Article

Ownership Structure and Carbon Disclosure: Evidence on the Moderating Effect of Profitability

KOMARA Acep[1,*], PUTRI Serli Ananda Amelia[2], TUFFAHATI Najla[3], SAADAH Kamalah[4], and YUSOFF Haslinda[5]

[1]Universitas Swadaya Gunung Jati, Indonesia; acep.komara@ugj.ac.id; https://orcid.org/0009-0009-8868-2934
[2]Universitas Swadaya Gunung Jati, Indonesia; serlianandaap14@gmail.com; https://orcid.org/0009-0007-0358-0097
[3]Universitas Swadaya Gunung Jati, Indonesia; najlatuff27@gmail.com; https://orcid.org/0009-0009-6139-1600
[4]Universitas Swadaya Gunung Jati, Indonesia; kamalah.saadah@ugj.ac.id; https://orcid.org/0000-0002-3629-3947
[5]Universiti Teknologi MARA, Malaysia; hasli229@uitm.edu.my; https://orcid.org/0000-0001-7545-9850
[*] Correspondence: acep.komara@ugj.ac.id

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Abstract*: This research aims to examine the impact of state and public ownership on carbon emissions disclosure, with profitability serving as a moderating variable and leverage as a control variable. The sample includes non-financial firms listed on the Indonesia Stock Exchange between 2021 and 2023. Through statistical analysis and modelling, the study found that state ownership positively and significantly influences carbon emissions disclosure, while public ownership does not significantly impact it. In addition, profitability cannot moderate the relationships between state and public ownership to the carbon emissions disclosure.*

Keywords*: carbon emissions disclosure; state ownership; public ownership; profitability; leverage.*

1. Introduction

Global economic growth is driven by the rapid development of the business world. However, the increase in environmental problems that are increasingly concerning at the worldwide level is also caused by these developments (Ganapathy & Kabra, 2017). One of the environmental problems that has become a significant concern of the international community is climate change (Ratmono et al., 2021). Many countries must address carbon emissions as one of the leading causes of climate change (Ika et al., 2022). With the increasing impacts of carbon emissions, such as global warming and ecosystem damage, the challenges in handling them are increasing (Riantono & Sunarto, 2022).

Asia has the most significant contribution to the world's carbon emissions. This region is responsible for about two-thirds of total global carbon emissions. This shows Asia's considerable role in the international climate change problem (Fransisca et al., 2024). According to data from the World Resources Institute (WRI), Indonesia's emissions in 2021 reached 1,475.83 million tons of CO2, equivalent to 3.11% of the world's total emissions. Data from the European Commission shows that in 2022, Indonesia contributed greenhouse gas emissions of 1,240.8 million tons of carbon dioxide (Mt CO2e), equivalent to 1.24 gigatons of carbon dioxide (Gt CO2e). This accounts for about 2.3% of global greenhouse gas emissions, making Indonesia the largest emitter in Southeast Asia.

The Indonesian government has determined its commitment to reducing carbon emissions through Presidential Regulation Number 61 of 2011, which contains a national action plan to reduce greenhouse gas emissions, and Presidential Regulation Number 71 of 2011 concerning implementing national investment in the greenhouse gas field. Article 4 of Presidential Regulation Number 61 of 2011 states that the contribution of the business world to the decline in greenhouse gas emissions is carried out through the disclosure of voluntary carbon emissions (Riantono & Sunarto, 2022). Reducing greenhouse gas emissions, particularly carbon emissions, is an important part of the Nationally Determined Contribution (NDC) by the 2015 Paris Agreement, in which each country develops an Action Plan involving companies outlining their Steps to reduce greenhouse gas emissions (Hasan et al., 2024). As a signatory to the Paris Agreement, Indonesia set its commitments in Law No. 16/2016. Through its NDC, Indonesia pledged to reduce carbon emissions by 29% by independent effort and 41% with international cooperation support in forestry, energy, and industrial sectors (Eko Cahyono et al., 2022).

Reducing carbon emissions is used as a strategic move by companies to reduce the environmental impact and support climate stabilization in the era of globalization, as it is now (Riantono & Sunarto, 2022). Companies need to increase environmental awareness by prioritizing conservation as a social commitment, reducing carbon emissions, reporting emissions, and implementing management strategies for environmental sustainability and the company's sustainability (Al-Mari & Mardini, 2024). Companies can manage carbon emissions by using carbon accounting, which is part of environmental accounting, so that they can provide data, set targets, compile reports, and design carbon emission reduction programs (Kurnia et al., 2020). Public information regarding greenhouse gas emissions, with emphasis on carbon dioxide arising from the company's production and operational activities, is typically delivered through a report of carbon emissions (Jiang et al., 2024). Companies in Indonesia that actively report their carbon dioxide emissions that they produce have not reached the entire company in Indonesia, considering that the reporting is still voluntary (Ratmono et al., 2021). Meanwhile, from a financial perspective, carbon emissions disclosure activities are costly (Saadah et al., 2024). Therefore, many companies consider that carbon emissions disclosure can have an impact on reducing their profits (Riantono & Sunarto, 2022).

The urgency of carbon emissions disclosure in the context of environmental reporting can be described through the theory of legitimacy and the theory of stakeholders (Setiany et al., 2022). Pressure from stakeholders, the increasing awareness of the impacts of climate change, as well as the development of carbon issues, are the main factors behind the practice of carbon emissions disclosure by the company (Wahyuningrum et al., 2024). Especially after environmental regulations, companies with state ownership usually face greater pressure from the government, so it is hoped that the company will further increase its ecological responsibilities, among others, through reporting information related to proactive carbon emissions (Singhania & Bhan, 2024). Meanwhile, public ownership contributes to encouraging companies to act more responsibly in terms of maintaining environmental balance and ensuring life sustainability for the current generation and future (Odriozola & Baraibar-Diez, 2017). In this case, the company's ownership structure reflects the extent to which certain shareholders can influence company policy, including decision-making related to carbon emissions disclosure (Ng et al., 2022). Companies that can deal with external pressures and show excellent performance generally have substantial human and financial resources, which allow them to compile voluntary reports required by stakeholders (Fransisca et al., 2024). Therefore, financial conditions, especially the level of profitability, have a close relationship with the company's motivation to implement carbon emission disclosure practices (Wahyuningrum et al., 2024).

Previous studies on the factors influencing carbon emission disclosure have yielded inconsistent findings, particularly regarding state ownership. For instance, research by Giannarakis et al. (2018), Acar et al. (2021), Fransisca et al. (2024), Nguyen et al. (2025), and Singhania & Bhan (2024) suggests that state ownership positively impacts carbon emission disclosure. Conversely, studies by Chu et al. (2013) and Wei et al. (2024) indicate that state ownership has a negative effect on carbon emission disclosure. Other research by Ismail et al. (2018) and Bedi & Singh (2025) did not find a significant relationship between state ownership and carbon emissions disclosure. Apart from that, there are also inconsistent results regarding public ownership and its influence on carbon emission disclosure, such

as research by Akhiroh & Kiswanto (2016) and Ng et al. (2022) report a positive effect of public ownership on carbon emission disclosure, while research by Salsani & Nursiam (2025) shows that public ownership does not influence carbon emission disclosure.

Previous studies have examined the relationship between state ownership and profitability, with some indicating a positive effect, such as those by Ben Rejeb Attia et al. (2018) and Nguyen & Nguyen (2024) while others, like Abramov et al. (2017), suggest a negative impact. Additionally, research on the effect of public ownership on profitability has shown mixed results, with studies by Agustina & Djoko (2018) and Surayya & Kadang (2020) indicating a positive relationship, while Zakiyatun et al. (2024) found no effect. Furthermore, several studies have explored the influence of profitability on carbon emissions disclosure, with findings from Faisal et al. (2018), Nisak & Yuniarti (2018), Ismail et al. (2018), Akbaş & Canikli (2018), Abdullah et al. (2020), dan Wahyuningrum et al. (2024) all pointing to a positive effect. However, there is also research conducted by Ratmono et al. (2021) shows that there is a negative influence on carbon emissions disclosure. On the other hand, studies by Riantono & Sunarto (2022), Wahyuningrum et al. (2022), Fransisca et al. (2024), and Dharma et al. (2024) indicate that profitability has no significant effect on carbon emissions disclosure.

This study tests the relationship between state and public ownership on carbon emission disclosure by incorporating profitability as a moderating variable, which constitutes its main novelty. The moderating factor of profitability was not considered in previous studies, which primarily investigated the direct impact of state and public ownership on carbon emissions disclosure. This study proposes that the influence of state and public ownership on carbon emissions disclosure be strengthened or weakened by profitability, which utilizes legitimacy and stakeholder theories. Explicit examination of this has not been conducted in prior literature.

Previous studies have still found differences in research results on carbon emission disclosure. Thus, the effect of state and public ownership on carbon emission disclosure is the main objective of this study, with profitability serving as the moderating variable. Non-financial companies listed on the Indonesia Stock Exchange (IDX) from 2021 to 2023 have been chosen as the focus of this research.

The remainder of the paper is structured as follows. Section 2 explains the theory used in this research. Section 3 explains the hypothesis development. Section 4 explains the research method, including data and measurement of each variable used in this research. Section 5 regarding results and discussion, explains the influence of ownership structure on the carbon emission disclosure with profitability as a moderating variable. Section 6 explains conclusions, contributions, and limitations as well as suggestions for further research.

2. Theoretical Framework

2.1. Stakeholder Theory

Stakeholder theory was first introduced by Freeman in 1984 (Dmytriyev et al., 2021). Based on the perspective of stakeholder theory, the company is considered an integral part of the social system. In this system, stakeholders have a significant ability to influence company performance, so companies need to act proactively to meet the needs of stakeholders (Acar et al., 2021). The operational sustainability of a company is closely related to the role carried out by stakeholders. Therefore, achieving the company's strategic goals relies heavily on the company's ability to foster and maintain a harmonious relationship with stakeholders so as not to cause barriers in the achievement process (Wahyuningrum et al., 2022). The relationship between companies and stakeholders requires non-financial disclosures, including information related to carbon emissions. Carbon emission disclosure also helps meet stakeholder expectations but can also increase their optimism about the company's future. As such, carbon emissions disclosures maximize shareholder value in the long run. Factors such as ownership structure also influence how much a company pays attention to these disclosures (Bedi & Singh, 2025).

2.2. Legitimacy Theory

Environmental disclosure (including carbon emissions disclosure) or corporate sustainability can be based on other theories, such as the legitimacy theory introduced by Dowling and Pfeffer in 1975 (Bedi & Singh, 2025). According to legitimacy theory, companies are inclined to attempt to adjust their activities and operations to align with the values prevailing in society (Wahyuningrum et al., 2022). When an organization is managed by the prevailing values in society, according to legitimacy theory, an organization will remain well-known among the public (Putra & Lindrianasari, 2024). Companies are encouraged to evaluate their operations to meet public expectations conscientiously. Thus, legitimacy theory is relevant in addressing climate change issues, especially pressing global problems such as carbon emissions, which have become a widespread concern among various parties (Wahyuningrum et al., 2024). Thus, the legitimation theory is used in this study to evaluate how well the company has met its social contract with the public regarding environmental issues, manifested through the information on carbon emissions disclosure (Ratmono et al., 2021).

Based on the theory of stakeholders and legitimacy theory, the pressure of environmental legitimacy arises due to public perception of performance and environmental reporting carried out by a business entity. This condition encourages companies to take a more proactive approach to applying environmental management practices (Yustina et al., 2024). In this context, voluntary carbon emissions disclosure is one of the mechanisms used by the company to obtain its legitimacy in operational activities, as well as an effort to manage the hopes of stakeholders (Wahyuningrum et al., 2024). The continuity of a company's existence relies heavily on the involvement and approval of various stakeholder groups. Therefore, businesses need to align their operational activities with the expectations of these parties. The theory of legitimacy emphasizes the role of the broader community in providing legitimacy to the organization. The theory of stakeholders underscores the importance of each stakeholder in affecting the direction and strategy of corporate management (Cotter & Najah, 2012).

3. Hypothesis Development

3.1. Carbon Emissions Disclosure

Carbon emissions disclosure is an aspect of environmental reporting, underpinned by various theoretical frameworks, such as legitimacy theory and stakeholder theory, which provide insights into its significance and urgency (Setiany et al., 2022). Carbon emissions disclosure provides quantitative and qualitative information regarding the amount of carbon emissions a company has generated or is expected to produce. In addition, this disclosure also contains details about the risks and opportunities faced by the company due to climate change, including the financial impacts of these risks and opportunities. This information is accompanied by actions taken in the past and the company's strategic plans to deal with future challenges (Dharma et al., 2024).

Carbon emissions disclosure is a process used to evaluate an organization's carbon emissions level and set targets to reduce them (Setiany et al., 2022). Carbon emissions disclosure includes a variety of information related to an organization's climate-related activities, such as carbon emissions accounting, preparedness for the impacts of climate change, technology implementation through investment, and carbon trading and compensation activities (Jung & Kim, 2020). Carbon emissions disclosure is generally in the company's annual and sustainability reports (Setiany et al., 2022). Transparency in revealing environmental policies implemented by companies can provide benefits, including reducing the risk of uncertainty and strengthening the company's competitiveness (Fristianti et al., 2023).

3.2. State Ownership and Carbon Emissions Disclosure

The voluntary provision of environmental-related disclosures, grounded in the principles of legitimacy and stakeholder theories, is presumed to be affected by the extent of state ownership. This is due to the tendency of government members on corporate boards to highlight their efforts on environmental issues (Acar et al., 2021). To fulfil stakeholder expectations, organizations are expected to communicate specific information deemed relevant to these key parties transparently (Cotter & Najah, 2012). Once governments pass environmental regulations, state-owned companies typically face increased pressure

from governments, leading them to be expected to take on heightened environmental responsibilities, such as willingly disclosing information concerning their carbon emissions (Singhania & Bhan, 2024).

According to several studies, such as those conducted by Giannarakis et al. (2018), Acar et al. (2021), Fransisca et al. (2024), Nguyen et al. (2025), and Singhania & Bhan (2024) state ownership has a positive effect on carbon emissions disclosure. Therefore, this study formulates the following hypothesis:

H1: State ownership has a positive impact on carbon emissions disclosure.

3.3. Public Ownership and Carbon Emissions Disclosure

Public ownership refers to the extent to which shares are distributed to the public. The greater the proportion of shares available, the higher the opportunity for transparency in conveying information (Salsani & Nursiam, 2025). Companies with high public ownership can build trust through information transparency, social and environmental responsibility, and good management of greenhouse gas emissions by reporting their carbon footprint, while oversight by public shareholders encourages increased emissions disclosures that strengthen the company's positive image (Ng et al., 2022).

According to several studies, such as those conducted by Akhiroh & Kiswanto (2016) and Ng et al. (2022) state that public ownership has a positive effect on carbon emissions disclosure. Therefore, this study formulates the following hypothesis:

H2: Public ownership has a positive impact on carbon emissions disclosure.

3.4. Profitability as a Moderating Variable of Ownership Structure on Carbon Emissions Disclosure

Legitimacy theory is essential in explaining how a company's profitability influences its decision to disclose information on carbon emissions, as firms with higher earnings are generally perceived to have a greater capacity to implement effective emission reduction strategies. Therefore, the company's responsibility in this regard increases, because public expectations of them also increase along with better financial capabilities (Ratmono et al., 2021). Profitability is part of a series of variables that measure financial performance (Fransisca et al., 2024). Companies with good financial performance tend to show commitment to the environment, especially in reducing carbon emissions (Hudzafidah et al., 2023; Otero-González et al., 2021). This is reflected through their carbon emissions disclosure. Thus, positive performance not only has an impact on economic aspects, but also reflects corporate social responsibility (Wahyuningrum et al., 2022).

Carbon transparency usually begins when companies have sufficient financial resources to disclose carbon emissions, with results that are considered commensurate (Wahyuningrum et al., 2024). In the carbon emissions disclosure, ensuring stakeholder trust in the company's ability to generate profits is crucial in strengthening the relationship between state and public ownership regarding the disclosure. The shareholding structure plays a role in the company's operations, as shares are part of the capital that supports the continuity of its business activities (Surayya & Kadang, 2020). Companies with strong financial performance generally possess greater capacity to allocate resources toward reducing carbon emissions and are more likely to disclose such initiatives. Furthermore, solid financial conditions enable firms to mitigate the risk of incurring losses associated with carbon-intensive activities, thereby reinforcing their commitment to sustainability in the eyes of stakeholders. (Faisal et al., 2018).

In previous studies, some studies tested the effect of state ownership on profitability, as conducted by Ben Rejeb Attia et al. (2018) and Nguyen & Nguyen (2024) show that state ownership has a positive effect on company profitability. Some studies test the impact of public ownership on profitability, as conducted by Agustina & Djoko (2018) and Surayya & Kadang (2020) show that public ownership has a positive effect on company profitability. In addition, some studies examine the impact of profitability on carbon emissions disclosure, as conducted by Faisal et al. (2018), Nisak & Yuniarti (2018), Ismail et al. (2018), Akbaş & Canikli (2018), Abdullah et al. (2020), and Wahyuningrum et al. (2024) show

that profitability has a positive effect on carbon emissions disclosure. Therefore, this study formulates the following hypothesis, as presented in Figure 1:

H3: Profitability moderates the relationship between state ownership and carbon emissions disclosure.

H4: Profitability moderates the relationship between public ownership and carbon emissions disclosure.

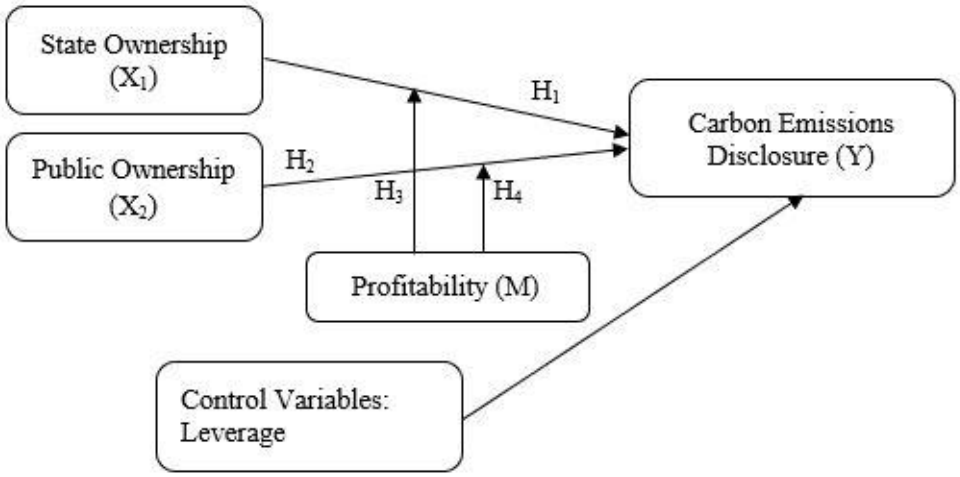


Figure 1. Conceptual framework

4. Research Method

4.1. Data Collection

This research uses quantitative methods. It uses secondary data from annual reports and sustainability reports of non-financial sector companies listed on the Indonesia Stock Exchange between 2021 and 2023. The sampling method employed is purposive sampling, selected based on specific predetermined criteria, which are detailed in Table 1.

Table 1. Determining the sample size

No.	Criteria	Total
1	Firms from the non-financial sector registered on the Indonesia Stock Exchange from 2021 to 2023.	660
2	Firms that made their annual and sustainability reports publicly available on their websites or via the Indonesian Stock Exchange continuously from 2021 to 2023.	(22)
3	Companies that are not suspended for the 2021-2023 period.	(36)
The total number of firms that fulfil the criteria for the research sample		602
Total samples used for research for 3 periods (602 x 3)		1806

4.2. Variable Measurement

Dependent Variable: Carbon Emissions Disclosure

Carbon emission disclosure serves as a medium through which companies demonstrate responsibility to stakeholders for the carbon emissions generated from their operational activities. This disclosure process is aligned with prevailing legal regulations, emphasizing transparency and accountability in its execution. Beyond regulatory compliance, it also plays a pivotal role in supporting environmental sustainability efforts by mitigating the adverse effects associated with climate change. This is achieved through various mitigation and adaptation initiatives that are designed in a relevant, effective, and efficient manner (Fransisca et al., 2024). In Peng et al. (2015), CED measurement includes the following items:

I1 = Emission reduction targets and results

I2 = Carbon emission measurement method

I3 = Direct greenhouse gas emissions

I4 = Indirect greenhouse gas emissions from energy

I5 = Energy consumption of total operations in the reporting year

Source of CED measurement: Bedi & Singh (2025)

$$CED = \frac{\text{Total Disclosure}}{\text{Maximum Disclosure}} \quad (1)$$

Independent Variables: State Ownership, Public Ownership

State ownership refers to shareholdings in a company under the government's control. In this case, the government has the right to these shares. This ownership demonstrates the state's participation in overseeing the company's operations. (Fransisca et al., 2024).

Source of *SO* measurement: Bedi & Singh (2025)

$$SO = \text{Percentage of shares owned by the government} \quad (2)$$

Public ownership pertains to the proportion of shares held by the public, which significantly influences the development of these shares (Surayya & Kadang, 2020).

$$PO = \frac{\text{Share Owned by The Public}}{\text{Shares Outstanding}} \quad (3)$$

Moderating Variable: Profitability

Profitability describes the company's ability to manage its resources to produce optimal financial performance. This refers to the company's effectiveness in utilizing its assets and capital to achieve expected profits, thus reflecting management's success in managing operations efficiently (Dharma et al., 2024).

Source of *ROA* measurement: Chu et al. (2013)

$$ROA = \frac{\text{Net Profit}}{\text{Total Assets}} \quad (4)$$

Control Variable: Leverage

Leverage reflects a company's reliance on debt financing to enhance its profitability. An increase in the company's debt level may lead to greater pressure from creditors for the company to disclose its carbon emissions voluntarily (Fransisca et al., 2024).

Source of *LEV* measurement: Wahyuningrum et al. (2022)

$$LEV = \frac{\text{Total Liabilities}}{\text{Total Equity}} \quad (5)$$

4.3. Data Analysis Technique

This research employs Moderated Regression Analysis (MRA) as the analysis method. The formulation of the Moderated Regression Analysis model is presented below:

$$CED = \alpha + \beta_1 SO + \beta_2 PO + \beta_3 LEV + \beta_4 ROA + \beta_5 SO*ROA + \beta_6 PO*ROA + \varepsilon \quad (6)$$

Where:

α = Constant
β = Regression Coefficient
CED = Carbon Emissions Disclosure
SO = State Ownership
PO = Public Ownership
LEV = Leverage
SO*ROA = Interaction between State Ownership and Profitability

PO*ROA = Interaction between Public Ownership and Profitability
ε = Error

5. Results and Discussion

5.1. Descriptive Statistics

In this research, a descriptive statistical analysis was performed to understand the general characteristics of the research variables before conducting further analysis, and the results are presented in Table 2.

Table 2. Descriptive Statistics Results

Variable	Obs	Mean	Std. dev.	Min	Max
CED_Y	1806	.5827243	.3163688	0	1
SO_X1	1806	.0131186	.0881291	0	.824811
PO_X2	1806	.2608138	.1707547	0	1
ROA_Z	1806	1.902331	97.02267	-1391.151	3612.443
LEV_C	1806	1.172345	9.374139	-231.2628	190.307

Data source: Stata 17, Data Processed, 2025

The descriptive statistical analysis results indicate that the average level of carbon emission disclosure among the observed companies is relatively high, reaching 0.5827. However, the presence of firms that provide no disclosure at all highlights a disparity in transparency practices, showing that carbon emission reporting is still inconsistently implemented across companies.

Viewed from the perspective of ownership structure, the proportion of state ownership in the sampled firms tends to be low. This condition is reflected in the average value of 0.0131, signifying that state participation in corporate ownership is minimal. Consequently, indicates that most companies in the sample are not state-owned. In contrast, public ownership is more varied, with an average of 0.2608, which means that around 26% of company shares are owned by the public. This suggests that companies in the sample tend to be owned more by public investors than by the state.

Regarding profitability, the ROA results have an average of 1.9023, reflecting a low return on assets in general. However, the substantial standard deviation indicates significant variation, with some companies experiencing large losses, while others have very high profitability. This high variation suggests that the financial condition of the companies in the sample is very diverse.

The firms included in the observation exhibit a mean leverage ratio of 1.1723, reflecting a generally low proportion of debt to their equity. However, the minimum value is very low to negative, and the maximum value is very high, in the form of substantial debt and negative equity.

5.2. Baseline Model

5.2.1. Panel Data Regression Model Selection

To determine the most appropriate panel data regression model for this research, a series of commonly used statistical tests were conducted, namely the Chow Test, the Lagrange Multiplier Test, and the Hausman Test. These three tests aim to compare and select the most suitable model among the Pooled Least Squares (PLS), Fixed Effect Model (FEM), and Random Effect Model (REM).

Table 3. Panel Data Regression Selection Results

Chow Test	***Lagrange Multiple Test***	***Hausman Test***
Since the probability value is 0.0000 < 0.05, the Fixed Effect Model is appropriate.	Due to the probability value of 0.0000 < 0.05, the Random Effect Model is deemed suitable for this analysis.	The probability value is 0.6497 > 0.05, so the Random Effect Model is the most appropriate.

Data source: Stata 17, Data Processed, 2025

Referring to the results of the panel data regression model selection presented in Table 3, this study identifies the Random Effect Model as the most suitable approach for conducting the regression analysis. In panel data regression, not all classical assumption tests must be performed. This is because, in theory, the use of panel data can reduce the possibility of bias that can appear in the analysis results (Gujarati & Porter, 2009).

5.2.2. Multicollinearity Test

To evaluate the presence of multicollinearity among the independent variables, a multicollinearity test was conducted and the results are presented in Table 4.

Table 4. Multicollinearity Test Results

Variable	VIF	1/VIF
SO_X1	1.06	0.944289
SO_X1ROA_Z	1.04	0.958632
PO_X2	1.03	0.971775
LEV_C	1.01	0.987873
PO_X2ROA_Z	1.00	0.999873
Mean VIF	1.03	

Data source: Stata 17, Data Processed, 2025

The results of the multicollinearity test in Table 4 show that the tolerance value is > 0.1 and the VIF is < 10; it can be concluded that the variables in this study do not exhibit multicollinearity.

5.2.3. Heteroskedasticity Test

As part of the classical assumption tests, heteroscedasticity testing was performed to determine the consistency of variance across observations, and the results are shown in Table 5.

Table 5. Heteroscedasticity Test Results

Breusch Pagan/Cook Weisberg test	**Prob.**
Chi2	2.89
Prob>Chi2	0.7165

Data source: Stata 17, Data Processed, 2025

The results of the heteroscedasticity test presented in Table 5 indicate the presence of homoscedasticity, suggesting that no signs of heteroscedasticity are present in the regression model using panel data for this study.

5.2.4. Test Coefficient of Determination (Adjusted R^2)

In this research, the coefficient of determination test was conducted to measure the extent to which the independent variables can explain the variation in the dependent variable, and the results are presented in Table 6.

Table 6. Test Results of the Coefficient of Determination

Source	SS	df	MS		
Model	1.95618715	5	.39123743	Number of obs	= 1806
Residual	178.70481	1,800	.0992804	F(5, 1800)	= 3.94
				Prob > F	= 0.0015
				R-squared	= 0.0108
				Adj R-squared	= 0.0081
Total	180.660997	1,805	.100089195	Root MSE	= .31509

Data source: Stata 17, Data Processed, 2025

In Table 6, the adj R-squared value of 0.0081 indicates that the proportion of carbon emission disclosure explained by state and public ownership is 0.81%. The remaining 99.19% is attributed to other influencing factors that were not examined within the scope of this research.

5.2.5. Hypothesis Tests

In this research, a moderation regression test was conducted to test the hypothesis proposed in the research, and the results are presented in Table 7.

Table 7. Moderation Regression Test Results

CED_Y	Coefficient	Std. err.	t	P>t	[95% conf.	interval]
SO_X1	.3543192	.0858618	4.13	0.000	.1859198	.5227185
PO_X2	-.031673	.0434492	-0.73	0.466	-.1168892	.0535432
SO_X1ROA_Z	.8878848	1.356862	0.65	0.513	-1.773305	3.549075
PO_X2ROA_Z	-7.97e-06	.0003141	-0.03	0.980	-.0006241	.0006081
LEV_C	-.0000701	.0007914	-0.09	0.929	-.0016223	.0014821
_cons	.586211	.0136011	43.10	0.000	.5595354	.6128865

Data source: Stata 17, Data Processed, 2025

Referring to the results displayed in Table 7, the coefficient of state ownership is 0.3543192 with a p-value of 0.0000, which is less than the 0.05 significance level, indicating that the hypothesis is empirically supported and suggesting that state ownership significantly and positively influences carbon emission disclosure.

The coefficient for public ownership is recorded at -0.031673, with a p-value of 0.466, which exceeds the 0.05 threshold, indicating that public ownership does not significantly influence carbon emissions disclosure.

Interaction between state ownership and profitability (ROA) on carbon emission disclosure is not significant, which means profitability (ROA) cannot moderate state ownership on carbon emission disclosure. The moderating effect of profitability on the relationship between state ownership and carbon emission disclosure yields a coefficient of 0.8878848 with a p-value of 0.513, which exceeds the 0.05 threshold. This shows that profitability cannot moderate state ownership on carbon emission disclosure.

Interaction between public ownership and profitability (ROA) on carbon emission disclosure is not significant, which means profitability (ROA) cannot moderate public ownership on carbon emission disclosure. The moderating role of profitability in the relationship between public ownership and the level of carbon emission disclosure yields a coefficient of -7.97e-06. However, the p-value of 0.980 exceeds the 0.05 threshold, indicating that profitability cannot moderate public ownership on the extent of carbon emission disclosure.

The variable of leverage, which functions as a control variable in the model, presents a regression coefficient of -0.0000701. With a p-value of 0.929 exceeding the 0.05 significance threshold, this shows that leverage does not have a significant effect on carbon emissions disclosure.

5.3. Discussion

The analysis reveals a coefficient of 0.3543 with a p-value of 0.000 for state ownership, state ownership has a positive and significant effect on carbon emissions disclosure. The result aligns with the study conducted by Giannarakis et al. (2018), Acar et al. (2021), Fransisca et al. (2024), Nguyen et al. (2025), and Singhania & Bhan (2024) show that state ownership has a positive effect on carbon emissions disclosure. Companies owned by the state tend to face higher regulatory pressure and are encouraged to increase transparency in carbon emissions disclosure. According to Stakeholder Theory, the government, as one of the main stakeholders, strongly influences companies to act more environmentally responsibly. Meanwhile, according to Legitimacy Theory, state-owned companies are more likely to disclose carbon emissions reports to maintain their social legitimacy and meet public expectations for environmental regulatory compliance.

The analysis reveals that the coefficient value associated with public ownership is -0.031673. Since the resulting p-value is 0.466, which exceeds the standard significance threshold of 0.05, it implies that public ownership does not significantly affect carbon emission disclosure. The result aligns with the study conducted by Salsani & Nursiam (2025), indicating that the level of public ownership does not significantly influence the extent of carbon emission disclosure. Increasing public ownership within a firm does not necessarily lead to greater transparency in carbon emissions disclosure. This is because external factors, such as pressure from external stakeholders, do not influence carbon emission disclosure practices, which may be more driven by internal factors such as CEO characteristics, internal company regulations, and other internal factors. In addition, the absence of direct demands from public shareholders regarding environmental transparency may contribute to the limited impact of public ownership on carbon emissions disclosure. As a result, companies with a greater proportion of public ownership may lack sufficient motivation to enhance the reporting of their carbon emissions.

The regression output analysis reveals that the interaction effect of profitability and state ownership on carbon emission disclosure yields a coefficient of 0.8878848. However, the associated p-value of 0.513 exceeds the threshold of 0.05. This suggests that profitability does not moderate the relationship between state ownership and the level of carbon emission disclosure. This finding does not align with the previous research conducted by Ben Rejeb Attia et al. (2018), and Nguyen & Nguyen (2024), which shows that state ownership positively affects corporate profitability. However, this finding is in line with the previous research conducted by Riantono & Sunarto (2022), Wahyuningrum et al. (2022), Fransisca et al. (2024), and Dharma et al. (2024), which indicates that profitability does not affect carbon emissions disclosure. In other words, corporate profitability neither amplifies nor diminishes the influence of state ownership on environmental transparency. Thus, the effect of state ownership on carbon emission disclosure remains unaffected by variations in firm profitability. In other words, carbon emission disclosure by state-owned companies is driven by regulatory and public responsibility factors rather than profitability.

The coefficient of the interaction between profitability and public ownership on carbon emissions disclosure is -7.97e-06, with a significance value of 0.980, which exceeds the 0.05 threshold. This indicates that profitability does not moderate the relationship between public ownership and carbon emissions disclosure, meaning that a company's extent of public ownership does not significantly affect its carbon emissions disclosure, regardless of whether profitability is high or low. This finding is in line with the previous research conducted by Zakiyatun et al. (2024) shows that public ownership does not affect the profitability of the company, as well as previous research conducted by Riantono & Sunarto (2022), Wahyuningrum et al. (2022), Fransisca et al. (2024), and Dharma et al. (2024) indicates that profitability does not affect carbon emissions disclosure.

This study uses leverage as a control variable with a coefficient value of -0.0000701 and a probability level of 0.929, which exceeds the 0.05 significance threshold. These results suggest that leverage does not have a significant effect on carbon emissions disclosure. This finding is in line with the previous research conducted by Riantono & Sunarto (2022) and Wahyuningrum et al. (2022) shows that leverage does not significantly affect carbon emissions disclosure. Generally, companies with high levels of debt may experience greater financial pressure, leading them to be more cautious in allocating resources to non-financial aspects such as environmental reporting. Nevertheless, the regression analysis indicates that leverage does not significantly influence a company's decision to disclose information related to carbon emissions, implying that the level of debt does not determine the extent of environmental transparency.

6. Conclusions, Contributions and Limitations

This research aims to expand existing studies and achieve three objectives, namely, to provide empirical evidence regarding the influence of State Ownership on Carbon Emissions Disclosure, to examine the effect of Public Ownership on Carbon Emissions Disclosure, and to explore whether Profitability can moderate the relationship between State Ownership and Public Ownership on Carbon Emissions Disclosure. The study uses a sample of 1.806 non-financial companies in Indonesia from 2021 to 2023. Data was collected from annual and sustainability reports on company websites or the Indonesia Stock

Exchange website (www.idx.co.id). Furthermore, this study obtained results from statistical testing of Stata version 17. The results of this study indicate that state ownership has a positive and significant effect on carbon emissions disclosure, while public ownership has no significant impact on carbon emissions disclosure. The profitability variable cannot moderate the influence of state and public ownership on carbon emission disclosure.

This research provides a theoretical contribution to advancing the accounting conceptual framework, particularly regarding the concept of disclosure, focusing on voluntary disclosure. In a practical context, the findings serve as a foundation for formulating government policies and regulations to encourage companies to enhance the carbon emissions disclosure within annual and sustainability reports. Furthermore, this study enables companies to better comprehend the factors that influence carbon emission disclosure, thereby supporting investors in making more informed investment decisions by gaining deeper insights into companies' carbon emission challenges.

The limitation of this study lies in the fact that the sample is limited to non-financial companies, which may restrict the applicability of the findings to companies in the financial sector, as these entities operate under different regulations and possess distinct business characteristics. This constraint may affect the generalizability of the results. In addition, this study does not include all carbon emission disclosure items, so the carbon emission disclosures analysed may not fully represent the company's overall environmental transparency. Future research should compare companies from different industry sectors to understand whether significant differences in carbon emissions disclosure are based on business sector characteristics. It is suggested that future research broaden the scope of carbon emission disclosures by incorporating all pertinent disclosure items. This approach would enable a more thorough analysis, offering a more precise and comprehensive understanding of corporate transparency regarding carbon emissions. This study does not include a robustness test. For future research, we recommend conducting a robustness test using profitability measures such as ROE, NPM, and other relevant variables.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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