

**IMPACT OF INDUSTRY TYPE, COMPANY SIZE, PROFITABILITY AND LEVERAGE TO CARBON EMISSION DISCLOSURE**

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**ABSTRACT**

*The aim of this study is to analyze the impact of industry type, company size, profitability, and leverage to carbon emission disclosure empirically. The population in this research are all mining companies listed on the Indonesia Stock Exchange (IDX) for the 2018-2020 period. The sample used were 14 companies with an observation period of 2018-2020, so 42 company data were obtained.*

*This research used legitimacy theory and stakeholder theory. The sample selection method in this research used purposive sampling with quantitative approaches. The analytical technique used in hypothesis testing is multiple linear regression analysis. The results of this research indicate that company size affects carbon emission disclosure. Meanwhile, the profitability, and leverage do not affect carbon emission disclosure. The limitations of this research are: (1) The measurement index of the company's carbon emission disclosure coverage is not following the conditions of companies in Indonesia, (2) Eliminating 1 variable, namely industry type.*

*The future research agendas are: (1) Further research is expected to improve the list of carbon emission disclosure items, (2) Further research is expected to be able to develop measurements for carbon emission disclosure that are following conditions in Indonesia.*

*Keywords: Carbon Emission Disclosure, Industry Type, Company Size, Profitability, Leverage*

**1. Introduction**

Global warming is a major issue that is widely discussed for most countries in the world. Global warming will be followed by climate change. The events of global warming and the ongoing climate change have finally made the world community aware of the importance of protecting nature and caring for the state of the environment (Mulya & Rohman, 2020).

Indonesian Environmental Statistics (2019) states that there are several types of greenhouse gases (GHG) that are the most common and worrying, namely carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrogen oxides (N<sub>2</sub>O). The Indonesian government is still trying to reduce GHG emissions in accordance with the targets stated in the Nationally Determined Contribution (NDC). In the NDC, the emission reduction target of 29 percent by 2030 translates to a figure of 834 million tonnes of CO<sub>2</sub>e for all sectors. The energy sector gets a portion of emission reductions of 314 million tons of CO<sub>2</sub>e (Ministry of Energy and Mineral Resources, 2020).

Indonesia has also ratified the Kyoto Protocol through Law no. 17 of 2004 where the implication of the Kyoto protocol is the emergence of carbon accounting, which is a requirement for companies to recognize, measure, record, present and disclose carbon emissions and includes carbon emission efficiency in the use of raw materials and costs associated with standard management. carbon (Pratiwi, 2018).

The results of the calculation of the national GHG inventory contained in the Greenhouse Gas Inventory Report and Monitoring, Verification Report 2018 by the Ministry of Environment and Forestry showed the level of GHG emissions in 2017 was 1,150,772 Gg CO<sub>2</sub>e, or an increase of 124,879 Gg CO<sub>2</sub>e, compared to the emission level. 2000 (Indonesian Environmental Statistics, 2019).

There are several factors that are considered to make companies reluctant to disclose carbon emissions. First, there is no regulation that requires companies to publish sustainability reports, especially disclosures related to carbon emissions. Second, the sustainability report require an additional cost for the company. This can be seen from the significant development of the number of companies listed on the Indonesia Stock Exchange (IDX), but the number of publicly listed companies that publish sustainability reports, especially related to carbon emissions (Investasi Kontan, 2011).

Public complaints are often found related to the number of disturbances or environmental damage caused by mining company activities. One way that can be taken to suppress and even reduce environmental damage is to include disclosure of carbon emissions. There are several factors that affect the disclosure of carbon emissions that are industry type, company size, profitability, and leverage.

## **2. Literature Review**

### **2.1 Legitimacy Theory**

This theory focuses on the relationship between companies and society through government regulations. This theory is an attempt to find the legality of the activities carried out by the company, while implicitly it means the expectations that the community wants, but it is not clearly written in legal regulations (Ghozali & Chariri, 2007 in Mujiani et al., 2019).

### **2.2 Stakeholder Theory**

The concept of stakeholder theory says that a company cannot be separated from its stakeholders. Stakeholders are groups or individuals who can be affected by company goals (Rizqi & Ghozali, 2015 in Mujiani et al., 2019). Stakeholders have a large enough share in disclosing carbon emissions because to protect the environment and the continuity of a company, many parties are needed to participate in overseeing the company's operational activities.

### **2.3 Carbon Emission Disclosure**

#### **2.3.1 Carbon Emission**

Carbon emission is the release of gases from the combustion of compounds containing carbon into the earth's atmosphere. Hilmi et al. (2020) states that based on the source, carbon emissions or greenhouse gases are divided into 2, namely industrial greenhouse gases and natural greenhouse gases. The industrial sector uses energy sources from fossil fuels such as oil and coal, causing an increase in greenhouse gases in the earth's atmosphere. Each burning of fossil fuels will cause an increase in carbon emissions in the wild.

#### **2.3.2 Carbon Emission Disclosure**

Companies are now required to be more open about information about their companies. The information disclosed in the annual report is mandatory disclosure (mandatory disclosure) and voluntary disclosure (voluntary disclosure) (Pranasyahputra et al., 2020). Disclosure of social and environmental activities has been regulated, one of them made by IAI as stated in PSAK No. 1 (Amendment 2016) paragraph 14, "Some entities also present, from financial statements, reports on the environment and reports on value added, especially for industries where environmental factors are significant and when employees are considered as a group of users of financial statements who play an important role. Reports

presented outside the financial statements are outside the scope of SAK.” (Pranasyahputra et al., 2020). Carbon emission disclosure in this research was measured using several items adopted from the research of Choi et al. (2013) in Pratiwi (2018).

#### **2.4 Industry Type**

According to the Global Industry Classification Standard (GICS), industrial types are classified into 2 major types, namely intensive industry (high profile) and non intensive industry (low profile). Companies that are included in the emission-intensive industries include industries in the fields of energy, transportation, raw materials, chemicals and utilities. Non-intensive companies in producing gas emissions include service providers, trade, finance and so on.

#### **2.5 Company Size**

The company size is a scale where the size of the company can be classified according to various ways, including total assets, log size, stock market value and others (Mujiani et al., 2019). Suwito & Herawaty (2005) in Mujiani et al. (2019) states that company size is divided into 3 categories, there are large companies, medium companies, and small companies. The company's resources can be reflected in its size. The larger the size of the company, the greater the resources it has. Large companies are expected to provide more voluntary carbon disclosures (Mujiani et al., 2019).

#### **2.6 Profitability**

According to Hantono (2018) profitability is a ratio that shows the company's ability to make profits. Companies with high profitability are easier to meet the demands made by the community because they have more resources to make environmental disclosures than companies with low profitability. According to Hantono (2018) profitability can be measured using several proxies, including ROA/ROI, ROE, NPM, GPM and Earning per Share.

#### **2.7 Leverage**

Leverage is a ratio used to measure the extent to which a company's assets are financed with debt (Kasmir, 2019). Companies that make voluntary disclosures will require additional costs, so there is a tendency to prefer not to disclose for companies with high leverage to save the costs. In stakeholder theory, high leverage indicates a large corporate responsibility to its creditors. According to Kasmir (2019), leverage is measured using several proxies, including Debt Ratio, Debt to Equity Ratio, LTDtER, Times Interest Earned, and FCC (Fixed Charge Coverage).

### **2.8 Logical Relation Between Variables and Formulation of Hypotheses**

#### **2.8.1 Effect of Industry Type on Carbon Emission Disclosure**

Based on the GICS (Global Industry Classification Standard) classification, the type of industry is classified into 2 major types, intensive industry (high profile) and non intensive industry (low profile). Companies that are high in producing carbon emissions will tend to disclose information about their carbon emissions. Disclosure of information on carbon emissions by carbon-intensive companies will help companies gain legitimacy from the community and as a form of corporate responsibility to stakeholders (Saptiwi, 2019).

#### **2.8.2 Effect of Company Size on Carbon Emission Disclosure**

Company size can be seen from the resources owned by a company. In addition to carrying out its operational activities, the company also needs to maintain the environment in which these activities take place in order to support its performance. Large companies have greater pressure and demands from the community when there are activities that are directly related to the environment. Based on this, companies must disclose information about their performance (Saptiwi, 2019). So that the larger the size of the company, the more likely the company is to disclose carbon emissions.

#### **2.8.3 Effect of Profitability on Carbon Emission Disclosure**

Profitability is a ratio to assess the company's ability to earn a profit. Profitability describes the financial condition of a company. Better financial conditions allow companies to disclose environmental information related to carbon emissions.

The high profitability of the company will make the company more flexible in managing finances to be responsible for the environment. Companies that make environmental disclosures will gain the trust of the public that the company is not profit oriented only but also participates in solving environmental problems (Pratiwi, 2018). So that the higher the level of profitability of a company, the more likely the company is to disclose carbon emissions.

#### 2.8.4 Effect of Leverage on Carbon Emission Disclosure

According to Sembiring (2003) in Saptiwi (2019) leverage is defined as the level of dependence of the company on debt in financing the company's assets and operations. The level of company leverage describes the company's financial risk. Companies with high leverage will tend to focus on paying off company obligations compared to making carbon disclosures by allocating a number of funds to fund additional financial and human resources for reporting (Luo et al., 2013 in Koeswandini & Kusumadewi, 2019).

Forcing the company to use available sources of funds to pay off the debt rather than to disclose carbon emissions because disclosing will result in greater costs and can be a burden for the company (Choi et al., 2013 in Mujiani et al., 2019). So that the higher the leverage of a company, the more likely it is that the company will disclose carbon emissions.

### 2.9 Hypothesis

H1: Type of Industry affects Carbon Emission Disclosure.

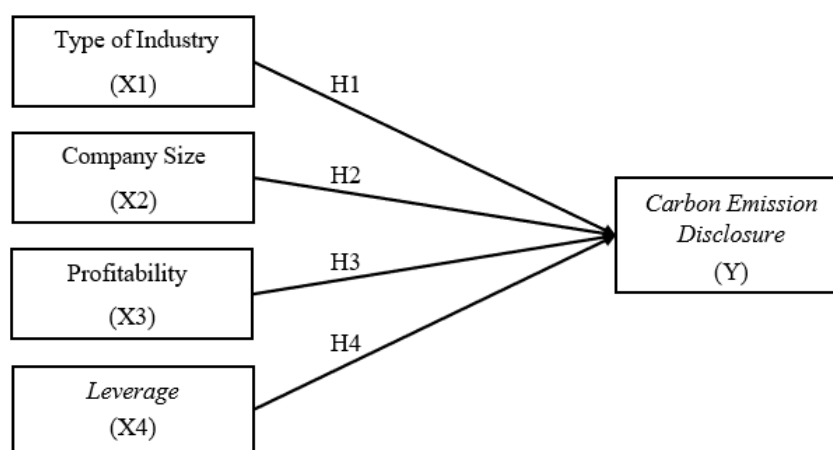
H2: Company size has an effect on Carbon Emission Disclosure.

H3: Profitability has an effect on Carbon Emission Disclosure.

H4: Leverage has an effect on Carbon Emission Disclosure.

### 2.10 Framework

Figure 1 Framework



## 3. Methods

### 3.1 Research Variables and Operational Definition

#### 3.1.1 Research Variables

The dependent variable in this research is carbon emission disclosure. Independent variables in this research are industry type, company size, profitability, and leverage.

### 3.1.2 Operational Definition

#### 3.1.2.1 Carbon Emission Disclosure

The measurement method used is content analysis. This method is carried out by observing the annual reports and sustainability reports of sample using a checklist to find out how far the companies have disclosed carbon emissions. Carbon emission disclosure was measured using several carbon emission disclosure items taken from the research of Choi et al. (2013) in Pratiwi (2018). The checklist based on the construction of the information request sheet provided by the CDP (Carbon Disclosure Project). CDP is an independent non-profit organization that provides extensive information on climate change in the world.

Companies classified based on the company's emissions are divided into 3 categories, namely scope 1-3. Scope 1-2 is reported, while scope 3 is an option (Choi et al., 2013) in (Pratiwi, 2018). Table 1 below is a description of scopes 1, 2 and 3:

Table 1  
Description of Scopes

| Category       |  | Description of Scopes 1, 2, and 3  |
|----------------|--|--|
| <i>Scope 1</i> | Direct GHG emissions                   | <ol style="list-style-type: none"> <li>1. GHG emissions occur from sources owned or controlled by the company, for example: emissions from burn boilers, furnaces, vehicles owned by the company; emissions from chemical production from equipment owned and controlled by company</li> <li>2. Direct CO<sub>2</sub> emission from biomass burning are not included in scope 1, but are reported separately.</li> <li>3. GHG emissions that are not included in the Kyoto protocol, such as CFCs, NOX, etc., should not be included in scope 1, but reported collectively separated.</li> </ol> |
| <i>Scope 2</i> | Indirect GHG emission from electricity | <ol style="list-style-type: none"> <li>1. Includes GHG emissions from power plants purchased or consumed by the company.</li> <li>2. Scope 2 physically occurs in the facility where electricity is generated.</li> </ol>  |
| <i>Scope 3</i> | Other indirect GHG emissions           | <ol style="list-style-type: none"> <li>1. Scope 3 is an optional reporting category, that allows for the treatment of all other indirect emissions.</li> <li>2. Scope 3 is a consequence of the company's activities, but occurs from sources that are not owned or controlled by the company.</li> <li>3. Examples of scope 3 are the activities of extracting and producing purchased raw materials, transportation of purchased fuels, and use of products and services which is sold.</li> </ol>   |

Source: Choi et al. (2013) in Pratiwi (2018)

Based on the table above, maximum total items reported by the company can be disclosed. In this research, the formula used to calculate carbon emission disclosures according to Pratiwi (2018) is as follows:

$$CED = \frac{\text{Total Items Disclosed}}{\text{Total Items}}$$

CED = Carbon Emission Disclosure

### 3.1.2.2 Industry Type

In this research, the type of industry is measured using a dummy variable which is in accordance with the research of Mulya & Rohman (2020) where a value of 1 is given to companies that are included in companies in emission-intensive industries (firms in emission intensive industries), which include the types of industries engaged in field of energy, transportation, raw materials (materials), chemicals and utilities. While a value of 0 is given to non-intensive companies in producing gas emissions, such as industries engaged in service providers, trade, finance and so on.

Value 1 = Companies in the energy, transportation, raw materials, chemical and utility sectors.

Value 0 = Companies in the service sector, trade, finance.

### 3.1.2.3 Company Size

Company size is a scale where the size of a company can be classified by knowing the total assets owned by the company. Firm size variables are presented in the form of natural logarithms (Mujiani et al., 2019). The measurement of firm size in this research uses a formula that is in accordance with the research of Mujiani et al. (2019) with the following formula:

$$\text{Company Size} = \ln [\text{Total Assets}]$$

### 3.1.2.4 Profitability

The profitability ratio provides a measure of the level of management effectiveness of a company, indicated by the profit generated from sales and investment income (Mujiani et al., 2019). In this research, profitability was measured using the ROA (Return on Assets) in accordance with the research of Mujiani et al. (2019). The formula used is as follows:

$$\text{ROA} = \frac{\text{Profit After Tax}}{\text{Total Assets}}$$

### 3.1.2.5 Leverage

Leverage is defined as the use of the company's assets or financial resources (Koeswandini & Kusumadewi, 2019). This ratio is used to measure how much the company's assets are financed with total debt (Mujiani et al., 2019). Leverage in this research was measured by Debt to Asset Ratio (DAR) in accordance with research from Mujiani et al. (2019). The formula used is as follows:

$$\text{DAR} = \frac{\text{Total Debt}}{\text{Total Assets}}$$

## 3.2 Research Object, Sample Unit, Population, and Sampling

### 3.2.1 Research Object and Sample Unit

The object of research used in this research is a mining company listed on the Indonesia Stock Exchange (IDX) for the 2018-2020 period. The sample unit in this research is quantitative data in the form of annual reports or sustainability reports of mining companies listed on the Indonesia Stock Exchange (IDX) for the 2018-2020 period.

### 3.2.2 Population and Sampling

The population in this research are all mining companies listed on the Indonesia Stock Exchange (IDX) for the 2018-2020 period. The criteria used for determining the sample are:

1. Mining companies listed on the Indonesia Stock Exchange (IDX) consecutively during the 2018-2020 period.
2. Mining companies that publish annual reports or sustainability report for the period 2018-2020.
3. Mining companies that disclose carbon emissions, covering at least 1 policy related to carbon/greenhouse gas emissions or disclosing at least 1 item of carbon emission disclosure.

### **3.3 Types and Sources of Data**

#### **3.3.1 Data Type**

The data in this research are secondary data. The data to be processed in this research has a periodic nature (time series) with reference to mining companies listed on the Indonesia Stock Exchange (IDX) for the 2018-2020 period.

#### **3.3.2 Data Source**

The secondary data used is data that can be obtained from the annual report or sustainability report from the website [www.idx.co.id](http://www.idx.co.id) or from the websites of each company.

### **3.4 Data Collection Method**

The data collection method used in this research is the documentation method, that is carried out by studying or collecting notes or documents related to the problem being researched (Sujarweni, 2019). The documentation method in this research uses data collection techniques by collecting, recording, and reviewing secondary data in the form of annual reports and sustainability reports of mining companies published by the Stock Exchange. Indonesian Stock Exchange (IDX) for the 2018-2020 period as well as the websites of each company.

### **3.5 Analysis Method**

The analytical method used in this research is quantitative analysis method.

#### **3.5.1 Descriptive Statistics**

Descriptive statistics are statistics used to analyze data by describing or describing data that collected as it is without intending to make conclusions that apply to the public or generalizations (Sugiyono, 2019). In this research, descriptive statistics are used to describe the variables in the research in terms of minimum value, maximum value, average value, and standard deviation value of industry type, company size, profitability, leverage, and carbon emission disclosures.

#### **3.5.2 Classical Assumption Test**

##### **3.5.2.1 Normality Test**

The normality test aims to find whether in the regression model, the confounding or residual variables have a normal distribution (Ghozali, 2018). In this research, the Kolmogorov-Smirnov (K-S) statistical test was used to test the normality of the data. To detect whether the residuals are normally distributed or not, use 2 ways:

##### **1. Graphical Analysis**

According to Ghozali (2018), the basis for making decisions are:

- a. If the data spreads around the diagonal line and follows the direction of the diagonal line or the histogram graph, shows a normal distribution pattern, then the regression model fulfills the assumption of normality.
- b. If the data spreads far from the diagonal and/or does not follow the direction of the diagonal line or the histogram graph, does not show a normal distribution pattern, then the regression model does not meet the assumption of normality.

##### **2. Statistical Analysis**

Statistical tests were carried out using non-parametric Kolmogorov-Smirnov (K-S) statistical

analysis with the following decision-making guidelines:

- a. If the Asymp value.Sig. (2-tailed) is more than 0.05 then H<sub>0</sub> is accepted. This means that the residual data is normally distributed.
- b. If the Asymp value.Sig. (2-tailed) is less than 0.05 then H<sub>0</sub> is rejected. This means that the residual data is not normally distributed.

#### 3.5.2.2 Multicollinearity Test

According to Ghozali (2018), the multicollinearity test aims to test whether the regression model finds a correlation between the independent variables. The value of R<sup>2</sup> generated by an empirical regression model estimate is very high, but individually many independent variables do not significantly affect the dependent variable.

1. Analyze the correlation matrix of the independent variables. If there is a fairly high correlation between independent variables (generally above 0.90), then this indicates multicollinearity. The absence of a high correlation between independent variables does not mean that it is free from multicollinearity.
2. Multicollinearity can also be seen from the value of tolerance and its opposite and variance inflation factor (VIF). A low tolerance value is the same as a high VIF value (because VIF = 1/Tolerance). The cutoff value that is commonly used to indicate the presence of multicollinearity is 0.10 or the same as the VIF value 10. Each researcher must determine the level of collinearity that can still be tolerated. For example, the tolerance value = 0.10 is the same as the collinearity level of 0.95.

#### 3.5.2.3 Autocorrelation Test

The autocorrelation test aims to test whether the linear regression model has a correlation between the confounding error in period "t" and the confounding error in period t-1 (previous). If there is a correlation, it is called an autocorrelation problem. The autocorrelation test in this research was tested using the Run. The Run Test is carried out using the following hypotheses:

H<sub>0</sub> : Residual data is random (random) Ha: Residual data is not random

Autocorrelation test is done by looking at the Asymp value.Sig. (2- tailed). If the significance level is > 0.05, it can be concluded that H<sub>0</sub> is accepted. On the other hand, if the significance level is < 0.05, it can be concluded that Ha is accepted.

#### 3.5.2.4 Heteroscedasticity Test

Heteroscedasticity test aims to test whether in the regression model there is an inequality of variance from the residuals of one observation to another. A good regression is homoscedasticity or there is no heteroscedasticity (Ghozali, 2018). To detect the presence or absence of heteroscedasticity, use the Spearman's Rho test. Spearman's rho test is a test that correlates the absolute residual of the regression results with all independent variables. If the significance of the correlation result is less than 0.05 (5 percent), then the regression equation is said to have heteroscedasticity, and if the correlation result is greater than 0.05 (5 percent), then the regression equation does not occur heteroscedasticity.

#### 3.5.3 Multiple Linear Regression Analysis

Multiple linear regression is used for studies that have more than one independent variable. Multiple linear regression analysis is used to determine the direction of the relationship and how much the independent variable affects the dependent variable (Ghozali, 2018). The results of the analysis in this research will be used to test how much influence the type of industry, company size, profitability, and leverage have on carbon emission disclosures. The form of the regression model used in this research based on the hypothesis is as follows:

$$Y = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon$$



Explanation:

Y = *Carbon Emission Disclosure*

$\alpha$  = Constant

$\beta_1 - \beta_4$  = Regression Coefficient

X1 = Industry Type

X2 = Company Size

X3 = Profitability

X4 = *Leverage*

$\varepsilon$  = Error

#### 3.5.4 Hypothesis Test

Hypothesis test is intended to determine whether or not there is an effect of independent variables, namely industry type, company size, profitability, and leverage on carbon emission disclosures.

##### 3.5.4.1 Individual Parameter Significance Test (t Test)

The t-statistical test shows how far the influence of one explanatory/independent variable individually in explaining the variation of the dependent variable (Ghozali, 2018). With 0.05 (5 percent) significance level:

1.  $H_0$  is rejected and  $H_a$  is accepted if the significant value is less than 0.05.
2.  $H_0$  is accepted and  $H_a$  is rejected if the significant value is more than 0.05.

##### 3.5.4.2 Simultaneous Significance Test (F-Test)

The F statistical test, shows whether all the independent/independent variables included in the model have a mutual influence on the dependent/bound variable (Ghozali, 2018).

1. If the calculated F value is greater than 4 with a significance value  $< 0.05$ , the hypothesis is accepted.
2. If the calculated F value is less than 4 with a significance value  $> 0.05$  then the hypothesis is rejected.

##### 3.5.4.3 Coefficient of Determination Test ( $R^2$ )

The coefficient of determination ( $R^2$ ), measure how far the model's ability to explain variations in the dependent variable is. The value is zero and one. A small value of  $R^2$  means that the ability of the independent variables in explaining the variation of the dependent variable is very limited. If the value is close to one, it means that the independent variable provides almost all the information needed to predict the variation of the dependent variable. The adjusted  $R^2$  value can increase or decrease if the independent variable is added to the research model (Ghozali, 2018).

## 4. Result and Discussion

### 4.1 Description of Research Object

The object used in this research is mining companies listed on the Indonesia Stock Exchange (IDX) during 2018-2020 period. The research object used in this research used the following sample criteria:

Table 2.  
Sampling Distribution

| No. | Description   | Number of companies |
|-----|---|---------------------|
| 1.  | Mining companies listed on the Exchange Indonesian Securities (IDX) consecutively during the 2018-2020 period | 45                  |

|                               |   |      |
|-------------------------------|---|------|
| 2.                            | Mining companies that do not publish annual reports or sustainability report for the period 2018-2020 | (6)  |
| 3.                            | Mining companies that do not report at least 1 item of carbon emission disclosure                     | (25) |
| Number of samples             |   | 14   |
| Year of observation 2018-2020 |   | 3    |
| Total                         |   | 42   |

Source: BEI, processed secondary data

Based on the distribution table for determining the sample above, 14 companies were obtained as samples in this research. This research uses 3 years of observation, so that the observed data amounted to 42 company data.

Table 3  
List of Research Sample Companies

| No. | Kode | Nama Perusahaan                |
|-----|------|--------------------------------|
| 1.  | ADRO | Adaro Energy Tbk               |
| 2.  | BUMI | Bumi Resources Tbk             |
| 3.  | DEWA | Darma Henwa Tbk                |
| 4.  | DSSA | Dian Swastatika Sentosa Tbk    |
| 5.  | HRUM | Harum Energy Tbk               |
| 6.  | ITMG | Indo Tambangraya Megah Tbk     |
| 7.  | PTBA | Bukit Asam Tbk                 |
| 8.  | PTRO | Petrosea Tbk                   |
| 9.  | ELSA | Elnusa Tbk                     |
| 10. | MEDC | Medco Energi International Tbk |
| 11. | ANTM | Aneka Tambang Tbk              |
| 12. | INCO | Vale Indonesia Tbk             |
| 13. | MDKA | Merdeka Copper Gold Tbk        |
| 14. | TINS | Timah Tbk                      |

Source: BEI, processed secondary data

## 4.2 Data Analysis

Data analysis in this research uses multiple linear regression analysis that examines the effect of industry type, company size, profitability, and leverage on carbon emission disclosures. The data used are as many as 42 company data. The data that has been collected in this research is then processed and analyzed using various statistical tests as follows:

### 4.2.1 Descriptive Statistics

Descriptive statistics aim to provide an overview or description of the variables in this research so that they are easy to understand. Descriptive statistical tests used include the average (mean), standard deviation, maximum, and minimum of the variable carbon emission disclosures, industry type, company size, profitability, and leverage. Data processing is carried out using the SPSS version 25 to accelerate the acquisition of calculation results that can explain the variables studied.

This research eliminates 1 variable, namely the industrial type variable because the industrial type sector that is sampled in this research is a mining company which is a high profile industry with all the score is 1, so that the variable is not possible to be processed using statistical methods.

1. Based on the results of the descriptive statistics with a sample of 42 data, the results obtained from each variable, including the company size variable has the lowest (minimum) value of 29.36 and the highest (maximum) value of 32.26. The average value (mean) of firm size is 30.6975 with a standard deviation of 0.90755.
2. The descriptive results for the profitability variable are known to have the minimum value of -0.10 and the maximum value of 0.21 with an average (mean) of 0.418 and a standard deviation of 0.05648.
3. The descriptive results for the leverage variable show the minimum value of 0.09 and the maximum value of 0.96 with an average (mean) of 0.4642 and a standard deviation of 0.22007.
4. The variable carbon emission disclosure is known to have the lowest (minimum) value of 0.11 and the highest (maximum) value of 0.83. The average value (mean) of carbon emission disclosures is 0.4894 with a standard deviation of 0.21786.

#### 4.2.2 Classical Assumption Test

##### 4.2.2.1 Normality Test

The normality test aims to test whether in the regression model, the confounding or residual variables have a normal distribution. A good regression model is a model with a normal or close to normal data distribution. In this research, the Kolmogorov-Smirnov (K-S) statistical test was used to test the normality of the data.

Based on the test result with  $N = 42$ , it can be seen that the Kolmogorov-Smirnov Statistic Test is 0.139 and Asymp. Sig. (2-tailed) shows a value of 0.040 which means less than 0.05. However, the value of the Monte Carlo Sig. (2-tailed) shows the result of 0.356 which means more than 0.05. From these results it can be concluded that  $H_0$  is accepted and  $H_a$  is rejected, it can be said that the residual data is normally distributed and can be used for the next test.

##### 4.2.2.2 Multicollinearity Test

The multicollinearity test aims to test whether there is a correlation between the independent variables in the regression model. A good regression model should not have a correlation between the independent variables. Multicollinearity in this research is seen from the tolerance value and variance inflation factor (VIF). The value used to indicate the presence of multicollinearity is a tolerance value  $< 0.10$  or equal to the value of the variance inflation factor (VIF)  $> 10$ .

Based on the result of Multicollinearity Test, it shows that the variables of firm size, profitability, and leverage have a tolerance value above 0.10 and the variance inflation factor (VIF) has a value below 10. Thus, it can be concluded that the independent variables used in this research are free from symptoms of multicollinearity. .

##### 4.2.2.3 Autocorrelation Test

A good regression model has no autocorrelation. The autocorrelation test in this research was detected using the Run Test by looking at the Asymp value. Sig. (2-tailed), if the significance level is  $> 0.05$  then  $H_0$  is accepted, it can be said that the residual data is random or free from autocorrelation. If the significance level is  $< 0.05$ , then  $H_a$  is accepted, it can be said that the residual data is not random or there is an autocorrelation problem. Based on the autocorrelation test, the results show that the Asymp value. Sig. (2-tailed) of 1,000 which is greater than the probability value of 0.05 which means that  $H_0$  is accepted and  $H_a$  is rejected. So it can be concluded that the residual data is random or there is no autocorrelation between

the residual values.

#### 4.2.2.4 Heteroscedasticity Test

The heteroscedasticity test in this research was tested using the spearman's rho test. Heteroscedasticity can be known if statistically the independent variable affects or has a significant effect on the dependent variable. The data has no indication of heteroscedasticity if the significance probability value is above 5 percent confidence level or  $> 0.05$ . Based on Heteroscedasticity Test, it shows that the significance value of the industrial type variable is 0.795, profitability is 0.554, and leverage is 0.703. These results indicate that the significance value of all independent variables is more than 0.05. Therefore, it can be concluded that the regression model in this research is free from heteroscedasticity problems.

#### 4.2.3 Multiple Linear Regression Analysis

**Coefficients<sup>a</sup>**

| Model |                   | Unstandardized Coefficients |            | Standardized Coefficients | t      | Sig. |
|-------|-------------------|-----------------------------|------------|---------------------------|--------|------|
|       |                   | B                           | Std. Error | Beta                      |        |      |
| 1     | (Constant)        | -4.174                      | .979       |                           | -4.264 | .000 |
|       | Ukuran Perusahaan | .155                        | .032       | .644                      | 4.800  | .000 |
|       | Profitabilitas    | .082                        | .594       | .021                      | .137   | .891 |
|       | Leverage          | -.180                       | .156       | -.182                     | -1.158 | .254 |

a. Dependent Variable: Carbon Emission Disclosure

Based on the multiple linear regression test, here is the following equation can be obtained:

$$Y = -4.174 + 0.155X_2 + 0.082X_3 - 0.180X_4 + \epsilon$$

Based on the above equation, it can be concluded as follows:

1. The coefficient constant = -4.174 with a negative value stating that by assuming the absence of company size, profitability, and leverage variables, carbon emission disclosures tend to decrease.
2. The regression coefficient of company size = 0.155 with a positive value stating that by assuming the absence of other independent variables, if the size of the company increases, then carbon emission disclosures tend to increase.
3. Profitability regression coefficient = 0.082 with a positive value stating that by assuming the absence of other independent variables, if profitability increases, then carbon emission disclosures tend to increase.
4. Leverage regression coefficient = -0.180 is negative, indicating that by assuming the absence of other independent variables, if leverage increases, carbon emission disclosures tend to decrease.

### 4.3 Hypothesis Test

#### 4.3.1 Individual Parameter Significance Test (t Test)

The t-statistical test was used to see the effect of individual firm size, profitability, and leverage variables on carbon emission disclosures.

Based on Individual Parameter Significance Test (t Test), the explanation of the t statistical equation model in this research shows the following results:

##### 1. Hypothesis testing 2

Table 4.9 shows that the t-test results obtained a t-count value of 4.800 with a significance value of 0.000. Because the significance value is less than 0.05 (5%), it can be said that company size has an effect on carbon emission disclosures. H2 is accepted.

##### 2. Hypothesis testing 3

Table 4.9 shows that the t-test results obtained a t-count value of 0.137 with a significance

value of 0.891. Because the significance value is greater than 0.05 (5 percent), it can be said that profitability has no effect on carbon emission disclosures. H3 is rejected.

### 3. Hypothesis testing 4

Table 4.9 shows that the results of the t-test obtained a t-count value of -1.158 with a significance value of 0.254. Because the significance value is greater than 0.05 (5 percent), it can be said that leverage has no effect on carbon emission disclosures. H4 is rejected.

#### 4.3.2 Simultaneous Significance Test (F Test)

The F statistical test is used to see the effect of the variables of company size, profitability, and leverage together on carbon emission disclosures.

Based on Simultaneous Significance Test (F Test), the F-count value is 7.695 with a significance of 0.000. Because the significance value is smaller than 0.05 (5 percent), it can be said that the variables of company size, profitability, and leverage simultaneously (simultaneously) have a significant effect on carbon emission disclosures.

#### 4.3.3 Coefficient of Determination Test ( $R^2$ )

The coefficient of determination ( $R^2$ ) is used to assess the total variation of the dependent variables that can be explained by the independent variable. The result of this test is the adjusted coefficient of determination (adjusted  $R^2$ ), which is a coefficient of determination that shows the amount of variation of the independent variable in explaining the dependent variable. If in a model there are more than two independent variables, it is better to use the adjusted  $R^2$  value.

Based on Coefficient of Determination Test ( $R^2$ ), it can be seen that the value of Adjusted R Square ( $R^2$ ) is 0.170 (17 percent). These results indicate that the variables of firm size, profitability, and leverage has an effect on carbon emission disclosures by 17 percent. While another 83 percent is explained by other variables outside this research model.

## 4.4 Discussion

### 4.4.1 Effect of Firm Size on Carbon Emission Disclosure

The second hypothesis in this research states that company size has a significant positive effect on carbon emission disclosures. This is proved by the obtained significance value of 0.000 or less than 0.05. Company size is a tool used to measure the size of the company. Large companies have greater pressure on environmental problems so they tend to increase their response to the environment, one of which is by disclosing carbon emissions in order to gain legitimacy from company stakeholders. Larger companies allow companies to have sufficient resources to pay the costs of producing information (collecting and producing information) for users of annual reports.

### 4.4.2 Effect of Profitability on Carbon Emission Disclosure

The third hypothesis in this research states that profitability has no significant effect on carbon emission disclosures. This is evidenced by the obtained significance value of 0.891 or greater than 0.05. Profitability shows the company's ability to generate profits. Companies do not need to wait for high profitability to make carbon emission disclosures because previously it has been regulated in Presidential Regulation No. 61 of 2011 that the company contributes to the reduction of gas emissions. Companies with low profitability can also tend to make carbon emission disclosures to attract investors and gain legitimacy from the community.

### 4.4.3 Effect of Leverage on Carbon Emission Disclosure

The fourth hypothesis in this research states that leverage has no significant effect on carbon

emission disclosures. This is proved by the obtained significance value of 0.254 or greater than 0.05. Leverage is a comparison between total debt and total assets owned by the company. The level of financial performance of a company is not always a benchmark in the consideration of conducting carbon emission disclosures because previously there has been a good relationship between the company and creditors as stakeholders which resulted in creditors not paying much attention to the company in disclosing carbon emissions. In addition, companies with high debt levels want to get high profits, but are low in social responsibility disclosures such as carbon emissions because they only care about profit without paying attention to the quality of the surrounding environment.

The size of the leverage does not affect the carbon emission disclosure as in the company PT Bumi Resources Tbk (BUMI) with a high level of leverage. There are many companies engaged in the mining sector report on carbon emission disclosures. It is noted that the company reported 11 to 15 of a total of 18 disclosure checklist items for 3 consecutive years. This shows that the size of the leverage does not affect the carbon emission disclosure because companies with high leverage continue to disclose their carbon emissions widely.

## 5. Conclusion

1. Company size has a significant positive effect on Carbon Emission Disclosure in mining companies listed on the IDX for the period 2018-2020.
2. Profitability has no significant effect on Carbon Emission Disclosure in mining companies listed on the IDX for the period 2018-2020.
3. Leverage has no significant effect on Carbon Emission Disclosure in mining companies listed on the IDX for the period 2018-2020.

## 5.1 Suggestions

1. Companies should be able to maximize the disclosure of information regarding carbon emissions as part of efforts to manage risks in the future and what strategies to deal with them.
2. For the government to make a policy regarding the company's maximum limit on the total carbon emissions it produces. If a company produces carbon emissions that exceed the maximum limit, it can be subject to a fine in the form of money paid as a tax on carbon emissions so that it can increase the country's foreign exchange.
3. For investors and potential investors, it is better to pay more attention to the profile of the company that will be funded, whether the company pays enough attention to the environment or not, so as to increase the company's sensitivity to environmental conditions.

## 5.2 Research Limitations

1. The measurement index of the company's full disclosure of carbon emissions was adopted from the research developed by Choi et al. (2013) based on the information request sheet provided by CDP (Carbon Disclosure Project) without any index adjustment according to company conditions in Indonesia.
2. This research eliminates 1 variable, namely the industrial type variable, because the sector used is a mining company which is a highprofile industry with a total score of 1, so it is not possible to process it using statistical methods.

## 5.3 Future Research Agenda

1. Future research is expected to improve the list of carbon emissions disclosure items, so that there is no element of subjectivity that can cause differences in determining the CDP (Carbon Disclosure Project) indicator index.
2. Future research is expected to measure the disclosure of carbon emissions in accordance

with conditions in Indonesia.

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