DETERMINANTS OF CARBON EMISSION DISCLOSURE: THE MODERATING ROLE OF FOREIGN OWNERSHIP IN ENERGY SECTOR FIRMS LISTED ON THE INDONESIA STOCK EXCHANGE

THESIS

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ABSTRAK

Determinan Pengungkapan Emisi Karbon: Peran Moderasi Kepemilikan Asing pada Perusahaan Sektor Energi yang Terdaftar di Bursa Efek Indonesia

Oleh:

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Penelitian ini bertujuan untuk menguji pengaruh ukuran perusahaan dan profitabilitas terhadap *Carbon Emission Disclosure* (CED), serta menganalisis peran moderasi kepemilikan asing pada perusahaan sektor energi yang terdaftar di Bursa Efek Indonesia (BEI) periode 2022–2024. Penelitian ini menggunakan pendekatan kuantitatif kausal-komparatif dengan 54 observasi tahun-perusahaan yang dianalisis menggunakan metode Moderated Regression Analysis (MRA). Hasil penelitian menunjukkan bahwa ukuran perusahaan, profitabilitas, dan kepemilikan asing tidak memiliki pengaruh langsung yang signifikan terhadap pengungkapan emisi karbon. Namun, kepemilikan asing terbukti secara signifikan memperlemah hubungan antara ukuran perusahaan dan pengungkapan emisi karbon, meskipun tidak memoderasi hubungan antara profitabilitas dan pengungkapan emisi karbon pada tingkat signifikansi 5%. Temuan ini menunjukkan bahwa karakteristik perusahaan dan struktur kepemilikan tidak secara langsung mendorong pengungkapan emisi karbon, namun kepemilikan asing berperan sebagai mekanisme tata kelola yang membatasi pengaruh ukuran perusahaan terhadap praktik pengungkapan tersebut.

Kata Kunci: *Carbon Emission Disclosure*, Ukuran Perusahaan, Profitabilitas, Kepemilikan Asing, Sektor Energi.

ABSTRACT

Determinants of Carbon Emission Disclosure: The Moderating Role of Foreign Ownership in Energy Sector Firms Listed on the Indonesia Stock Exchange

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This study aims to examine the effect of firm size and profitability on Carbon Emission Disclosure (CED) and to analyze the moderating role of foreign ownership in energy sector companies listed on the Indonesia Stock Exchange (IDX) during the 2021–2024 period. This research employs a quantitative causal-comparative approach using 54 firm-year observations analyzed through Moderated Regression Analysis (MRA). The results indicate that firm size, profitability, and foreign ownership do not have a significant direct effect on carbon emission disclosure. However, the moderation test shows that foreign ownership significantly weakens the relationship between firm size and carbon emission disclosure, although it does not moderate the relationship between profitability and carbon emission disclosure at the 5% significance level. These findings suggest that company characteristics and ownership structure do not directly drive carbon emission disclosure, but foreign ownership acts as a governance mechanism that limits the influence of firm size on disclosure practices.

Keywords: Carbon Emission Disclosure, Firm Size, Profitability, Foreign Ownership, Energy Sector.

Determinan Pengungkapan Emisi Karbon: Peran Moderasi Kepemilikan Asing pada Perusahaan Sektor Energi yang Terdaftar di Bursa Efek Indonesia

RINGKASAN PENELITIAN

1. Latar Belakang

Perubahan iklim telah menjadikan pelaporan emisi gas rumah kaca (GRK) sebagai aspek krusial dalam akuntabilitas dan manajemen risiko perusahaan. Sektor energi merupakan salah satu penyumbang emisi GRK terbesar di Indonesia, sehingga transparansi lingkungannya menjadi sangat penting, terlebih dengan adanya tekanan regulasi baru seperti Peraturan Presiden No. 98/2021. Walaupun demikian, praktik Carbon Emission Disclosure (CED) di sektor energi masih belum merata dan pelaporannya sering kali tidak lengkap. Di sisi lain, penelitian-penelitian terdahulu menunjukkan hasil yang tidak konsisten mengenai pengaruh ukuran perusahaan, profitabilitas, dan kepemilikan asing terhadap CED. Penelitian ini hadir untuk mengisi celah literatur dengan menguji peran kepemilikan asing sebagai variabel moderasi, yang jarang dieksplorasi dalam penelitian sebelumnya.

2. Metode Penelitian

Penelitian ini menggunakan desain kuantitatif dengan pendekatan kausal-komparatif. Populasi yang diteliti adalah seluruh perusahaan sektor energi yang terdaftar di Bursa Efek Indonesia (BEI). Melalui teknik purposive sampling, terpilih 18 perusahaan sebagai sampel dengan periode observasi dari tahun 2022 hingga 2024, menghasilkan total 54 observasi firm-year. Variabel dependen dalam studi ini adalah CED yang diukur menggunakan 7 item dari standar GRI 305. Variabel independennya adalah Ukuran Perusahaan (logaritma natural total aset) dan Profitabilitas (ROA), sedangkan Kepemilikan Asing bertindak sebagai variabel moderasi. Analisis data dilakukan menggunakan Fixed Effects Model dan Moderated Regression Analysis (MRA) melalui software EViews.

3. Hasil Penelitian

Berdasarkan pengujian regresi untuk efek langsung (direct effect), ukuran perusahaan (p=0.5145), profitabilitas (p=0.9118), dan kepemilikan asing (p=0.5734) terbukti tidak memiliki pengaruh yang signifikan terhadap pengungkapan emisi karbon. Pada uji moderasi (MRA), variabel interaksi antara ukuran perusahaan dan kepemilikan asing (X_1Z) menghasilkan koefisien negatif sebesar -0.3573 dengan p-value 0.0225. Ini membuktikan bahwa kepemilikan asing secara signifikan memperlemah hubungan antara ukuran perusahaan dan CED. Sementara itu, variabel interaksi antara profitabilitas dan kepemilikan asing (X_2Z) memiliki koefisien -0.84813 dengan p-value 0.0759, yang berarti tidak signifikan pada level 5% (meskipun signifikan marginal pada level 10%).

4. Kesimpulan

Karakteristik perusahaan (ukuran dan profitabilitas) serta struktur kepemilikan asing tidak secara langsung mendorong tingkat pengungkapan emisi karbon pada perusahaan sektor energi di Indonesia. Namun, kepemilikan asing berfungsi sebagai mekanisme tata kelola yang memoderasi secara spesifik memperlemah pengaruh ukuran perusahaan terhadap perilaku pengungkapan. Kehadiran dan pengawasan ketat dari investor asing bertindak sebagai substitusi (pengganti) atas dorongan transparansi yang biasanya muncul secara alami dari ukuran perusahaan yang besar.

Determinants of Carbon Emission Disclosure: The Moderating Role of Foreign Ownership in Energy Sector Firms Listed on the Indonesia Stock Exchange

RESEARCH SUMMARY

1. Background

Climate change has made the reporting of greenhouse gas (GHG) emissions a crucial aspect of corporate accountability and risk management. The energy sector is one of the largest contributors to GHG emissions in Indonesia, making environmental transparency increasingly important, especially with the emergence of new regulatory pressures such as Presidential Regulation No. 98/2021. Nevertheless, the practice of Carbon Emission Disclosure (CED) in the energy sector remains uneven, and the reporting is often incomplete. On the other hand, previous studies have shown inconsistent findings regarding the influence of firm size, profitability, and foreign ownership on CED. This study aims to fill the existing literature gap by examining the role of foreign ownership as a moderating variable, which has been rarely explored in previous research.

2. Research Method

This study employs a quantitative design with a causal-comparative approach. The population consists of all energy sector companies listed on the Indonesia Stock Exchange (IDX). Through purposive sampling, 18 companies were selected as the sample with an observation period from 2022 to 2024, resulting in a total of 54 firm-year observations. The dependent variable in this study is Carbon Emission Disclosure (CED), measured using seven items from the GRI 305 standard. The independent variables are Firm Size (natural logarithm of total assets) and Profitability (ROA), while Foreign Ownership serves as the moderating variable. Data analysis was conducted using the Fixed Effects Model and Moderated Regression Analysis (MRA) with the assistance of EViews software.

3. Research Findings

Based on the regression results for the direct effects, firm size (p = 0.5145), profitability (p = 0.9118), and foreign ownership (p = 0.5734) were found to have no significant effect on carbon emission disclosure. In the moderation test (MRA), the interaction variable between firm size and foreign ownership (X_1Z) produced a negative coefficient of −0.3573 with a p-value of 0.0225. This indicates that foreign ownership significantly weakens the relationship between firm size and CED. Meanwhile, the interaction variable between profitability and foreign ownership (X_2Z) has a coefficient of −0.84813 with a p-value of 0.0759, indicating that the effect is not significant at the 5% level (although marginally significant at the 10% level).

4. Conclusion

Firm characteristics (firm size and profitability) as well as foreign ownership structure do not directly encourage the level of carbon emission disclosure among energy sector companies in Indonesia. However, foreign ownership functions as a governance mechanism that specifically moderates and weakens the influence of firm size on disclosure behavior. The presence and stricter monitoring from foreign investors act as a substitute for the transparency incentives that would typically arise naturally from larger firm size.

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CHAPTER 1
INTRODUCTION

1.1 Background of the Study

Climate change has elevated corporate greenhouse gas (GHG) reporting from a peripheral voluntary activity to a core dimension of corporate accountability and risk management. Wahyuningrum (2025) explains that Indonesian policy and stakeholder pressure have increased expectations for firms to disclose carbon emissions. Reuters (2024) reports that recent regulatory discussions and market pressures in Indonesia have further intensified scrutiny on corporate environmental performance.

Changes in Indonesia's regulatory and institutional environment since 2021 create a timely policy window for empirical analysis. He et al. (2024) show that such regulatory windows often coincide with measurable changes in firm disclosure behaviour in emerging markets. The Government of Indonesia's recent presidential and ministerial initiatives, particularly Presidential Regulation No. 98/2021 and its derivative rules have strengthened institutional incentives for companies to disclose emissions data (Government of Indonesia, 2021). While these regulations apply broadly across sectors, they explicitly identify high-emission industries as priority targets for monitoring and mitigation. Because the energy sector is among the largest contributors to national greenhouse gas emissions, the regulatory framework effectively places stronger compliance pressures on energy firms, making them more directly affected by these policy changes compared to other industries.

The energy sector is especially material for Indonesia's emissions profile and, therefore, central to carbon emission disclosure (CED) research. An international sector assessment (Wahyudi, Lenni, & Sutarto, 2024) highlights that energy-related activities account for the largest share of national greenhouse gas emissions. Wahyuningrum (2025) further argues that transparency in energy firms is directly relevant to meeting national mitigation targets.

Empirical evaluations indicate that voluntary carbon disclosure among Indonesian firms and energy firms in particular remains uneven and incomplete. A sectoral review by Semanticscholar (Suhardi & Purwanto, 2015) documents

common omissions, including undefined boundaries and missing scope delineations. Wahyudi, Lenni, & Sutarto, (2024) provides empirical evidence that many IDX-listed energy companies report below benchmark disclosure levels.

Firm size is a frequently cited determinant of voluntary disclosure in accounting and sustainability research. Garanina et al. (2021) find that larger firms generally disclose more nonfinancial information due to greater visibility and reputational risk. Fuadah (2022) supports this view in an Indonesian context by showing a positive association between company size and environmental disclosure metrics.

Profitability, proxied by Return on Assets (ROA), is theoretically relevant because profitable firms may have slack resources to invest in environmental management and reporting. The emerging market literature reports mixed findings: Suranta (2025) finds a positive relationship between ROA and disclosure in a regional sample, while Karbon's review studies (Semanticscholar, 2015) document several cases where ROA has no significant effect. These inconsistencies motivate empirical testing of ROA and CED in the 2021–2024 energy sample.

The ownership structure, particularly foreign ownership, constitutes a governance channel that can shape disclosure choices. Fuadah (2022) finds that foreign investors may bring international transparency norms to domestic firms. Wulan (2022) reports that foreign directors and foreign shareholding are associated with improved environmental reporting in some Indonesian samples.

More importantly, foreign ownership may operate as a moderator that conditions how firm attributes (size, ROA) are translated into disclosure outcomes. Muhammad (2021) explicitly tested foreign ownership as a moderating variable in an Indonesian sample and found that foreign shareholding altered the strength of disclosure–value relations. He et al. (2024) provide complementary international evidence showing that firms with stronger international linkages tend to improve the quality of their environmental reporting, which supports the idea that foreign ownership can alter the relationship between internal firm incentives and disclosure behaviour.

The Global Reporting Initiative (2021) defines the GRI 305 series (GRI 305-1 to GRI 305-7) as the standard elements for corporate emissions reporting. In

this study, each GRI 305 item is coded as 1 when disclosed and 0 when not disclosed, resulting in a seven-item Carbon Emission Disclosure (CED) index (range 0–7) for each firm-year. Previous studies, such as Suhardi and Purwanto (2015) and Fuadah (2022), have similarly used item-based disclosure indices and ownership operationalizations in Indonesian disclosure research. Consistent with these studies, foreign ownership in this research is measured as the percentage of total outstanding shares held by foreign investors.

Building on prior research, this study examines the role of foreign ownership in influencing the relationship between firm characteristics and disclosure. Notably, while studies have explored foreign ownership and firm characteristics in the context of corporate disclosure, empirical research that tests the moderating effect of foreign ownership on this relationship is scarce. After reviewing the literature, it appears that only a limited number of studies have examined this moderating. Therefore, this study contributes to the literature by applying a moderation-testing approach, using panel regressions with firm and year fixed effects, as well as interaction terms (Size × Foreign Ownership and ROA × Foreign Ownership), following the methodology of Muhammad (2021).

By focusing on IDX energy firms during the policy-relevant 2021–2024 window, this study not only captures the impact of recent regulatory changes, including the Presidential Regulation No. 98/2021 and related ministerial rules, but also aligns with the period of post-pandemic recovery. The Indonesian government's new initiatives, which came into effect in 2021, have significantly raised institutional incentives for companies to disclose emissions data (Government of Indonesia, 2021). This window is crucial as it marks the convergence of both regulatory pressure and the evolving business environment following the pandemic, which has shifted both corporate priorities and investor expectations. By explicitly modeling foreign ownership as a moderator, the research contributes sector-specific evidence to the literature, offering practical insights for regulators and investors. Wahyuningrum (2025) highlights the policy relevance of improved transparency in energy firms, while Muhammad (2021) demonstrates the analytical value of including foreign ownership interaction effects in disclosure models.

1.2 Problem Formulation

Despite growing awareness of environmental reporting, Carbon Emission Disclosure (CED) in Indonesia's energy sector remains limited, and the influence of firm size, profitability, and foreign ownership is not fully clear. This study formulates specific problems and research questions to address these gaps.

1.2.1. Problem Statement

Carbon Emission Disclosure (CED) in Indonesia's energy sector remains limited despite the government's regulatory push for environmental transparency. Previous studies have found mixed evidence regarding the determinants of CED, such as firm size and profitability, with inconsistent findings on whether foreign ownership influences disclosure levels. Moreover, research rarely explores foreign ownership as a moderating variable that might strengthen or weaken the relationship between firm characteristics and CED. Considering the growing global emphasis on Environmental, Social, and Governance (ESG) reporting and Indonesia's commitment to emission reduction, there is an urgent need to understand what drives CED and how foreign ownership interacts with other factors to affect disclosure practices..

1.2.2. Research Questions

Based on the issues outlined in the background of the study and problem formulation, this study develops several research questions to examine the determinants of Carbon Emission Disclosure (CED) and the role of foreign ownership in energy sector firms. These questions aim to clarify how firm characteristics and ownership structure influence disclosure practices. The research questions are as follows:

1. Does firm size significantly influence Carbon Emission Disclosure (CED) among energy sector companies listed on the Indonesia Stock Exchange (IDX)?
2. Does profitability, measured by Return on Assets (ROA), significantly influence CED among these companies?

3. Does foreign ownership positively influence CED among energy sector companies listed on the IDX?
4. Does foreign ownership moderate the relationship between firm size and CED?
5. Does foreign ownership moderate the relationship between profitability (ROA) and CED?

1.3 Research Objectives

Following the research questions, this study establishes several objectives to provide clear direction for the analysis of factors influencing Carbon Emission Disclosure (CED) in energy sector firms. These objectives are designed to capture both the direct effects of firm characteristics and the moderating role of foreign ownership. The objectives of this research are:

1. To examine the effect of firm size on Carbon Emission Disclosure (CED) in energy sector companies listed on the IDX.
2. To investigate the effect of profitability (ROA) on CED in these companies.
3. To assess the impact of foreign ownership on CED in energy sector companies listed on the IDX.
4. To analyze whether foreign ownership moderates the relationship between firm size and CED.
5. To analyze whether foreign ownership moderates the relationship between profitability (ROA) and CED.

1.4 Research Contributions

This study aims to provide theoretical and practical insights by examining how firm characteristics and foreign ownership influence Carbon Emission Disclosure in the energy sector.

1. Theoretical Contributions.

This study contributes to the literature on environmental accounting and corporate governance in several ways. First, it expands Agency Theory by empirically examining how firm characteristics, such as size and profitability, influence Carbon Emission Disclosure (CED) within the context of an emerging

market. Second, this research addresses a gap in existing literature by exploring the moderating role of foreign ownership in the relationship between firm attributes and carbon emission disclosures. This aspect is underexplored in Indonesian studies, especially regarding its influence on environmental transparency. Lastly, the study provides updated empirical evidence from 2021–2024, capturing recent developments in sustainability reporting and global ESG demands, and thus enriching the Agency Theory framework in the context of environmental disclosures in Indonesia's energy sector.

2. Practical Contributions.

The findings of this study can guide policymakers in designing more effective environmental disclosure regulations by identifying the factors that drive CED in the energy sector. For companies, especially those with foreign investors, the study highlights how ownership structure influences disclosure practices, potentially encouraging greater transparency to meet both local and global stakeholder expectations. Moreover, investors and stakeholders can use the findings to assess corporate sustainability performance, enabling informed decision-making in capital allocation and corporate governance practices.

1.5 Contextual Overview of Research

The researcher presents the contextual overview of this study as follows:

Chapter 1 Introduction.

This chapter begins with the background of the study, explaining the increasing importance of carbon emission disclosure (CED) due to regulatory, institutional, and stakeholder pressures in Indonesia. The chapter outlines how climate-related transparency has become a crucial aspect of corporate accountability, especially among energy sector firms. The introduction also highlights past empirical findings, regulatory developments, and the theoretical basis that motivate the research on firm size, profitability, and the moderating role of foreign ownership. Furthermore, it presents the problem formulation, research questions, objectives, contributions, and the contextual foundation underlying the entire study.

Chapter 2 Literature Review.

Chapter 2 discusses the theoretical background relevant to the study, focusing on Agency Theory as the main theoretical lens. It reviews key concepts such as carbon emission disclosure, firm size, profitability, and foreign ownership, alongside the relationships among these variables. Next, it provides a comprehensive empirical review of previous studies, both domestic and international, to position the research gap, particularly the limited evidence on foreign ownership as a moderating factor. The chapter concludes by presenting the conceptual framework and developing four hypotheses that guide the empirical analysis.

Chapter 3 Research Method.

This chapter explains the quantitative research design applied in the study, including the causal–comparative approach used to analyze the determinants of CED. It outlines the research setting, the time frame (2021–2024), and the rationale for selecting energy sector firms listed on the Indonesia Stock Exchange (IDX). The chapter further details the type and source of data, population and sample selection (13 firms, yielding 52 firm-year observations), research variables, and operational definitions. It also describes the analytical procedures, including descriptive statistics, classical assumption tests, multiple regression analysis, and moderated regression analysis (MRA) to test the role of foreign ownership as a moderating variable.

Chapter 4 Result and Discussion.

Presents findings derived from statistical analysis using EViews, beginning with descriptive statistics that summarize the characteristics of each variable. It then reports the results of normality, multicollinearity, heteroskedasticity, and autocorrelation tests to validate the regression model. The chapter continues with hypothesis testing through direct effect regression and moderated regression analysis. Finally, it discusses the meaning of the results

by comparing them with previous studies, explaining whether firm size, profitability, and foreign ownership significantly influence carbon emission disclosure among energy firms.

Chapter 5 Conclusion and Recommendations.

The final chapter summarizes the key findings of the research and concludes whether the proposed hypotheses are supported. Based on the empirical results, it offers practical implications for policymakers, companies, and investors, especially in the context of improving environmental transparency in the energy sector. The chapter also provides theoretical contributions and suggests avenues for future research, such as expanding sectors, variables, or