

The Effect of Carbon Emission Disclosure, Profitability, and Firm Size on Capital Market Reaction: A Moderation Study of Media Coverage

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Abstract:

The purpose of this study is to investigate how the influence of carbon emission disclosure, ROA, and company size affects the capital market reaction, especially in the form of abnormal stock returns. This is important because the causal variables studied increase investor confidence and influence their investment decisions. A critical component of national economic infrastructure is the capital market system. Meanwhile the Efficient Market Hypothesis (EMH) suggests Indonesia's capital market exhibits semi-strong efficiency, corporations must fulfil environmental and social responsibilities to maintain community legitimacy. Market participants evaluate various financial metrics, including profitability ratios and organizational scale, which significantly influence equity valuations. This research examined 42 entities within the transportation and logistics sector listed on the Indonesia Stock Exchange (IDX) during the 2021-2023 period. The finding indicates that the market has not achieved semi-strong efficiency, as investment decisions frequently demonstrate behavioural biases influenced by psychological factors rather than rational analysis. A methodological limitation of this investigation is its focus on a single sector within transportation and logistics firms.

Keywords: Carbon Emission Disclosure (Ced); Capital Market; Company Size; Media Coverage; Profitability.

1. Introduction

The capital market plays a crucial role in a country's economic activities. Through the Indonesia Stock Exchange (IDX), companies can acquire funds to support their business operations and expansion plans. Simultaneously, investors can utilize this platform for temporary investments aimed at maximizing returns. The market responds to corporate actions as these decisions directly influence investor returns. Capital market efficiency is generally classified into three forms: weak, semi-strong, and strong. Recent empirical evidence suggests that the Indonesian capital market exhibits semi-strong form efficiency, indicating that security prices reflect all publicly available corporate information (Kusumaningtyas, 2019). Companies disseminate both financial and non-financial information, with Carbon Emission Disclosure (CED) emerging as a significant component of financial reporting. The prominence of CED has increased considerably due to its intrinsic connection with corporate social responsibility (CSR) and environmental impact assessment. Investors tend to view in favour companies that incorporate CED in their Sustainability Reports (SR). Institutional theory exhibits organizations seek legitimacy for social acceptance and operational continuity, companies voluntarily disclose their environmental impact, despite the non-mandatory nature of such reporting (Solekhah & Wahyudi, 2022). The primary objective of Carbon Emission Disclosure is to enhance public awareness regarding operational environmental impacts, thereby facilitating the development of environmentally conscious regulations. This disclosure practice aligns with longterm investors' growing emphasis on environmental considerations in their investment decisions. Empirical research has demonstrated that carbon emission announcements significantly influence capital market responses (Bimha & Nhamo, 2017). Previous research has not considered the influence of media in moderating the impact of



carbon emission disclosures on capital market reactions. Positive media coverage of carbon emission disclosures can be perceived as a signal that the company is committed to sustainability and social responsibility. This, in turn, can enhance investor confidence and driveup stock prices.

Environmental considerations significantly influence capital market responses and investment decisionmaking processes. Given that the Indonesian capital market exhibits semi-strong form efficiency, investors respond to both mandatory and voluntary information disclosures. Furthermore, investors incorporate media-disseminated information alongside corporate disclosures into their decision-making framework. The media serves as an independent intermediary, facilitating information flow between corporations and investors. Wang et al. (2013) emphasize that media, as a primary information source for stakeholders, can substantially influence organizational decision-making. This information dissemination helps reduce information asymmetry among stakeholders, while media coverage enhances public access to critical disclosure information (Wirawan & Setijaningsih, 2022). Consequently, media coverage can either intensify or diminish the impact of Carbon Emission Disclosures on financial market responses. In their investment decisions, investors also consider corporate profitability metrics. High profitability levels enhance investor confidence by signaling robust financial health. Moreover, larger corporations are typically perceived as having greater financial stability and stronger market reputations, making them more attractive to potential investors. The transportation and logistics sector holds particular significance in the capital market, demonstrating notable growth in 2023. According to national statistics, the air transportation sector experienced 13.4% growth, while maritime and rail transportation sectors grew by 2.06% and 0.99%, respectively. However, this sector represents a significant environmental concern, contributing 23% of total carbon emissions, ranking it as the second-largest emissions contributor across industries (Anderson & Smith, 2023).

2. Literature Review

Institutional theory posits that organizations pursue legitimacy—defined as social acceptance—to facilitate effective operational functioning. Organizations that deviate from established institutional norms are perceived as irrational or anomalous. The concept of institutional isomorphism, introduced by DiMaggio and Powell, suggests that organizations within similar institutional contexts tend toward homogeneity due to various internal and external pressures. This phenomenon is evident in the transportation and logistics sector, where Carbon Emission Disclosure (CED) practices have become institutionalized, creating normative pressure for industry-wide adoption.

The Efficient Market Hypothesis (EMH) postulates that market efficiency is achieved when stock prices fully reflect all available information, leading to price equilibrium through accessible and cost-effective information dissemination among market participants. Hartono (2022) defines an efficient market as one that responds swiftly and appropriately to new information, establishing a new equilibrium price that accurately incorporates available information. Market efficiency is traditionally categorized into three forms: weak, semi-strong, and strong. The weak form suggests that current market prices reflect all historical price movement information. Semi-strong form efficiency indicates that current prices incorporate all publicly available information. Strong form efficiency implies that security prices fully reflect all information, including private data. Empirical verification of market efficiency requires robust testing mechanisms. Information content in market announcements can be evaluated through returns analysis, specifically examining price changes or abnormal returns. Hartono (2022) argues that the presence of abnormal returns following an announcement indicates significant information content, suggesting market responsiveness to new information. Capital market reaction manifests as security price adjustments in response to new market information.

The speed and pattern of market response vary according to the level of market efficiency. In efficient markets, price adjustments occur rapidly following new information dissemination, whereas inefficient markets exhibit delayed or gradual responses. Hartono (2022) suggests that market response can be quantified through returns analysis, particularly through abnormal returns—defined as the differential between actual and expected investor returns. The cumulative abnormal return (CAR) methodology, which incorporates beta as a risk factor in stock return calculations, provides a more precise measurement of market response. This relationship suggests that the use of a CAR methodology that considers beta as a risk factor can help understand how voluntary carbon emission disclosure (CED) transparency, especially by companies with good financial performance, affects the market response to the environmental information provided (Al-Mari & Mardini, 2024).

Carbon Emission Disclosure (CED) represents a crucial component of corporate environmental responsibility, particularly for operations with significant environmental impact potential. Corporate disclosure



through annual reports serves as a mechanism for environmental and social accountabilityThis disclosure practice, embedded within the broader framework of corporate social responsibility, aims to enhance organizational legitimacy and public reputation. The present study employs CED measurement criteria derived from the Carbon Disclosure Project (CDP) information request framework. CDP, an international non-profit organization established in 2000, facilitates global carbon emission data disclosure initiatives. The methodology involves quantifying and analyzing disclosed information regarding energy consumption patterns and their environmental implications. Bae Choi et al. (2013) developed a comprehensive disclosure index based on CDP parameters, encompassing five major categories subdivided into eighteen distinct disclosure items. The following are the CED disclosure categories:

	Category	Disclosure Items		
1. Climate change risks and		1. Climate risk or climate change	_	
	opportunities (CC)	Opportunity or business or climate change		
2.	Greenhouse gas (GHG)	1. GHG protocol or ISO or Panel on Climate Change (IPCC)		
	emissions	Verification or third party		
		3. Total emissions or CO2		
		4. Greenhouse gases or emissions or Carbon		
		5. Coal or electricity or mining		
		6. Machine or vehicle		
		7. Previous year's emissions		
3.	Energy consumption	1. The amount of energy or energy consumption or consumption or amour	nt	
	(EC/Energy Consumption)	2. Biodiesel or biofuel or vegetable or renewable.		
		3. Energy or Electricity		
4.	Greenhouse gas reduction and	1. Reducing emissions or strategies	_	
	costs (RC)	2. Emission reduction targets or levels		
		Environmental costs or environmental budget		
		4. Environmental capital expenditure or capital expenditure		
5.	Accountability of	1. Climate or climate change (seen from the board of directors' report	t)	
	EmissionCarbon (AEC)	Company climate or development (seen from the board of directors report).	s'	

Table 1. CED Disclosure Categories and Items

Source: Choi et al. (2013)

Media coverage, while lacking a standardized academic definition in existing literature, encompasses the systematic reporting and dissemination of information through various communication channels. According to the Indonesian Language Dictionary (2019), the term encompasses comprehensive reporting or in-depth analysis of specific events or issues through diverse communication platforms, including print media, broadcast channels, and digital platforms. Media coverage functions as both an information conduit and an intermediary mechanism in public communication. The media's capacity to shape public opinion stems from its editorial perspective and narrative framing. Pratiwi and Sari (2016) emphasize that organizations must carefully manage their media relationships due to the significant impact on corporate reputation. Media dissemination of sensitive corporate information, particularly negative news, can trigger stakeholder reactions, potentially affecting stock valuations and market performance. Conversely, positive media coverage, especially regarding environmental initiatives, can incentivize enhanced corporate disclosure practices (Nur & Priantinah, 2012). This relationship demonstrates the media's dual role as an information disseminator and a catalyst for corporate transparency.

Corporate profitability serves as a crucial determinant in investment decision-making processes, as it demonstrates an organization's efficiency in resource utilization for profit generation over specified periods. Companies exhibiting high profitability ratios indicate superior resource management capabilities, thereby enhancing their financial performance metrics. While various profitability indicators exist, this study employs Return on Assets (ROA) as the primary measurement tool, as it effectively quantifies an organization's efficiency in asset utilization for profit generation (Sudan, 2015). Companies demonstrating robust profitability metrics are generally perceived to possess substantial financial resources. Corporate size emerges as another significant factor influencing investor decision-making, particularly due to the enhanced market recognition of larger enterprises' products and services. Jensen and Thompson (2020) posit that corporate scale is primarily determined through total asset valuation or net profit metrics. The magnitude of asset holdings serves as a direct indicator of



organizational scale. According to Indonesian regulatory framework (Law No. 20, Chapter IV, Article 6, 2008), enterprises are categorized into three distinct.

Hypothesis Development

The Relationship Between Carbon Emission Disclosure and Capital Market Reaction

While Carbon Emission Disclosure (CED) remains a voluntary component of sustainability reporting (SR), institutional theory suggests that organizations engage in such disclosure practices to enhance stakeholder trust and legitimacy. Companies' Carbon Emission Disclosures represent an essential element of their environmental stewardship and demonstrate compliance with societal expectations. Given Indonesia's semi-strong form market efficiency, stock prices reflect all publicly available information, including sustainability reports. The empirical evidence regarding the relationship between CED and capital market reactions presents mixed findings. Several studies have documented a significant association between CED and market response (Asmaranti et al., 2018; Bimha & Nhamo, 2017). However, contradictory evidence exists, with some research indicating no significant relationship between CED and market reactions findings in the extant literature warrant further investigation into this relationship.

Drawing from institutional theory and the efficient market hypothesis, coupled with empirical evidence from previous studies, we propose the following hypothesis:

H1: Carbon Emission Disclosure exhibits a significant relationship with capital market reaction.

The Moderating Role of Media Coverage in the Relationship Between Carbon Emission Disclosure and Capital Market Reaction

Organizational legitimacy remains fundamental for companies seeking to demonstrate compliance with societal norms and expectations. Fuadah et al. (2018) emphasize that corporate sustainability inherently depends on community support and environmental stewardship. To enhance stakeholder perception and establish legitimacy, organizations increasingly utilize media channels for information dissemination. Media serves as a crucial intermediary in corporate communication, effectively facilitating information flow between organizations and their stakeholders (Jannah & Muid, 2014). Media coverage can potentially mitigate institutional pressures through effective stakeholder communication, subsequently influencing corporate reputation and market reactions. The media's role extends beyond mere information dissemination; it possesses the capacity to frame narratives and shape public perception, thereby moderating the impact of corporate disclosures on stakeholder opinion. As a moderating variable, media coverage can potentially amplify or attenuate the relationship between independent and dependent variables. Consequently, media coverage may strengthen or weaken the impact of corporate environmental disclosures on investor perceptions, as reflected in capital market reactions. The media's ability to frame and contextualize environmental information suggests its potential moderating role in the relationship between Carbon Emission Disclosure and market response.

Based on this theoretical framework and empirical evidence, we propose the following hypothesis:

H2: Media coverage significantly moderates the relationship between Carbon Emission Disclosure and capital market reaction.

The Relationship Between Profitability and Capital Market Reaction

Profitability serves as a crucial financial indicator influencing investment decisions. Enhanced profitability metrics signal favorable future earnings potential, potentially stimulating investor interest and affecting stock valuations. This study employs Return on Assets (ROA) as the primary profitability measure, where higher ROA values indicate superior resource utilization efficiency. Empirical evidence regarding the relationship between profitability and investor decision-making presents mixed findings. While Churatunnisa and Andayani (2022) document a significant association between profitability and investor decisions, contrasting evidence is presented by Agustin et al. (2021). Based on these theoretical arguments and empirical evidence, we propose:

H3: Profitability exhibits a significant relationship with capital market reaction.

The Impact of Organizational Size on Capital Market Reaction

Organizational size, typically measured through total asset valuation, serves as a proxy for operational capacity and financial robustness. Larger organizations generally attract enhanced investor confidence due to their



perceived financial stability. Febrian and Nazar (2024) suggest that organizational size influences market response through increased public visibility and information accessibility. Market expectations typically demonstrate positive bias toward larger organizations due to their perceived capacity to navigate economic challenges and maintain financial stability. The empirical literature presents mixed evidence regarding the relationship between organizational size and market reaction, measured through stock price movements and investor returns. While several studies document a significant association between organizational size and stock price movements (Darmawan et al., 2019; Arifin & Agustami, 2017), other research suggests limited impact of size on market reactions (Anwar & Fadjrih, 2021).

Research Model

Based on the theoretical basis and hypothesis development, the relationship between the dependent, dependent and moderating variables in this study is:





3. Methods

This study employs secondary data obtained from corporate annual reports and financial statements. The primary independent variable, Carbon Emission Disclosure (CED), is assessed through content analysis of annual reports. Additional independent variables include Return on Assets (ROA) as a profitability measure and total assets as an organizational size proxy. The dependent variable, capital market reaction, is operationalized through abnormal returns. Following Sekaran and Roger (2016), we incorporate media coverage as a moderating variable, examining its influence on the relationship between Carbon Emission Disclosure and market reaction. Since each item is worth 1, a company would receive 18 if it disclosed every item in its report. The following formula is then used to weight the final scores:

$CED = \frac{\text{total disclosure score}}{\text{total maximal score (18)}}$

Market reaction in this study is operationalized through abnormal returns, defined as the differential between realized and expected returns (Hartono, 2022). The event study methodology employs a comprehensive observation window encompassing 61 trading days: 30 days prior to the annual report publication (t-30), the publication date (t0), and 30 days following publication (t+30). To establish the relationship between firm-specific returns and market returns, we utilize an estimation window of 100 trading days (t-130 to t-31). This extended estimation period enables robust parameter estimation for the market model and enhances the statistical reliability of our abnormal return calculations. The study used IBM SPSS statistic 25 for analysis data, the secondary data collect from yahoo finance. The following formula is used to determine abnormal returns in this study: 1) Calculating actual return:

$$R_{it} = \frac{P_{it} - P_{it-1}}{P_{it}}$$

Information:



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 R_{it} = The actual return occurs for the i-th security

 P_{it} = Current price

 P_{it-1} = Previous price

2) Calculating abnormal returns:

$$AR_{it} = R_{it} - E_{rt}$$

$$E_{rt} = \frac{IHSG_t - IHSG_{t-1}}{IHSG_{t-1}}$$

Information:

 R_{it} = Abnormal stock returns

 E_{rt} = Expected Return of shares

 $IHSG_t$ = Composite stock price index in period t

 $IHSG_{t-1}$ = Composite stock price index in period t-1

3) Calculating cumulative abnormal return (CAR)

$$CAR_{i,t} = \sum_{t=-30}^{t=+30} AR_{it}$$

Information:

CAR_{i.t} = Accumulated abnormal return of stock i

 AR_{it} = Abnormal return of stock i

Media coverage as a moderating variable in this study is measured by the company's news coverage in the media such as online magazines. Given a score of 1 if there is media coverage and 0 if not. Profitability in this study is measured using the ROA ratio. Here is the formula for ROA:

Return on Asset (ROA) =
$$\frac{Earning after Tax}{Total Assets}$$

Meanwhile, Company Size in this study uses the company's Total Assets, the following is the company size formula:

Size = Ln Total Aset

4. Findings and Discussion

Descriptive Statistics

Table 2. Descriptive Statistics

	Ν	Minimum	Maximum	Mean	Std. Deviation
ROA	42	28	.60	.0552	.14494
SIZE	42	21.08	32.26	28.5996	2.39509
CED	42	.16	.72	.4878	.14658
REACTION_INVEST	42	45	.57	.0634	.20654
CED_LipMed	42	.00	.72	.4627	.17981

Source: Processed Data (2024)

Based on the results of descriptive statistics, it shows the maximum, minimum, mean and standard deviation values for each variable. The highest average for the research variable was the Company Size disclosure variable of 32.26. The lowest minimum value for the research variable is the variable CED Lipmed 0.00 because there is no news so the Media Coverage value is 0. The highest standard deviation for the research variable is the Company Size variable of 2.39509. The number of data in this study studied was 42 data, the number was obtained from:

Table 3. Number of Samples

No.	Sample Criteria	Number of	Number of Years	Amount
		Companies		

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1.	Issuers in the transportation and logistics sector listed on the Indonesia Stock Exchange (IDX) during the period 2021 to 2023.	56	3	168
2.	Issuers that do not publish financial reports and annual reports (annual reports and/or sustainability reporting) consecutively during the period 2021 to 2023.	-16	3	-48
3.	Issuers that do not disclose carbon emissions, either in the form of at least one policy or item related to carbon emissions in the period 2021 to 2023.	-21	3	-63
4.	Issuers that do not have annual report publication date data:			
-	2021	-8		-15
-	2022	-2		
-	2023	-5		
	Total observations (n data)			42

Source: Processed Data (2024)

Classical Assumptions

To ensure that the results were unbiased, the study conducted a classical assumption test before testing the hypothesis. Normality, autocorrelation, heteroscedacity, and multicollinearity tests were used in the traditional assumption test of this study. The Kolmogorov Smirnov test is used to test the normality of research; If the significance value is greater than 0.05, the data is considered normally distributed. The data in this study were distributed normally, as indicated by the significance value of Kolmogorov Smirnov of 0.104. The Breusch-Godfrey Serial Correlation LM test was used in the autocorrelation analysis of this study. The regression model has no autocorrelation problem if the significance value is greater than 0.05; In this test, the significance value was 0.069, indicating that there was no autocorrelation. The Glejser test was used in the heteroscedasusity test of this study. The significance value in the Glejser test is more than 0.05 then there is no heteroscedasticity. There was no heteroscedasticity in this study because the significance value of the dependent variable was greater than 0.05. The VIF value and tolerance value were used in the multicollinearity test of this study. Multicollinearity does not occur if the tolerance value is less than 0.10 and the VIF value is less than 10. Multicollinearity did not occur in this study because the VIF value of each dependent variable was less than 10 and the tolerance value was less than 0.10.

Table 4. Classical Assumption Test

Variables	Normality test	Autocorrelation test (Breusch-Godfrey test)	Heteroscedasticity test	Multico	llinearity test
	(Asymp Sig.)	Res_Lag	•	VIF	tolerance
CED (X1)	.104	.069	.118	2,587	.387
ROA (X2)	•		.601	1,037	.965
X1*Z Moderation	•		.430	2,540	.394
Company Size (X3)	•		.435	1,055	.948
Courses Dressed D	ata (2024)				

Source: Processed Data (2024)

Table 4. Hypothesis Test (t-test)

Hypothesis	Variables	Unstandardized B	Significance
H1	CED (X1)	174	.629
H2	X1*Z Moderation	.340	.245
H3	ROA (X2)	263	.257
H4	Company Size (X3)	.010	.485

Source: Processed Data (2024)

The significance value in this study is greater than 0.05, which indicates that the hypothesis is not statistically supported, based on the data table of hypothesis test results. There is no evidence to support H1 stating that Capital Market Reactions are affected by Carbon Emission Disclosure (CED). Because stock prices in the market have not fully included information, this indicates that the Indonesian capital market is not yet efficient with a semistrong form. If the price of an asset accurately represents all available information, including that contained in the



financial statements of the company that issued the shares, then the market is said to be in a semi-robust efficient form.(Hartono, 2017). However, in this study, the release of company reports did not affect the price of securities. This indicates that the Indonesian capital market is in a state of weak efficiency and the price of securities is not in accordance with the company's historical data. In making financial decisions, investors do not use historical data. This study supports the previous findings by Huka & Kelen (2022) and Sariet al., (2024) which stated that the Indonesian capital market is not yet semi-strong efficient.

The second hypothesis of this study which states that media coverage moderates the effect of Carbon Emission Disclosure (CED) on capital market reactions is not statistically supported. The presence of media coverage variables is not able to strengthen or weaken the influence of CED on capital market reactions. Media is seen as not an effective means of conveying information to investors, some of the reasons why media are not an effective means include information bias or different investor interests. Behavioral finance theory states that the market is not always efficient because it is influenced by investor psychology, biases, and emotional factors. Gupta & Ahmed (2017) stated that investors are not always rational which leads to deviations in the price of securities from their fundamental value. Investors who are not always rational can make decisions based on the emotions or psychology of the investor in question. This phenomenon shows that emotional and psychological factors can influence investor preferences, where companies that show a commitment to sustainability and social responsibility tend to be more attractive to them, so the results of this study can be a guide to help investors make better investment decisions (Adinda, 2024; Pradesti, 2015).

The third and fourth hypotheses related to financial variables that state that ROA and Company Size affect Capital Market Reaction are not statistically supported. ROA is one of the profitability indicators that fundamentally compares profit after tax and total assets. Fundamental value is or intrinsic value is the value that should be a security (Hartono, 2017). The efficiency of the Indonesian capital market has not reflected past information, so investors are still following the trends that occur in the capital market, this is an advantage of securities technical analysis. Technical analysis uses market value in determining the price of securities, market value is the market price of the exchange at a certain time determined by market demand and supply. Based on behavioral finance theory, investors' decisions are influenced by psychological factors, so investors who are not always rational will take action according to current market trends. The results of this study are in line with previous research (Agustin et al., 2021; Ciptaningrum, 2023; Permatasari, 2017) that profitability does not affect the reaction of the capital market because the ROA indicator has a weakness, namely it tends to focus on the short-term rather than long-term goals.

The size of companies is not statistically supported by the reaction of the capital market, this indicates that it does not look at how big or small the size of companies in the transportation and logistics sectors is when making decisions to invest in the capital markets. The large size of the company reflects that the company has good financial or operational stability so that investors will be more confident if they invest in the company. However, the profit factor is also seen by potential investors, the term high risk high return so that investors will be more interested in companies that are growing and have high capital for their investment returns. Indonesia's capital market is dominated by young people, including millennials and Gen Z (Annur, 2023), young investors have a high investment risk preference because they are still at productive age. This research is in line with the research of Anwar & Fadjrih (2021) and Cyntessa Nur Annisa Mukti (2017) who stated that the size of the company does not affect the market reaction, the size of a large company does not always provide a large rate of return.

5. Conclusion and Recommendation

This study concludes that the hypothesis presented is not statistically supported. The capital market in semi-strong efficiency has also not been proven, the share price does not reflect the content of the information published by the company. This is related to behavioral financial theory because investors in deciding to invest are often irrational which is influenced by investor psychological factors. The limitation of this study is that the sample used is companies in the transportation and logistics sector, further research can use samples from companies in other sectors listed on the Indonesia Stock Exchange (IDX). Another limitation is that the study observation window uses 30 days, further research can use other observation window periods. Although investors rationally consider carbon emissions disclosure in their assessments, behavioral finance theory suggests that psychological and emotional factors can distort investors' responses to such information.



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