

## The Effect of Carbon Emission Disclosure and Financial Performance on Firm Value

Khanin Tu'adah<sup>1\*</sup>, Lilis Setyowati<sup>2</sup>, Mohamed Abdulwahb Ali Alfared<sup>3</sup>

<sup>1-2</sup>Universitas Dian Nuswantoro, Indonesia

<sup>3</sup>Accounting Program, Faculty of Economics and Business, Ain Shams Higher Institute, Tripoli 13932, Libya

\* [khanintuadah@gmail.com](mailto:khanintuadah@gmail.com)

### Abstract

Growing awareness of sustainability issues has encouraged companies to disclose carbon emission information as part of their environmental accountability and corporate transparency practices. However, previous empirical evidence regarding the effect of carbon emission disclosure on firm value remains inconclusive, particularly when compared with traditional financial determinants such as profitability and leverage. This study aims to examine the effects of carbon emission disclosure, profitability, and leverage on firm value among industrial sector companies listed on the Indonesia Stock Exchange during the 2022–2025 period. A quantitative research approach was employed using secondary data obtained from companies' annual reports and sustainability reports. The sample consisted of 86 firm-year observations selected through purposive sampling. Panel data regression analysis was conducted using EViews software. The findings reveal that profitability has a positive and statistically significant effect on firm value, whereas carbon emission disclosure and leverage do not significantly influence firm value. These results indicate that investors continue to place greater emphasis on firms' financial performance than on environmental disclosure when making investment decisions. This study contributes to the sustainability and corporate finance literature by providing empirical evidence that profitability remains the primary determinant of firm value, while the capital market has not yet fully incorporated the economic value of carbon emission disclosure into firm valuation.

Keywords: Carbon emission disclosure, Profitability, Leverage, Firm value, Industrial sector.

### Introduction

The primary objective of companies registered on the stock market is to maximize shareholders' wealth. This shareholder wealth is reflected in firm value. This metric represents investors' assessment of a company's performance and success, as demonstrated by its share value (Ningrum, 2022). A high market valuation indicates that a company has successfully gained public trust regarding its capacity to yield future profits and manage risks.

In general, a firm's stock price reflects its firm value. In Indonesia, the Indonesian Stock Exchange (IDX) operates as the entity responsible for organizing securities trading, including stock trading, while also performing regulatory functions within the capital market. The movements of stock prices listed on the IDX are summarized in the Composite Stock Price Index (CSPI). Throughout 2024, CSPI experienced a decline of 2.65% compared to the previous year (CNBC Indonesia, 2025). The industrial sector was one of the major factor behind this decline. The industrial sector index exhibited a significant decline over the 2022–2024 period. From 2022 to 2023, the index dropped by 6.86%, falling from 1,174.34 to 1,093.76 (Otoritas Jasa Keuangan, 2024). This downward trend persisted through 2023–2024 with a further decrease of 5.32%, bringing the index down to 1,035.57 in 2024 (Otoritas Jasa Keuangan, 2025). During the 2022–2024 period, several firms in the industrial sector also experienced declines in stock prices, which subsequently reduced firm value.

Along with the advancement of time, the assessment of firm value is no longer limited to historical financial data. The Indonesian Stock Exchange (IDX) has demonstrated its commitment to supporting and actively participating in efforts to achieve global sustainable development as outlined under the global Sustainable Development Goals (SDGs) agenda (BEI, 2021). This development has encouraged the capital market to incorporate non-financial factors into its valuation process in accordance with the three fundamental aspects of sustainability principles, namely *People*, *Planet*, *Profit* (Dwiyaning & Widiyaningsih, 2025).

One of the most crucial non-financial factors is corporate ecological commitment, particularly regarding greenhouse gas (GHG) emissions, given the increasingly evident impacts of worldwide climate shifts. According to the Meteorological, Climatological, and Geophysical Agency, the year 2024 was recorded most scorching year within historical global climate, with the average global temperature exceeding the 1.5°C limit set by the Paris Accord compared to the pre-industrialized era (1850) (BMKG, 2025).

Indonesia's manufacturing industry sector has been recorded as a major driver of global greenhouse gas output in recent years (BPS, 2025). This phenomenon serves as the basis for conducting research within the industrial sector. The study aims to examine whether carbon emission issues influence investors' assessments, thereby contributing to a decline in firm value. The following presents data on several sectors with the highest greenhouse gas emissions in Indonesia over the past three years.

Carbon Emission Disclosure (CED) undertaken by companies represents a strategic signal for capital market participants. Transparency in carbon emission disclosure may deliver an optimistic cue about an enterprise's readiness to face the energy transition and manage climate-related risks. Conversely, the lack of disclosure or excessively high emission levels may lead to market devaluation, as such companies are perceived as being more vulnerable to climate change risks. A number of prior researches, such as those carried out by Putri & Serly (2024), Fitriana & Amelia (2024) and Yuliandhari et al. (2023), found a positive impact of carbon emission disclosure on firm value. In contrast, Kim & Kim (2025) found that carbon emission disclosure had an adverse influence on firm value. Meanwhile, the findings of Afrilia & Astuti (2023), Budiman et al. (2024) and Kencana et al. (2024) demonstrate that disclosing carbon emission fails to influence firm value.

On the other hand, a company's financial performance, as an internal factor, constitutes a primary determinant of firm value. A high level of profitability serves as an indicator of operational efficiency. There is a tendency for firms with strong earnings performance to be perceived as having a greater capability to create value, thereby receiving higher market appreciation. Research by Salas et al. (2021), Astuti et al. (2024), Abiyyatha et al. (2025), and Purwanto et al. (2025) verified that profitability has a positive effect on firm value. Meanwhile, according to the studies of Diva & Triyono (2025) and Budiman et al. (2024), profitability was reported to possess no significant impact on firm value.

Another internal corporate factor, namely leverage, which serves as an indicator of financial risk, may also influence firm value. A company's decision to utilize debt can be interpreted as a signal conveyed to the market, reflecting management's optimism regarding the stability of future cash flows. However, an excessive debt ratio may instead burden the company with substantially greater financial risk. Companies with high leverage are generally perceived by investors as having a greater likelihood of bankruptcy risk, which may consequently reduce market perceptions of firm value. The evidence from Budiman et al. (2024) and Adelia et al. (2024) confirm that firm value is negatively affected by leverage. In contrast, Purwanto et al. (2025) found that employing leverage creates a positive influence on firm value. Meanwhile, other research conducted by Astuti et al. (2024), Diva & Triyono (2025) and Abiyyatha et al. (2025) demonstrated the absence of any meaningful impact of leverage on firm value.

Despite their strong theoretical foundations, previous studies have frequently produced inconsistent findings. Driven by these differences in results, the present paper replicates the study carried out by Budiman et al. (2024) intending to re-examining and providing a more in-depth analysis of the simultaneous and partial effects of Carbon Emission Disclosure, Profitability, and Leverage on the Firm Value of industrial sector companies registered on the Indonesian Stock Exchange during the 2022–2024 timeframe that focused on Business-to Business (B2B), aiming to deliver specific field data in Indonesia and address existing research gaps. This paper directs its attention to the industrial sector based on the consideration that this sector has been one of the major contributors to the decline of the Composite Stock Price Index (CSPI), with several companies within the sector experiencing declining stock price trends during the 2022–2024 period. This research differs from previous studies through modifications to the variable measurement parameters in accordance with recommendations from prior researchers, as well as by updating the research period.

## Literature Review

The framework of Signaling Theory was pioneered by Spence (1973). To this day, the theory has become a primary theoretical foundation for explaining the interaction between corporate information disclosure and capital market responses. Signaling theory is employed in this study because the independent variables represent signals conveyed by companies to external parties, particularly investors. The theory assumes the presence of an information imbalance between internal and outside stakeholders, whereby management, as the internal party, possesses more thorough data regarding the corporation's actual condition and future prospects compared to investors as external parties. Given this information gap, company management is expected to convey clear and credible signals regarding corporate quality to external parties (investors). These signals may take the form of financial data, strategic decisions, or non-financial disclosures, including sustainability-related disclosures. Investors subsequently interpret the signals conveyed by the company to

evaluate its prospects and make investment decisions, which ultimately influence the company's market value through stock prices.

### **Research Hypotheses**

One of the most crucial non-financial signals in the current era is carbon emission disclosure. Companies in the industrial sector are among the largest contributors to carbon emissions; therefore, transparency regarding emission-related information has become a significant concern for investors and other stakeholders. Such disclosure includes the types of carbon emissions generated, their quantity and intensity, as well as reductions in carbon emissions achieved through the implementation of corporate policies. This disclosure serves as a favorable indication that the enterprise is not solely pursuing profit but is also concerned with environmental aspects affected by its operational activities. The reception of this positive signal enhances investor trust regarding the firm's forward outlook, leading investors to become more optimistic about investing, which in turn increases firm value. This aligns with the empirical works by Alfayerds & Setiawan (2021) and Putri & Serly (2024), which found that greenhouse gas disclosure positively affects firm value. Consequently, the proposed hypothesis is as follows:

H1: Carbon emission disclosure positively affects firm value.

Profitability represents a primary signal conveyed by company management to investors, considering that the main objective of investors is to obtain returns from their investments. Profitability is measured using profitability ratios. According to Supiyanto et al. (2023), profitability ratios serve as indicators for measuring a company's capability to generate profits. These ratios also reflect managerial performance in managing the company. According to Signaling Theory, high and consistent profitability constitutes a strong indication that a company has successfully managed its resources effectively, thereby increasing the likelihood of generating positive cash flows in the future. Investors perceive profitability as a signal of managerial success, which fosters optimism and enhances investment interest. Consequently, this condition drives an expansion in firm value. The studies conducted by Abiyyatha et al. (2025) and Astuti et al. (2024) produced findings in agreement with this assumption. Therefore, the second hypothesis is formulated as follows:

H2: Profitability positively affects firm value.

Leverage is another important indicator in determining firm value. The ratio utilized to gauge an enterprise's scale of leverage is the leverage ratio (solvency ratio). This ratio indicates the proportion of a firm's total properties backed by liabilities (Supiyanto et al., 2023). High leverage indicates that a company generates relatively low sales while bearing substantial costs that must be covered. This condition acts as a negative signal to investors. Firms with high levels of debt may raise investor concerns regarding their ability to manage financing effectively. Such concerns may lead to a decline in stock prices, which in turn results in a decrease in firm value, as evidenced by the studies of Budiman et al. (2024) and Adelia et al. (2024). Therefore, the third hypothesis is formulated as follows:

H3: Leverage negatively affects firm value.

### **Method**

The paper adopts a quantitative research framework. The study's population consists of firms in the industrial sector listed at the Indonesian Stock Exchange (IDX). The research focuses on industrial sector companies listed on the Indonesian Stock Exchange during the 2022–2024 period as the research objects. The sampling process was executed using the purposive sampling technique based on the following criteria:

1. Companies that published financial statements for the 2022–2025 research period.
2. Companies that reported profits in their financial statements during the 2022–2024 period.
3. Companies that published sustainability reports for the 2022–2024 period.
4. Companies that disclosed carbon emissions information in their sustainability reports during the 2022–2024 period

This study relies on publicly available data gathered from the formal portal of the legitimate site of the Indonesian Stock Exchange (IDX) and the official web pages of each firm. The variables were measured using the following measurement instruments:

Firm value represents investors' assessment of a firm's performance and success (Ningrum, 2022). In this study, Tobin's Q is employed to measure firm value. This ratio represents the market values a firm's overall assets, including intangible assets, rather than solely tangible assets. Therefore, the use of Tobin's Q is considered more comprehensive in reflecting market expectations regarding a company's future prospects

compared with book value-based measures. In this study, Tobin's Q is evaluated at  $t+1$  period to capture market responses to the signals conveyed by companies during period  $t$ .

$$\text{Tobin's } Q = \frac{(\text{Stock price} \times \text{Outstanding shares}) + \text{Total Liabilities}}{\text{Total Assets}}$$

Carbon emission disclosure reflects the level of transparency regarding a firm's carbon footprint throughout the annual reporting cycle. In this study, carbon emission disclosure is quantified by employing the GRI 305 Standard, which specifically governs disclosures related to greenhouse gas emissions generated from an entity's operational activities. This reporting parameter is calculated by examining the extent to which companies disclose the following items:

1. Direct GHG emissions disclosure (Scope 1) in accordance with GRI 305-1.
2. Indirect GHG emissions disclosure (Scope 2) in accordance with GRI 305-2.
3. Other indirect GHG emissions disclosure (Scope 3) in accordance with GRI 305-3.
4. GHG emissions intensity disclosure in accordance with GRI 305-4.
5. GHG emissions reduction disclosure in accordance with GRI 305-5.
6. Ozone-depleting substances (ODS) emissions disclosure in accordance with GRI 305-6.
7. Nitrogen Oxides (NOx), Sulfur Oxides (SOx), and other significant air emissions disclosure in accordance with GRI 305-7.

$$CED = \frac{\text{Number of Disclosed Items}}{\text{Maximum Number of Disclosable Items}} \times 100\%$$

Profitability is measured using profitability ratios. These ratios describe a company's earnings generated from its operational activities and asset utilization. financial returns are quantified through the Return on Assets (ROA) ratio. This proxy reflects how competently companies in the industrial sector utilize their total productive assets to generate profits. Market participants in the industrial sector place considerable emphasis on asset efficiency (e.g., machinery, factories, and inventories); therefore, ROA acts as a powerful indicator of operational performance to the market.

$$ROA = \frac{\text{Net Income}}{\text{Total Assets}} \times 100\%$$

Leverage refers to how far the a company's assets are are backed by liabilities (Supiyanto et al., 2023). Leverage is measured using leverage ratios. For this paper, Debt to Equity Ratio (DER) is employed as the proxy for measuring leverage. For companies in the industrial sector, which generally require substantial capital to finance fixed assets and operational activities, DER acts as a powerful indicator for assessing the company's financial risk.

$$DER = \frac{\text{Total Liabilities}}{\text{Total Equity}}$$

Descriptive statistics and panel data regression analysis were selected as the analytical techniques for examining the research data in order to understand the simultaneous and partial impacts of several explanatory variables on the dependent variable. The selection of this method considers the characteristics of panel data, which simultaneously capture cross-sectional dynamics across firms and changes over time. Descriptive analysis was conducted to identify the he dispersion and characteristics of the examined variables. In descriptive statistics, the data are presented as they are, without making inferential generalizations to the population. Following the descriptive statistical phase, a panel regression estimation was performed.

To identify the highly suitable estimation model among the three primary models—Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM)—a series of statistical tests was performed, including the Chow Test, Hausman Test, and Lagrange Multiplier Test. After the selected model was established, diagnostic checks for classical assumptions were conducted to secure the precision and consistency of the outcome findings, including the normality test, multicollinearity test, heteroscedasticity test and autocorrelation test. Subsequently, panel data regression analysis was conducted, followed by hypothesis testing, including simultaneous testing and partial testing.

## Results and Discussion

The population in this study includes industrial sector companies registered on the Indonesia Stock Exchange (IDX) for the 2022–2024 period. To obtain a sample that meets the research objectives, a purposive sampling method was applied based on several criteria. The complete selection process and criteria are summarized in Table 1.

**Table 1.** Purposive Sampling Result

| Num                                                 | Description                                                                                       | 2022 | 2023 | 2024 | Total |
|-----------------------------------------------------|---------------------------------------------------------------------------------------------------|------|------|------|-------|
| 1.                                                  | Number of industrial companies listed on the Indonesia Stock Exchange                             | 53   | 61   | 65   | 179   |
| 2.                                                  | Companies without published financial statements for the research period (t) and period t+1       | -1   | -1   | -3   | -5    |
| 3.                                                  | Companies experiencing losses                                                                     | -9   | -16  | -17  | -42   |
| 4.                                                  | Companies without published sustainability reports                                                | -12  | -6   | -8   | -26   |
| 5.                                                  | Companies that published sustainability reports but did not disclose carbon emissions information | -6   | -8   | -6   | -20   |
| Total number of companies studied from 2022 to 2024 |                                                                                                   | 25   | 30   | 31   | 86    |

Source: Processed by the author

The initial population consisted of 179 potential observations from industrial enterprises publicly traded on the Indonesia Stock Exchange (IDX) during 2022-2024. From this population, observations were excluded in accordance with established criteria. A total of 5 observations were excluded because the companies did not publish financial statements. Furthermore, 42 observations were excluded due to negative earnings. Another 26 observations were removed because the companies did not publish sustainability reports, while 20 observations were excluded for not disclosing carbon emissions details in their sustainability reports. Consequently, the ultimate dataset comprised 86 observations used in this study. The sample selection process resulted in an unbalanced panel data structure, as the authors retained all companies that satisfied the sampling criteria in each respective year aiming to optimize the overall sample size and reduce potential bias.

**Table 2.** Results of Descriptive Statistical Analysis

| Variables                  | Min  | Max   | Mean | Std. Dev | Skewness |
|----------------------------|------|-------|------|----------|----------|
| Carbon Emission Disclosure | 0.03 | 0.81  | 0.31 | 0.19     | 0.43     |
| Profitability              | 0.00 | 0.30  | 0.07 | 0.06     | 1.06     |
| Leverage                   | 0.03 | 10.44 | 0.80 | 1.18     | 6.59     |
| Firm Value                 | 0.37 | 41.00 | 2.03 | 4.52     | 7.69     |

Source: Data processed using EViews 12

Looking at the descriptive statistic summary, the distributional characteristics of the four research variables exhibit considerable variation. Carbon emissions disclosure spans between 0.03 and 0.81, with an average score of 0.31, a standard deviation of 0.19 and a skewness value of 0.43. A similar pattern is observed for profitability, which extends from 0.00 to 0.30 accompanied by a mean value of 0.07, standard deviation 0.06 and a skewness value of 1.06. In contrast, the other two variables exhibit substantial variability. Leverage shows a wide range of values, from 0.03 to 10.44, with a mean of 0.80, standard deviation 1.18 and a skewness value of 6.59. Similarly, firm value demonstrates significant variation, ranging from 0.37 to 41.00 with a mean score of 2.03, standard deviation 4.52 and a skewness value of 7.69.

Prior to estimating the panel data regression specification, a model selection procedure was conducted to identify the most appropriate estimation approach. The selection process involved three testing methods, including the Chow test, the Hausman test, and the Lagrange Multiplier test. The empirical outcomes of these diagnostic checks are compiled in Table 3.

**Table 3.** Model Selection Results

| Chow Test                                                                 | Hausman Test                                              | Lagrange Multiplier Test                                  |
|---------------------------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------|
| Criteria:<br>Cross-Section F > 0.05 = CEM<br>Cross-Section F < 0.05 = FEM | Criteria:<br>P-value ≤ 0.05 = FEM<br>P-value > 0.05 = REM | Criteria:<br>Probabilitas Breusch-Pagan (BP) > 0.05 = CEM |

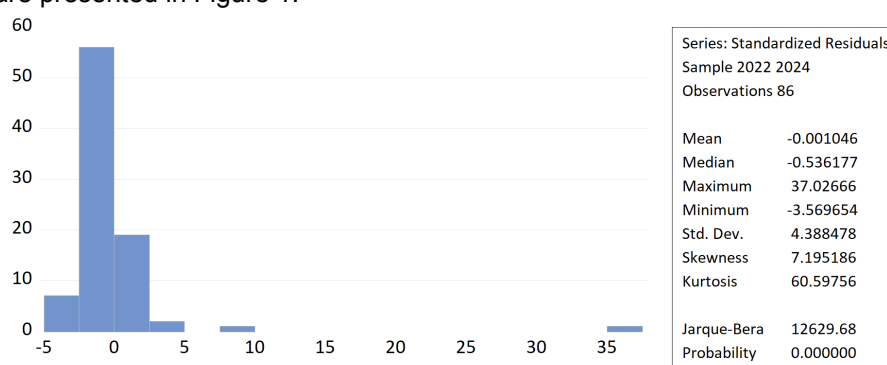
|                     |                     |                                                 |
|---------------------|---------------------|-------------------------------------------------|
|                     |                     | Probabilitas Breusch-Pagan<br>(BP) < 0.05 = REM |
| Result: 0.00        | Result: 0.10        | Result: 0.00                                    |
| Selected Model: CEM | Selected Model: REM | Selected Model: REM                             |

Source: Data processed using EViews 12

As shown in Table 3, the model selection tests conducted identified the Random Effects Model (REM) as the most suitable panel data regression model.

#### Normality Test

This analysis was conducted to check if the underlying dataset conforms to a normal distribution. Normality test was performed using the Jarque–Bera method, under the rule that a p-value higher than 0.05 implies the error terms are normally distributed. The test diagnostic results for residual using the original data (prior to transformation) are presented in Figure 1.

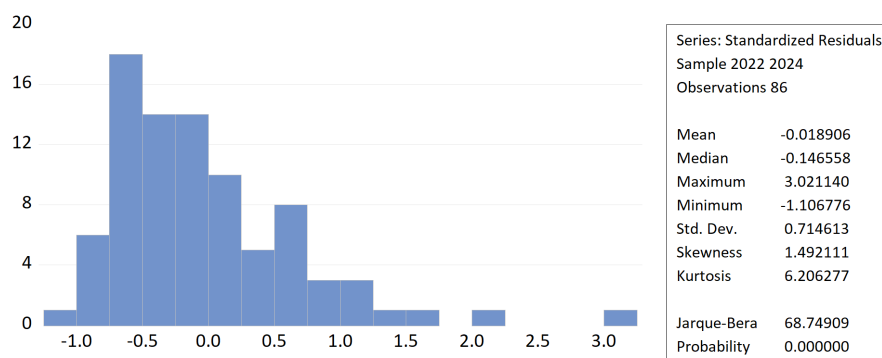


**Figure 1.** Normality Test Results Before Transformation

Source: Data processed using EViews 12

As shown in Figure 1, the Jarque–Bera statistic was 12629.68, yielding a p-value of 0.000000. Given that this significance value was substantially lower than the critical 5% level ( $0.000000 < 0.05$ ), it indicates that the model's residuals based on the original data were not normally distributed. To resolve this non-normality, the data were transformed using the natural logarithm (ln), as the residual distribution exhibited positive skewness (Heryana, 2023). Positive skewness is characterized by a distribution whose peak is shifted to the left with a long tail extending to the right. The natural logarithm transformation is appropriate for mitigating positive skewness because, mathematically, it compresses larger values while stretching smaller ones. As a result, the variance becomes more stable and the data distribution more closely approximates a normal distribution.

Skewed residuals are often associated with high levels of skewness in the underlying variables. According to Kurnia & Akbar (2023), a dataset can be considered approximately normally distributed when its skewness value falls between  $-2$  and  $+2$ . Therefore, the natural logarithm transformation was conducted to the leverage variable (LN\_DER) and firm value variable (LN\_TOBINSQ), as the descriptive statistics presented in Table 2 indicate that their skewness values were below  $-2$  or above  $+2$ . The results of the normality test after the transformation are presented in Figure 2 below.

**Figure 2.** Normality Test Results After Transformation

Source: Data processed using EViews 12

As shown in Figure 5, the data transformation improved the shape of the residual histogram, which became more symmetrical and closely resembled a bell-shaped distribution. The Jarque–Bera statistic decreased substantially to 68.74909. Although the Jarque–Bera probability value remained at 0.000000 after the transformation, the analysis was continued based on the Central Limit Theorem (CLT). According to the CLT, for sufficiently large sample sizes ( $N > 30$ ), the normality assumption may be relaxed because the error terms' sampling distribution generally approximates a normal distribution asymptotically (Ghozali, 2021). The final sample size for this project consists of 86 observations ( $N = 86$ ). Therefore, the panel data regression model was considered appropriate for further analysis.

Although the Central Limit Theorem (CLT) suggests that a relatively large sample size ( $N = 86$ ) tends to produce residuals that are asymptotically normally distributed, the natural logarithm (ln) transformation was nevertheless applied in this study. This statistical treatment was considered essential because the original data exhibited extremely high positive skewness, with a skewness value of 7.195186. Estimating the regression model using the untransformed data would allow the presence of substantial outliers to distort the mean and inflate the variance, potentially resulting in biased and inefficient regression coefficient estimates. Therefore, the ln transformation was employed to reduce the variability of the data scale and improve the stability of the regression model, while the large sample size provided additional support for the normality assumption under the Central Limit Theorem.

The multicollinearity test was performed to verify if a strong or perfect correlation existed between the predictors of the regression specification. A robust econometric model must avoid strong correlations among its independent variables. The diagnostic was performed by observing the Centered Variance Inflation Factor (VIF) scores obtained from the EViews output. A regression model is classified free from multicollinearity when the Centered VIF value for each independent variable is less than 10.

**Table 4.** Multicollinearity Test Result

| Variance Inflation Factors |                         |                   |                 |
|----------------------------|-------------------------|-------------------|-----------------|
| Date: 06/15/26 Time: 20:31 |                         |                   |                 |
| Sample: 1 86               |                         |                   |                 |
| Included observations: 86  |                         |                   |                 |
| Variable                   | Coefficient<br>Variance | Uncentered<br>VIF | Centered<br>VIF |
| C                          | 0.028841                | 4.889451          | NA              |
| CED                        | 0.174085                | 3.903012          | 1.103612        |
| ROA                        | 1.828360                | 2.871237          | 1.132003        |
| LN_DER                     | 0.007893                | 1.657840          | 1.088593        |

Source: Data processed using EViews 12

According to the empirical findings presented in Table 5, the Centered VIF values for CED, ROA, and LN\_DER were 1.103612, 1.132003, and 1.088593, respectively. Since the Centered VIF values for each independent variable remained under the limit of 10, it can be concluded that there are no multicollinearity complications within the regression framework. Therefore, the model is considered suitable for further analysis.

The diagnostic for heteroscedasticity was implemented to evaluate if the variance of the error terms remained homoscedastic throughout the sample. This test was performed using the Breusch–Pagan–Godfrey method in EViews. The decision criterion was based on the probability value of the Obs\*R-squared Chi-square statistic. If the Prob. Chi-Square value exceeded the 5% significance level ( $\alpha = 0.05$ ), the null hypothesis of homoscedasticity is accepted.

**Table 5.** Heteroscedasticity Test Result

| Heteroskedasticity Test: Breusch-Pagan-Godfrey |          |                     |        |
|------------------------------------------------|----------|---------------------|--------|
| Null hypothesis: Homoskedasticity              |          |                     |        |
| F-statistic                                    | 0.812328 | Prob. F(3,82)       | 0.4907 |
| Obs*R-squared                                  | 2.482094 | Prob. Chi-Square(3) | 0.4785 |
| Scaled explained SS                            | 7.000921 | Prob. Chi-Square(3) | 0.0719 |

Source: Data processed using EViews 12

As demonstrated by the EViews output presented in Table 6, the Obs\*R-squared statistic was 2.482094, with a Prob. Chi-Square(3) value of 0.4785. Since this p-value exceeded the 5% significance level ( $0.4785 > 0.05$ ), the null hypothesis was not rejected. Consequently, the estimation shows no evidence of heteroscedasticity.

The autocorrelation test was conducted to determine whether the error terms within the regression framework exhibited serial correlation over time. Specifically, autocorrelation was assessed using the Durbin–Watson (DW) test by examining the Durbin–Watson statistic reported under the weighted statistics section of the random effects estimation output.

**Table 6.** Autocorrelation Test Result

| Durbin Watson stat | Conclusion         |
|--------------------|--------------------|
| 1.945289           | No Autocorrelation |

Source: Data processed using EViews 12

Based on the EViews output, the Durbin–Watson statistic was 1.945289. This value was compared with the critical values of the Durbin–Watson table at the 5% significance level, with a sample size of 86 observations ( $N = 86$ ) and three independent variables ( $k = 3$ ). The comparison yielded an upper critical value (dU) of 1.7088 and a value of  $4 - dU$  equal to 2.2912. Since the calculated Durbin–Watson statistic falls between dU and  $4 - dU$  ( $1.7088 < 1.945289 < 2.2912$ ), it can be concluded that the regression model does not exhibit either positive or negative autocorrelation.

After selecting the most appropriate panel data regression model, which resulted in the Random Effects Model (REM), and conducting the required diagnostic tests, the regression results are presented as follows.

**Table 7.** Panel Data Regression Result

| Dependent Variable: LN_TOBINSQ                    |             |            |             |        |
|---------------------------------------------------|-------------|------------|-------------|--------|
| Method: Panel EGLS (Cross-section random effects) |             |            |             |        |
| Date: 06/17/26 Time: 12:23                        |             |            |             |        |
| Sample: 2022 2024                                 |             |            |             |        |
| Periods included: 3                               |             |            |             |        |
| Cross-sections included: 38                       |             |            |             |        |
| Total panel (unbalanced) observations: 86         |             |            |             |        |
| Swamy and Arora estimator of component variances  |             |            |             |        |
| Variable                                          | Coefficient | Std. Error | t-Statistic | Prob.  |
| C                                                 | -0.115807   | 0.200759   | -0.576848   | 0.5656 |
| CED                                               | 0.519487    | 0.427836   | 1.214219    | 0.2281 |
| ROA                                               | 3.692702    | 1.528096   | 2.416538    | 0.0179 |
| LN_DER                                            | 0.110747    | 0.098822   | 1.120675    | 0.2657 |

Source: Data processed using EViews 12

Based on the results obtained, the panel data regression equation is formulated as follows:

$$\text{LN\_TOBINSQ} = -0.115807 + 0.519587\text{CED} + 3.692702\text{ROA} + 0.110747\text{LN\_DER}$$

The regression model above can be interpreted as follows:

- 0.115807 : When CED, ROA, and LN\_DER are equal to zero, the predicted value of LN\_TOBINSQ is -0.115807.
- 0.519487CED : Holding other variables constant, a one-unit increase in CED is associated with an increase of 0.519587 in LN\_TOBINSQ.
- 3.692702ROA : Holding other variables constant, a one-unit increase in ROA is associated with an increase of 3.692702 in LN\_TOBINSQ.
- 0.110747LN\_DER : Holding other variables constant, a 1% increase in DER is associated with a 0.110747% increase in LN\_TOBINSQ.

The first hypothesis test conducted was the coefficient of determination analysis, which aims to indicate the percentage of total effect exerted by the independent variables toward the variation of the dependent variable.

**Table 8.** Coefficient of Determination Test Results

|                    |          |                    |          |
|--------------------|----------|--------------------|----------|
| Root MSE           | 0.392023 | R-squared          | 0.101338 |
| Mean dependent var | 0.088404 | Adjusted R-squared | 0.068460 |
| S.D. dependent var | 0.415385 | S.E. of regression | 0.401471 |
| Sum squared resid  | 13.21668 | F-statistic        | 3.082261 |
| Durbin-Watson stat | 1.945289 | Prob(F-statistic)  | 0.031865 |

Source: Data processed using EViews 12

Relying on the coefficient of determination test, the adjusted R-squared was found to be 0.06. This relatively minimal percentage demonstrates that carbon emissions disclosure, profitability, and leverage provides limited explanatory power over firm value. In other words, a major percentage of the variance in firm value is attributable to factors outside this research model. This finding is reasonable, as firm value (Tobin's Q) is strongly influenced by investors' perceptions, which are dynamic and shaped by numerous external factors. These factors may include macroeconomic conditions such as inflation and interest rates, firm-specific characteristics such as firm size and dividend policy, as well as market sentiment and industry-related events.

The next test conducted was the overall significance test to evaluate if the explanatory variables collectively affect firm value. The criteria are structured below:

- a. In the event that the p-value of the F-statistic is less than 0.05, the explanatory variables simultaneously influence the dependent variable. Therefore, the research model is considered appropriate for use in this study.
- b. In the event that the F-statistic p-value be greater than 0.05, the predictors fail to jointly influence the dependent variable. Therefore, the research model is not considered appropriate for use in this study.

Referring to Table 9, the probability value (F-statistic) equals  $0.03 < 0.05$ , indicating that the independent variables collectively affect firm value.

The next test performed was the partial significance test (t-test) to assess if every independent variable separately exerts a meaningful impact upon the dependent variable. The criteria are as follows:

- a. In the event that the probability score (p-value) is  $< 0.05$ , the independent variable has a statistically significant partial influence upon the dependent variable.
- b. In the event that the probability score (p-value) is  $> 0.05$ , the independent variable does not have a statistically significant partial influence upon the dependent variable.

**Table 9.** Result of the t-Test

| Variable | Coefficient | Std. Error | t-Statistic | Prob.  |
|----------|-------------|------------|-------------|--------|
| C        | -0.115807   | 0.200759   | -0.576848   | 0.5656 |
| CED      | 0.519487    | 0.427836   | 1.214219    | 0.2281 |
| ROA      | 3.692702    | 1.528096   | 2.416538    | 0.0179 |
| LN_DER   | 0.110747    | 0.098822   | 1.120675    | 0.2657 |

Source: Data processed using EViews 12

1. The significance value of the Carbon Emission Disclosure (CED) variable is 0.2281, which is greater than the 5% significance level. Therefore, carbon emission disclosure does not have a statistically significant partial effect on firm value.
2. The significance value of the ROA variable is 0.0179, which is lower than the 5% significance level. Therefore, profitability has a statistically significant partial effect on firm value.
3. The significance value of the DER variable is 0.2657, which exceeds the 0.05 significance level. Therefore, leverage does not have a statistically significant partial effect on firm value.

## **Discussion**

### **Effect of Carbon Emission Disclosure on Firm Value**

The data analysis demonstrate that carbon emission disclosure does not exert a meaningful impact on firm value. This result implies that carbon emission disclosure is not currently treated as a critical determinant by investors in evaluating firms. Although companies have disclosed carbon emission information in their sustainability reports, such information has not been sufficient to generate a positive investor response reflected in market share prices. This finding is inconsistent with the signaling theory. Investors tend to disregard this information because carbon emission disclosure is not perceived as having a direct financial impact on the company's future cash flows. Consequently, since it lacks clear economic value, the market does not respond to this signal.

The negligible influence of carbon emission disclosure on firm value may be attributed to the relatively low level of market attention toward environmental issues in Indonesia. This explanation is supported by Afrilia & Astuti (2023), who found that carbon emission disclosure does not influence firm value because such disclosure is not yet mandatory under Indonesian regulations, resulting in limited market attention. Furthermore, Kencana et al. (2024) reported that the quality and comprehensiveness of carbon emission disclosure in Indonesia remain relatively low, preventing firms from creating a competitive advantage capable of attracting stakeholders and investors. However, these findings are inconsistent with those of Fitriana et al. (2024), who argued that more extensive carbon emission disclosure enhances firm value. Conversely, it challenges the documentation by Yuliandhari et al. (2023) and Putri & Serly (2024) who discovered a favorable impact of carbon emission disclosure on firm value.

### **Effect of Profitability on Firm Value**

The findings reveal that profitability significantly enhances the overall value of a company. This signifies that the greater a firm's ability to generate profits, its overall market assessment appreciates accordingly. This evidence validates Signaling Theory, which states that signals conveyed by a company will be positively interpreted by investors when they provide clear economic relevance. In this context, corporate profitability corporate earnings serve as a favorable signal to stakeholders concerning the firm's condition and future prospects.

High profitability reflects excellent organizational health, thereby enhancing market trust in the organization's subsequent growth potential. Firms exhibiting robust profit margins typically appeal more to potential shareholders, as they are perceived as being capable of providing superior returns (Abiyyatha et al., 2025). Increased investor interest in a company stimulates an elevated demand for its shares, leading to higher share prices, thereby driving up firm value. High profitability conveys information that the management successfully utilizes its assets to maximize earnings. Consequently, investors respond positively, as shown by the rise in firm value. The result also support previous literature established by Salas et al. (2021), Purwanto & Lastanti (2025) and Astuti et al. (2024) which documented a beneficial impact profitability on firm value. However, this outcomes contrasts with the findings of Diva & Triyono (2025) and Budiman et al. (2024) who did not find a significant effect of profitability on firm value.

### **Effect of Leverage on Firm Value**

The findings indicate that leverage exhibits insignificant effect. This insignificant effect suggests that a firm's debt level has not become a core determinant used by investors in evaluating firm value. Investors may place more weight to company's profitability, market conditions, and other fundamental factors rather than its financing structure. This finding does not match the Signaling Theory, whereby the use of high debt may serve as a signal that a company doesn't has ability to manage financing effectively. In the context of this study, such a signal does not appear to be sufficiently strong to exert a meaningful influence on firm value. The findings of this study are consistent with those of Abiyyatha et al. (2025), who reported that increases or decreases in a company's debt level are not necessarily regarded by investors as a key indicator when evaluating the firm's financial condition. This result is also in line with the findings of Diva & Triyono (2025),

who found that leverage has no significant effect on firm value. However, the present finding is inconsistent with the literature by Budiman et al. (2024) and Adelia et al. (2024) who reported a detrimental effect of leverage on firm value.

## Conclusion

The findings of this research concerning the effects of carbon emission disclosure, profitability, and leverage on firm value indicate that carbon emission disclosure does not have a significant impact on firm value. Investors do not yet prioritize carbon emission disclosure as a primary factor in firm valuation. This suggests that carbon emission-related information are not yet viewed as value-relevant components by the market. Profitability exerts a significant favorable effect on firm value. This implies that an enhanced capacity for driving profit translates directly into a higher firm value. High profitability mirrors robust corporate performance, strengthens investor confidence, and triggers higher trading demand, ultimately leading to higher firm value. Leverage demonstrates an insignificant impact on firm value. This indicates that a corporate debt ratios has not yet become a key determinant in investors' valuation decisions. Investors likely focus more heavily on profitability and other fundamental factors rather than the company's financing structure. Overall, the study demonstrates that only profitability exerts a substantial impact on market valuation, whereas carbon emission disclosure and leverage fail to exhibit statistically significant effects.

Several constraints accompany this empirical work. Primarily, the coefficient of determination is relatively low, with an adjusted R-squared value of 6%, indicating that fluctuations in firm value is largely explained by factors outside the research model. Second, the final sample size was relatively limited, consisting of 86 observations, due to the stringent purposive sampling criteria related to the availability of carbon emissions disclosure. Third, this study focused exclusively on firms in the industrial sector and was restricted to a brief temporal window, spanning the years 2022–2025.

In light of these constraints, subsequent studies are advised to integrate alternative explanatory factors, including firm size, dividend policy, and macroeconomic factors, in order to enhance the R-squared capacity concerning firm value. Furthermore, future studies may expand the scope of the research to include other environmentally sensitive sectors, such as mining and energy, and extend the timeframe to more accurately capture longitudinal capital market responses and trends in a more comprehensive manner.

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