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The Effect of Carbon Tax, Capital Expenditure and Firm Size on Carbon Emission Disclosure on the Indonesia Stock Exchange

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A B S T R A C T

The impacts of carbon tax, capital expenditure, and firm size on carbon emission disclosure are investigated and validated in this study. The focus of the research will be on industrial businesses with a mining related business that are listed between 2020 and 2022 on the Indonesia Stock Exchange (IDX). This study method use of purposive sampling. The secondary data used is financial records that are obtained from the Indonesia Stock Exchange website. The Eviews 12 program is used to do the panel data regression analysis. The results of the study indicate that carbon taxes are the only variables that significantly affect the disclosure of carbon emissions. Nonetheless, there are two different factors that negatively affect carbon emission disclosure: capital expenditure and firm size.

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INTRODUCTION

It comes as no surprise that "global warming" is cited as the cause of weather anomalies, floods, landslides, and temperature variations. An increase in the quantity of greenhouse gases emitted into the earth's atmosphere is what causes global warming. There are two categories of greenhouse gases: those that cause warming directly and those that cause warming indirectly. One of the primary elements that directly causes global warming is carbon dioxide (CO2), which has a big volume and the capacity to absorb heat from sunlight.

Indonesia has one of the fastest deforestation rates in the world, mainly due to the conversion of forests to agricultural land, oil palm plantations, or mining. This process releases carbon stored in forest biomass into the atmosphere, contributing significantly to global carbon emissions. Many companies are beginning to recognize the importance of environmental responsibility in their operations and are looking for ways to reduce their carbon footprint. Companies in the energy sector, particularly those involved in the extraction and production of fossil fuels such as coal, oil and gas, are major contributors to carbon emissions in Indonesia. While some companies have adopted green practices, many still rely on fossil fuels with high carbon emissions.

From 6 billion tons of CO2 in 1950 to nearly quadrupling to over 22 billion tons in 2020—and continuing to rise to over 34 billion tons now global carbon emissions have surged (Ritchie & Roser, 2020). When coal is used to replace oil in the production of energy, more carbon dioxide (CO2) is released into the atmosphere, trapping heat and posing risks to human health, the environment, and the economy, these risks include sea level rise, decreased agricultural productivity, ecosystem damage, and climate change (IPCC, 2014).

Carbon emissions are disclosed as part of corporate social responsibility (CSR) disclosure, which is often referred to as environmental disclosure. Businesses can freely share accounting and other relevant information through this voluntary activity, which aids in their compliance with the rules outlined in the annual report (Jannah & Dul Muid, 2014).

Indonesia's carbon dioxide emissions in 2017 were expected to be 487 million tons (MtCO2), or 4.7% more than the previous year, based on data gathered by GCP. If Indonesia doesn't take action to limit or suppress its carbon dioxide emissions, it will rank among the primary contributors to global warming (Akhiroh & Kiswanto, 2016). According to the 2015 Paris Agreement, Indonesia must reduce its greenhouse gas emissions by 38% with international collaboration and by 29% on its own by 2030. The national energy policy was modified by the government in 2014. By 2020, the entire country is expected to be electrified, and by 2025, 23% of energy would come from renewable sources.

The disclosure of carbon emissions is influenced by numerous factors. One of the determining elements is the carbon tax (Pratama, 2022). Capital expenditure is the second aspect because businesses that disclose carbon information are responsible for managing their carbon emissions through their own budget (Dwinanda & Kawedar, 2019). Larger businesses are more likely to declare their carbon emissions (Firmansyah et al., 2021) in (Cecilia Rooschella & Virna Sulfitri, 2023) making firm size the third factor.

According to signaling theory, disclosing carbon emissions in company reports sends a good message to investors. It is anticipated that this signaling theory will assist investors in better understanding their portfolios and selecting assets. Disclosure of carbon emissions is also associated with legitimacy theory. Businesses can gain more credibility in the eyes of the public by disclosing environmental carbon emissions since they behave in an ecologically responsible manner. Legitimacy theory focuses on how government rules affect a company's connection with society. Businesses typically follow social norms and limits. A firm will become legitimate if it operates in line with social objectives and stays away from societal expectations.

The researcher plans to reevaluate the influence of capital expenditure, business size, and carbon tax in light of the inconsistencies from past research findings and the fact that several mining companies indicated that they would disclose carbon emissions in 2020–2022. Manufacturing companies listed on the IDX are engaged in the mining sector between 2020 and 2022. It is anticipated that this research will offer insights and data regarding the Indonesian economy, specifically regarding the disclosure of carbon emissions. This study replicates earlier research (Pratama, 2022), (Dwinanda & Kawedar, 2019), and (Cecilia Rooschella & Virna Sulfitri, 2023) in the industrial sector, namely in companies listed on the Indonesia Stock Exchange, but with different variables and observation periods (2020–2022).

LITERATURE REVIEW

Effect of Carbon Tax on Carbon Emissions Disclosure

Signaling theory predicts that businesses will disclose carbon emissions more frequently as an indication of their dedication to environmentally friendly business operations. According to this hypothesis, a carbon tax can have a significant impact on a company's disclosure of its carbon emissions since it sends a message about shareholder pressure, environmental value, and sustainable competitive advantage. Because of the tax levied on the use of fossil fuels, the law of demand states that an increase in the price of fossil fuels would lead to a drop in demand. Research by (Allan et al., 2014) in (Sekar Palupi et al., 2023) indicates that imposing a carbon price can both boost the economy and lower emissions. However, income tax only applies to this particular type of income.

H1 : Carbon Tax has an impact on Carbon Emissions Disclosure

Effect of Capital Expenditure on Carbon Emissions Disclosure

According to legitimacy theory, in order to comply with social regulations and win over the trust of the public, businesses that generate carbon waste can be required to submit reports on their carbon emissions. Capital expenditures themselves are included in social environmental activities since the relevant assets are included in fixed assets (Dwinanda & Kawedar, 2019). Investing in capital projects is a signal of quality that investors and customers alike can understand. Businesses that can reduce their carbon emissions are of interest to investors because this could impact their stock market value.

Disclosure of carbon emissions and capital expenditures are tightly tied. In line with the results of earlier investigations (Cecilia Rooschella & Virna Sulfitri, 2023). Businesses can invest in more modern, functional, and efficient fixed assets by putting into practice a more aggressive environmental strategy. Consequently, it is thought that businesses engaged in environmental social initiatives possess the capacity to regulate their emissions in order to lower their reported emissions.

H2 : Capital Expenditure has an impact on Carbon Emissions Disclosure

The Effect of Firm Size on Carbon Emissions Disclosure

In signaling theory, larger companies usually have a larger operational scale, which can have an impact on the amount of carbon emissions produced. Since a company's size can indicate its quality, trustworthiness, and commitment to sustainable business practices and environmental responsibility, its size can greatly influence carbon emissions disclosure. Since most businesses are of the micro, small and medium enterprise (MSME) type, firm size is critical to the influence of carbon emissions disclosure.

Due to the need to properly fund internal operations, conglomerate companies tend to generate larger and more stable cash flows (Lee & Cho, 2021) in (Cecilia Rooschella & Virna Sulfitri, 2023).

H3 : Firm Size has an impact on Carbon Emissions Disclosure

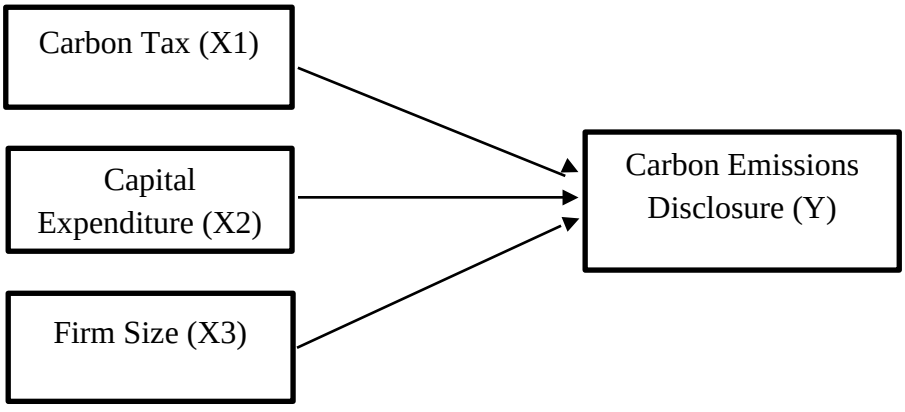


Figure 1. Framework of Thought

METHODOLOGY

This investigation falls under the category of quantitative research and employs a multiple regression analysis system to test hypotheses. The purpose of this analysis is to determine the impact of carbon tax, capital expenditure, and firm size on carbon emission disclosure in Indonesia. The analysis instrument is powered by EViews 12. The scope of this investigation spans three consecutive years, from 2020 to 2022. This research makes use of purposive sampling. As an example of a criterion for sample selection, consider the following: (1) Manufacturing firms operating in the mining industry that are publicly traded on the IDX between 2020 and 2022; (2) The organization consecutively releases its financial statements and corporate social responsibility (CSR) disclosures in its Annual Report, Sustainability Report, or CSR Report throughout the aforementioned time frame.

Operational Variables

1. Carbon Emissions Disclosure (Y)

Disclosure of greenhouse gas carbon emissions comprises a compilation of qualitative and quantitative data pertaining to the historical and projected carbon emission levels of an organization. The calculation of the GHG emissions disclosure level for this study was conducted utilizing the Global Reporting Initiative (GRI) 305 carbon emissions disclosure index. This index encompasses disclosure pertaining to particular topics associated with emissions. The assignment of a score of 1 to a disclosure item and a score of 0 to an undisclosed item, respectively.

$$CED = \frac{\sum xid}{n}$$

2. Carbon Tax (X1)

The measurement of the carbon tax variable is based on the carbon tax practice in Indonesia, where the rate is IDR 30 per kilogram of carbon dioxide (CO_2 e).

Carbon Tax = Total Carbon Emissions x Tax Rate

3. Capital Expenditure (X2)

Capital expenditure is measured according to the cash flow statement investment section for the acquisition of fixed assets.

Capex = ln (acquisition or purchase of fixed assets)

4. Firm Size (X3)

The magnitude of an organization is determined by its revenue, total assets, and earnings. This impacts the social efficacy of the company and its ability to achieve its objectives (Yeni et al., 2021). The formula for calculating firm size is as follows:

Firm Size = LN (Total Assets)

Data Analysis Technique

EViews 12 was utilized for data processing and result analysis. Model selection was evaluated using three distinct test methodologies prior to hypothesis testing: the Common Effect Model (CEM), the Fixed Effect Model (FEM), and the Random Effect Model (REM). The aforementioned tests consist of the Lagrange Multiplier test, the Chow test, and the Hausman test. In addition, the hypothesis is examined using the coefficient of determination, F test, and partial test (T test). The equation utilized for multiple regression analysis is as follows:

$$CED = \alpha + \beta_1 CT + \beta_2 CAPEX + \beta_3 FS$$

Description as follows:
CED = Carbon Emission Disclosure
CT = Carbon Tax
Capex = Capital Expenditure
FS = Firm Size
a = Constant

RESEARCH RESULT AND DISCUSSION

Descriptive Statistics

The results of descriptive statistical analysis produce the following data:

Table 1. Descriptive Statistics Results

Variables	N	Mean	Minimum	Maximum	Std. Deviation
CT	45	23,2260	18,06	27,78	1,96860
CAPEX	45	24,7864	20,38	29,11	2,73430
FS	45	29,4482	23,55	31,83	2,15635
CED	45	0,5687	0,00	1,00	0,32916

Source: EViews 12 Output dan Data Processed, 2024

According to the findings of the descriptive statistical analysis, the carbon tax variable (X1) exhibits a range of values from minimum 18.06 to maximum 27.78, with an average value of 23.2260 and a standard deviation of 1.96860. The variable representing capital expenditures (X2) exhibited a range of values from minimum 20.38 to maximum 29.11, with an average value of 24.7864 and a standard deviation of 2.73430. The variable representing the magnitude of a company (X3) exhibits a range of values from minimum 23.55 to maximum 31.83, with an average value of 29.4482 and a standard deviation of 2.15635. The variable representing disclosure of carbon emissions (Y) exhibits a range from 0.00 to 1.00, with an average value of 0.5687% and a standard deviation of 0.32916.

Panel Data Regression Analysis Model Selection

Chow Test

Table 2. Chow Test Results

Effect Test	Statistic	Prob.
Cross-section Chi Square	20,190116	0,1243

Source: EViews 12 Output and Data Processed, 2024

The cessation of further testing is warranted, as evidenced by the Chow Test results accepting the Common Effect Model (CEM).

Classical Assumption Test

The classic assumption tests applied to the chosen CEM model are heteroscedasticity and multicollinearity (Basuki & Yuliadi, 2014 : 183) (Napitupulu, et.al 2021 : 120).

Multicollinearity Test

Table 3. Multicollinearity Test Results

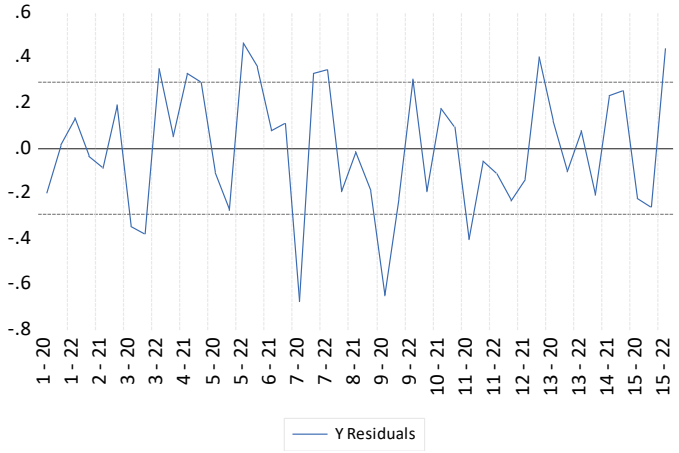
	CT	CAPEX	FS
CT	1,000000	0,086073	-0,088389
CAPEX	0,086073	1,000000	-0,324796
FS	-0,088389	-0,324796	1,000000

Source: EViews 12 Output and Data Processed, 2024

It is possible that there is no multicollinearity and the multicollinearity test is successful, because the correlation coefficient of carbon tax (X1) and capital expenditure (X2) amounts to 0.086073 < 0.85, carbon tax (X1) and firm size (X3) amounts to -0.088389 < 0.85 and capital expenditure (X2) and firm size (X3) amounts to -0.324796 < 0.85.

Heteroscedasticity Test

Table 4. Heteroscedasticity



Source: EViews 12 Output and Data Processed, 2024

As indicated by the residual graph in blue, the residual variances are equivalent since the value does not surpass the limits of -500 and 500. As a consequence, neither the symptoms nor the outcomes of the heteroscedasticity test are identified.

Panel Data Regression Equation

Y = -1.21 + 0.08*X1 - 0.01*X2 + 0.005*X3

With the following explanation :

1. The constant value of -1.21 indicates that the CED (Y) variable will diminish by 121% in the absence of the CT (X1), CAPEX (X2), and FS (X3) variables.
2. The CT (X1) variable has a beta coefficient of 0.08; therefore, the CED (Y) variable will increase by 8% for every 1% increase in the X1 variable, assuming all other variables remain constant. In contrast, a 1% decrease in the X1 variable will result in a 0.8% decrease in the CED (Y) variable, assuming all other variables remain constant.
3. Since the beta coefficient for the CAPEX variable (X2) is -0.01, the CED (Y) variable will decrease by 1% for every 1% increase in the X2 variable, assuming all other variables remain constant. On the contrary, the CED (Y) variable will experience a 1% increase when the X2 variable decreases by 1%, assuming all other variables remain constant.
4. Since the beta coefficient for the FS variable (X3) is 0.005, the CED (Y) variable will increase by 0.5% if all other variables remain constant and X3 increases by 1%. In contrast, a 1% decrease in the X3 variable will result in a 0.5% decrease in the CED (Y) variable, assuming all other variables remain constant.

Hipothesis Test

T Test

Table 5. T Test Results

Variable	Coefficient	Std. Error	t-Statistic	Prob
C	-1,214747	1,017614	-1,193721	0,2394
CT	0,086754	0,022367	3,878659	0,0004
Capex	-0,015294	0,016960	-0,901791	0,3724
FS	0,005011	0,021510	0,232938	0,8170

Source: EViews 12 Output and Data Processed, 2024

Based on table 5 above, the t-statistic test results can be interpreted as follows :

a. Based on the test results, the independent variable CT (X1) has an impact on carbon emissions disclosure. The t-count value of 3.878659 was obtained, whereas the t-table value was 2.0167. This indicates that the t-count value is greater than the t-table (3.878659> 2.0167) with a sig value of 0.0004 <0.05. Therefore, Ha was accepted and H0 was rejected.
b. Based on the test results, the independent variable CAPEX (X2) has no effect on carbon emissions disclosure. The t-count value of 0.901791, while the t-table value is 2.0167, indicating that the t-count value is smaller than the t-table (0.901791 < 2.0167) with a sig value of 0.3724 > 0.05. Ha is rejected and H0 is accepted.
c. The test results for the independent variable FS (X3) showed that the t-count value was 0.232938, whereas the t-table value was 2.0167. This indicates that, with a sig value of 0.8170 > 0.05, the t-count value is less than the t-table (0.232938 < 2.0167), and thus Ha is rejected and H0 is accepted, indicating that the independent variable FS (X3) has no effect on the disclosure of carbon emissions.

F Test

Table 6. F Test

R-squared	0,274769
Adjusted R-squared	0,221704
S.E. of regression	0,290391
Sum squared resid	3,457407
Log likelihood	-6,114001
F-statistic	5,177912
Prob(F-statistic)	0,003981

Source: EViews 12 Output and Data Processed, 2024

Since CT, CAPEX, FS affect CED, H0 is rejected and Ha is accepted. This is because the calculated F value of 5.177912 > F table which is 2.83274713 and sig. 0,003981 < 0,05.

Coeficient of Determination Test (R^2)

In the coefficient of determination test, this study can determine how well the independent variables provide an explanation of the dependent variable. Table 6 shows the Adjusted R-Square value of 22.1704% or 0.221704, and the coefficient of determination explains that the independent variables, namely CT, CAPEX, and FS can explain Carbon Emission Disclosure, which is 22.1704%. Other variables that are not included in this research model have a coefficient of determination value of 77.8296% (100 - Adjusted R Square value).

CONCLUSIONS AND RECOMMENDATIONS

The objective of this research is to analyze the impact of carbon tax, capital expenditure, and company size on the disclosure of carbon emissions by manufacturing companies operating in the mining sector that are publicly traded on the Indonesia Stock Exchange (IDX) between 2020 and 2022. According to the findings of the aforementioned study, the disclosure of carbon emissions is substantially impacted by the carbon tax variable. In contrast, neither capital expenditure nor company size have a substantial impact on the disclosure of carbon emissions.

The implementation of a carbon tax results in increased disclosure of carbon emissions therefore, H1 is accepted in this study. Large corporations generally possess greater financial resources, which enables them to invest in reporting systems that are more sophisticated and precise. As a result, they are more motivated to disclose carbon emissions in a plain and precise manner. As a result of the negative impact that capital expenditure has on carbon emission disclosure, H2 is disregarded in this study. Due to technological and infrastructure constraints, corporations encounter heightened financial pressure to allocate funds towards capital expenditures that bolster business expansion, rather than towards carbon emission reduction investments. This results in inaccurate reporting of carbon emissions. In the interim, the impact of firm size on carbon emission disclosure is detrimental, leading to the rejection of H3. Organizations with labor, technological, and expertise constraints that hinder the ability to report carbon emissions in detail.

This research cannot address all the problems faced by the company due to the limited unit of analysis and inadequate sample in concluding the research results with the broad problems experienced by manufacturing companies. The observation sample in this study only includes one sector on the IDX, namely mining sector manufacturing companies. The research period used is limited to only three years, namely 2020-2022. The limited time period will affect the research results.

ADVANCED RESEARCH

Recommendations for further research are to add proxies in measuring environmental relationships by expanding variables from the energy sector (GRI 302). The addition of this variable can help determine whether there is a relationship between the emissions produced and the energy used. Future research can also expand the research objects used as observation samples. For example, the research can be expanded by observing several sectors, the expansion of this research object will help strengthen the accuracy and reliability of the research.

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