)	(-2.10)
CSRCommittee	0.0362	0.0574**	0.873	3.582	0.881
	(1.32)	(2.72)	(1.94)	(1.18)	(0.85)
SDA	0.208***	0.458***	5.022***	14.78***	0.603
	(6.48)	(5.10)	(5.41)	(3.44)	(0.53)
LEV	-0.0892*	-0.391*	-2.533***	-7.096*	-11.98***
	(-2.39)	(-2.50)	(-5.61)	(-2.35)	(-5.25)
LDA	-0.0189	-0.0610*	-0.546	-2.947	-4.235***
	(-1.42)	(-2.36)	(-1.57)	(-1.24)	(-5.54)
DE	0.00351	0.121*	0.289*	3.271***	0.633
	(0.47)	(2.15)	(2.45)	(5.43)	(1.48)
_cons	-0.0175	-0.0638	-0.0775	4.107	6.009*
	(-0.36)	(-0.70)	(-0.10)	(0.76)	(2.51)

Table A6: Regression results for the percentile 90

	PERCENTILE 90				
	ROA	**ROE**	**Q**	**KZ**	**Z1**
ESG	0.00103	0.00568	0.00568	0.308	0.0285
	(0.47)	(0.65)	(0.65)	(0.56)	(0.18)
ESGCon	0.000114	0.000490	0.000490	-0.00387	0.00981
	(0.33)	(0.50)	(0.50)	(-0.04)	(0.99)
CSRStra	0.000229	-0.000181	-0.000181	-0.0264	-0.00610
	(0.68)	(-0.18)	(-0.18)	(-0.49)	(-0.30)
CSRCS	0.000503	0.000607	0.000607	-0.0112	0.0361
	(0.75)	(0.22)	(0.22)	(-0.09)	(0.84)
CSRReport	-0.000467	0.00280	0.00280	0.0467	0.0306
	(-0.50)	(0.63)	(0.63)	(0.24)	(0.37)
Emission	0.000437	0.00141	0.00141	0.0406	0.00397
	(1.96)	(1.32)	(1.32)	(0.85)	(0.20)
CabonTotal	-1.64e-11	-1.51e-10	-1.51e-10	-5.88e-10	-1.88e-10
	(-0.03)	(-0.07)	(-0.07)	(-0.01)	(-0.01)
ENV	-0.00129	-0.00285	-0.00285	-0.167	-0.00505
	(-1.44)	(-1.23)	(-1.23)	(-0.80)	(-0.10)
SOC	0.000354	-0.00257	-0.00257	-0.107	0.00453
	(0.47)	(-0.68)	(-0.68)	(-0.52)	(0.07)
GOV	-0.000758	-0.00234	-0.00234	-0.0982	0.00108

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	PERCENTILE 90				
	ROA	**ROE**	**Q**	**KZ**	**Z1**
	(-1.06)	(-0.85)	(-0.85)	(-0.61)	(0.02)
CSRAudit	-0.0142	0.00656	0.00656	-0.680	-0.811
	(-0.93)	(0.14)	(0.14)	(-0.27)	(-1.15)
CSRCommittee	0.00295	0.0576	0.0576	3.448	-1.484
	(0.07)	(0.33)	(0.33)	(0.42)	(-0.54)
SDA	0.266***	1.073***	1.073***	28.88***	1.755
	(6.31)	(5.53)	(5.53)	(3.74)	(0.99)
LEV	-0.147*	-0.815**	-0.815**	-7.982	-13.76**
	(-2.36)	(-3.07)	(-3.07)	(-0.74)	(-3.17)
LDA	-0.0294	-0.0952	-0.0952	-13.65	-7.311***
	(-1.03)	(-1.17)	(-1.17)	(-1.68)	(-4.63)
DE	0.00696	0.249**	0.249**	3.537	0.603
	(0.47)	(3.11)	(3.11)	(1.75)	(0.72)
_cons	0.0955	-0.0400	-0.0400	12.53	9.886
	(1.32)	(-0.13)	(-0.13)	(0.73)	(1.75)
N	731	731	731	618	599

Table A7: Oaxaca – Blinder decomposition method results

	ROA	**ROE**	**Q**	**KZ**	**Z**
overall					
group_1	0.0423***	0.114***	1.580***	5.686***	2.684***
	(14.35)	(13.73)	(18.96)	(17.27)	(11.27)
group_2	0.0585***	0.202***	2.174***	9.575***	3.099***
	(15.63)	(11.30)	(14.45)	(6.16)	(21.13)
difference	-0.0162***	-0.0877***	-0.594***	-3.889*	-0.415
	(-3.40)	(-4.46)	(-3.45)	(-2.45)	(-1.48)
explained	-0.0151	-0.0260	-0.771*	-6.224*	-0.565
	(-1.63)	(-0.83)	(-2.02)	(-2.00)	(-1.28)
unexplained	-0.00118	-0.0617	0.178	2.336	0.151
	(-0.13)	(-1.93)	(0.56)	(1.09)	(0.34)
Explained					
ESG	**-0.0134**	**-0.0946***	**-1.723****	**-8.527**	**-1.683***
	(-0.96)	**(-1.97)**	**(-3.18)**	**(-1.57)**	**(-2.18)**
ESGCon	0.000199	0.000505	0.0185	-0.0241	0.00660
	(0.64)	(0.45)	(0.96)	(-0.38)	(0.64)
CSRStra	-0.00846**	-0.0166	0.0705	-0.468	-0.00302
	(-2.87)	(-1.52)	(0.87)	(-1.01)	(-0.03)
CSRCS	-0.00127	-0.00638	0.0971	1.381	-0.114
	(-0.47)	(-0.73)	(1.01)	(1.64)	(-1.13)
CSRReport	0.000150	0.000820	0.00873	-0.0609	-0.00133
	(0.57)	(0.60)	(0.64)	(-0.37)	(-0.11)
Emission	-0.0105	0.0370	0.161	-3.931	0.0376
	(-1.09)	(1.04)	(0.57)	(-1.72)	(0.09)
CabonTotal	-0.0000104	0.000133	-0.000451	-0.00600	-0.00117
	(-0.38)	(0.41)	(-0.37)	(-0.35)	(-0.30)

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	ROA	**ROE**	**Q**	**KZ**	**Z**
ENV	0.0100	0.0540	0.429	3.539	0.474
	(1.36)	(1.77)	(1.89)	(1.49)	(1.09)
SOC	0.00447	0.0225	0.476*	2.031	0.371
	(0.74)	(1.22)	(2.24)	(0.90)	(1.31)
GOV	0.00309	0.0105	0.207*	0.860	0.298*
	(1.46)	(1.23)	(2.09)	(1.11)	(2.08)
CSRAudit	0.00657*	0.00103	-0.0308	1.819*	0.177
	(2.23)	(0.13)	(-0.46)	(2.08)	(1.77)
CSRCommittee	-0.000875	-0.00172	-0.190	-1.407	-0.0198
	(-0.35)	(-0.20)	(-1.95)	(-1.68)	(-0.23)
SDA	-0.00493**	-0.0193*	-0.294**	-0.972*	-0.0195
	(-2.64)	(-2.34)	(-2.77)	(-1.98)	(-0.81)
LEV	0.0000884	0.00175	0.0108	0.0214	-0.0958
	(0.06)	(0.26)	(0.23)	(0.32)	(-0.61)
LDA	0.000350	0.000368	0.00693	-0.0707	0.0174
	(0.39)	(0.37)	(0.35)	(-0.11)	(0.23)
DE	-0.000515	-0.0160	-0.0181	-0.409	-0.00946
	(-1.10)	(-1.24)	(-0.99)	(-0.86)	(-0.68)
Unexplained					
ESG	-0.0291	-0.249	-0.0148	-26.32	3.657
	(-0.30)	(-0.86)	(-0.01)	(-1.20)	(0.74)
ESGCon	0.0318	0.0964	-1.082	3.832	-0.463
	(1.28)	(0.86)	(-1.40)	(0.79)	(-0.45)
CSRStra	-0.0797***	-0.189**	0.150	-5.213	-1.767
	(-4.15)	(-2.60)	(0.26)	(-1.35)	(-1.82)
CSRCS	-0.0125	0.00307	0.206	6.487	-0.820
	(-0.47)	(0.04)	(0.24)	(0.80)	(-0.78)
CSRReport	0.0761	0.250	1.576	-18.97	4.134
	(1.35)	(0.98)	(0.77)	(-0.67)	(1.60)
Emission	-0.0257	0.132	-0.488	-15.13	-1.517
	(-0.96)	(1.44)	(-0.64)	(-1.83)	(-1.33)
CabonTotal	-0.0000742	-0.000226	-0.00419	-0.0370	-0.00142
	(-0.78)	(-0.63)	(-1.31)	(-1.44)	(-0.24)
ENV	0.00937	0.0749	-0.0180	8.801	-1.019
	(0.32)	(0.71)	(-0.02)	(1.13)	(-0.62)
SOC	0.0108	-0.0381	-1.507	1.364	0.264
	(0.25)	(-0.32)	(-1.11)	(0.14)	(0.13)
GOV	0.00563	0.0132	-0.549	4.101	-2.132
	(0.19)	(0.13)	(-0.52)	(0.67)	(-1.31)
CSRAudit	0.0135*	0.0382*	0.0155	3.645*	0.0675
	(2.26)	(2.13)	(0.09)	(2.43)	(0.30)
CSRCommittee	0.0195	-0.0461	-0.541	-5.817	2.347
	(0.65)	(-0.47)	(-0.57)	(-0.57)	(1.84)
SDA	-0.00425	-0.0489	-0.653	-5.991*	-1.073**
	(-0.67)	(-1.57)	(-1.83)	(-2.50)	(-2.62)
LEV	0.0276**	0.0262	0.443	-5.009	-0.417
	(3.00)	(0.73)	(1.25)	(-1.59)	(-0.56)

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	ROA	**ROE**	**Q**	**KZ**	**Z**
LDA	0.0443*	0.0985*	1.517**	31.24*	2.864***
	(2.48)	(1.96)	(2.98)	(2.36)	(3.50)
DE	-0.0119*	-0.0314	-0.00211	1.379	0.709
	(-2.31)	(-1.11)	(-0.01)	(1.63)	(1.75)
_cons	-0.0767	-0.192	1.130	23.97	-4.682
	(-1.08)	(-0.57)	(0.40)	(0.86)	(-1.43)
N	731	731	742	618	599