

THE EFFECT OF CARBON TAX APPLICATION AND GREEN FINANCIAL INITIATIVES ON THE PROFITABILITY OF MANUFACTURING COMPANIES ON THE IDX

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Abstract

Indonesia has responded to the intensifying climate crisis by introducing environmental policies such as carbon taxation and green finance. These measures aim to reduce carbon emissions while sustaining economic growth. However, concerns have emerged regarding their potential impact on corporate profitability, particularly in the manufacturing sector. The relationship between sustainability policies and financial performance remains inconclusive, warranting further investigation. This study examines the effect of carbon tax implementation and green finance initiatives on the profitability of manufacturing companies listed on the Indonesia Stock Exchange. It also explores the extent to which firms can maintain financial performance amid increasingly stringent environmental regulations. The research is grounded in legitimacy theory, which posits that firms must align their activities with societal expectations to retain legitimacy. In this context, environmental initiatives serve as a means for companies to demonstrate commitment to sustainability and gain stakeholder support. A quantitative approach with an associative method was employed, using purposive sampling to select 131 manufacturing firms over the 2021–2023 period, resulting in 393 observations. Secondary data were obtained from annual and sustainability reports and analyzed using multiple linear regression via EViews 12. The results reveal that carbon tax implementation and green finance have no significant individual or combined effect on Return on Equity. These findings suggest that current environmental policies have not yet provided tangible financial benefits to manufacturing firms. Thus, more adaptive strategies and supportive incentives may be necessary to help businesses remain competitive while advancing sustainability objectives.

Keywords: Carbon Tax; Green Finance; Profitability

INTRODUCTION

The escalating climate crisis has prompted countries worldwide, including Indonesia, to implement strict environmental policies such as carbon taxation and promote green finance initiatives. These strategies are part of Indonesia's broader commitment to achieving the Sustainable Development Goals (SDGs) and fulfilling its obligations under the Paris Agreement (EDGAR, 2024; Sutopo et al., 2014). While these policies are designed to reduce greenhouse gas emissions and support sustainable development, they also raise concerns about their economic implications, particularly their potential impact on corporate profitability. This concern is especially relevant in the manufacturing sector, which is both carbon-intensive and crucial to the national economy (Salim & Sidiq, 2022). Despite growing scholarly and policy attention, existing research on the relationship between environmental regulation and firm performance has produced mixed results. Some studies have shown that carbon taxes and green finance can enhance long-term efficiency and profitability (Agosti et al., 2023; Legowo et al., 2024), while others argue they increase operating costs and reduce

competitiveness, particularly in the short term (Albab & Tjaraka, 2024; Hasanah & Hariyono, 2022). These inconsistencies highlight a research gap that must be addressed to better understand how environmental policy instruments influence financial outcomes in developing economies like Indonesia.

To fill this gap, this study aims to analyze the effect of carbon tax implementation and green finance initiatives on the profitability of manufacturing firms listed on the Indonesia Stock Exchange (IDX) between 2021 and 2023. The research is grounded in Legitimacy Theory by Dowling and Pfeffer (1975), which posits that firms must adapt their operations to meet societal expectations in order to retain social legitimacy. From this perspective, engaging in sustainable practices through regulatory compliance and green financial strategies can strengthen stakeholder trust, enhance reputation, and ultimately support financial performance (Krushelnytska, 2017; Secinaro et al., 2020). Building on this foundation, the study makes both theoretical and practical contributions. Theoretically, it extends current literature by integrating two environmental variables carbon tax and green finance into a unified analytical model, which has not been widely explored in the Indonesian context. It also provides empirical evidence from a post-pandemic period, offering insights into how recent policy shifts interact with profitability metrics such as Return on Equity (ROE).

Practically, the findings can inform multiple stakeholders. For businesses, the study offers a framework to understand how environmental policy compliance may affect financial outcomes, thus helping shape more adaptive corporate strategies. For investors, it provides an evidence-based tool to evaluate companies' financial resilience under environmental pressures. For regulators, the results offer policy feedback to design more effective and incentive-aligned environmental regulations. Lastly, for the general public, it contributes to greater awareness of how environmental responsibility intersects with economic performance. The key novelty of this research lies in its focus on the manufacturing sector a major source of emissions and a backbone of the Indonesian economy rather than on financial institutions, which are more commonly studied (Hasanah & Hariyono, 2022). Moreover, the inclusion of both carbon tax and green finance as independent variables allows for a more comprehensive analysis of how firms respond to dual environmental pressures.

The results reveal that neither carbon tax nor green finance has a statistically significant effect on profitability, as measured by ROE. Additionally, when tested simultaneously, the two variables still do not exhibit a meaningful combined effect. These findings suggest that current environmental policies may lack the direct financial incentives or enforcement strength to significantly alter firm behavior or performance. Therefore, the study implies that a more adaptive policy design possibly combining regulatory measures with supportive incentives is necessary to align environmental goals with corporate financial interests. Only through such a synergistic approach can Indonesia ensure that its sustainability agenda is both environmentally and economically viable.

LITERATURE REVIEW AND HYPOTHESIS FORMULATION

A. Legitimacy Theory

Dowling and Pfeffer (1975) emphasize that legitimacy theory revolves around the idea that organizations must adjust their actions to align with societal norms and expectations to maintain public acceptance. This alignment is crucial for building trust among stakeholders, particularly investors, as companies perceived as legitimate are more likely to receive positive market responses. In the context of sustainability-focused business, implementing carbon taxes and adopting green finance strategies can serve as tools for companies to reinforce their legitimacy. Such actions not only attract environmentally conscious investors but also enhance perceptions of financial stability and growth prospects. Conversely, failure to meet these social and environmental standards can erode legitimacy, weaken investor confidence, and negatively affect financial performance.

B. Carbon Tax

A carbon tax is a policy that requires companies to pay a fee when they emit greenhouse gases that negatively impact the environment. The tax amount is typically calculated based on the number of metric tons of carbon dioxide equivalent (tCO₂e) emitted. This mechanism functions as a financial incentive, encouraging businesses and individuals to lower emissions by improving energy efficiency, switching to cleaner energy sources, or altering consumption habits (Conway, 2017). Unlike traditional taxes that are linked to government services, the carbon tax operates as a standalone charge aimed at curbing emissions. It effectively integrates the environmental costs of carbon output into the market prices of goods and services, thus promoting more sustainable production and consumption (Nations, 2019).

C. Green Finance

Green finance is a financial approach that channels investments toward initiatives supporting sustainable development, environmentally responsible products, and economic policies focused on long-term ecological balance, such as climate-related funding and pollution mitigation (Krushelnyska, 2017). It also encompasses efforts to secure capital for climate-related challenges while addressing financial risks by integrating environmental, social, and governance (ESG) considerations into investment decisions (Almazrouei & Nobanee, 2021). Common instruments in green finance include green bonds, financial technologies, and funding for renewable energy and carbon reduction projects, all aligned with global frameworks like the Sustainable Development Goals and the Paris Agreement (Sachs et al., 2019).

D. Profitability

Profitability represents a key indicator of a company's financial health, reflecting its capability to generate income from the resources it manages. According to Kasmir (2016), it is commonly assessed through ratios like Return on Assets (ROA) and Return on Equity (ROE), which evaluate how effectively a firm utilizes its assets and capital. This metric highlights operational outcomes and managerial efficiency in resource utilization. Hery (2015) notes that profitability holds central importance for investors and stakeholders, as it signals the firm's potential to deliver future earnings. Similarly, Brigham (2016) views profitability not only as a performance measure but also as a strategic planning tool that helps guide decisions aimed at boosting efficiency. Furthermore, as explained by Zutter and Smart (2019), profitability is shaped by both internal factors, such as operational effectiveness and capital structure and external elements like market dynamics and macroeconomic conditions.

Several studies, such as those by Legowo et al., (2024) and Agosti et al., (2023) found that green finance practices and carbon management strategies can enhance profitability and operational efficiency. However, others like Hasanah and Hariyono (2022) and Afifah et al., (2020) reported that green finance does not necessarily lead to increased profitability and may even elevate credit risk. In terms of carbon-related policies, research by Wang et al., (2022) and Salim and Sidiq (2022) showed that carbon tax and emissions trading mechanisms positively influence business continuity and environmental efficiency. Regarding firm value, findings from Yusnia et al., (2024), Fitriana et al., (2024), and Rusmana and Purnaman (2020) indicate that environmental performance disclosure and environmental costs can significantly enhance firm valuation. Conversely, Alfikri and Susyani (2024) argued that green finance has no direct effect on firm value and that profitability does not moderate its relationship with other financial indicators. Overall, the results reflect the complex and context-dependent nature of the link between environmental initiatives and financial outcomes.

Based on the theoretical foundation and previous empirical findings discussed earlier, this study proposes the following hypotheses to examine the effect of environmental policy instruments on corporate profitability:

H1: Carbon tax implementation has a positive impact on corporate profitability.

H2: The implementation of green finance initiatives has a positive impact on corporate profitability.

RESEARCH METHODS

This study employs a quantitative approach with an associative design to examine the effect of carbon tax and green finance initiatives on profitability. The research focuses on manufacturing companies listed on the Indonesia Stock Exchange (IDX) during the 2021–2023 period. These companies were selected using purposive sampling based on the availability of financial and sustainability reports, resulting in 131 companies and 393 firm-year observations.

The data used are secondary in nature, collected through annual reports and sustainability disclosures published on official company websites and the IDX. Data were analyzed using panel data regression with the Common Effect Model (CEM) approach, processed through EViews 12.

Profitability, the dependent variable, is measured using Return on Equity (ROE), reflecting a firm's efficiency in generating net profit from shareholder equity:

$$ROE = \frac{\text{Net Income After Tax}}{\text{Equity}} \times 100\%$$

The independent variables include carbon tax and green finance initiatives. The carbon tax is measured using the formula:

$$\text{Carbon Tax} = \text{Tax Base} \times \text{IDR } \frac{30,000 \text{ CO}_2\text{e}}{\text{ton}}$$

Green finance is assessed using the Green Coin Rating (GCR) index, composed of 15 indicators such as environmental training, green procurement, carbon emissions disclosure, and green investment. It is calculated as:

$$GFI = \frac{\text{Number of GCR Items Disclosed}}{15} \times 100\%$$

The classical assumption tests applied include multicollinearity and heteroscedasticity tests. Model selection was conducted using the Chow Test, Hausman Test, and Lagrange Multiplier Test. Hypotheses were tested using multiple regression analysis to determine the effect of each independent variable on profitability. The moderation model was formulated as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + e$$

Description:

- Y : Company Value
- α : Constant Number
- $\beta_1 - \beta_2$: Regression Coefficient
- X1 : Carbon Tax
- X2 : Green Finance
- e : Error

RESULTS AND DISCUSSION

This study examines the relationship between carbon tax implementation and green finance initiatives on the profitability of manufacturing companies listed on the Indonesia Stock Exchange (IDX) during the 2021–2023 period. Using purposive sampling, 131 companies were selected from a population of 232, resulting in 393 observations. The research uses secondary data sourced from annual financial and sustainability reports and applies panel data regression with classical assumption testing.

Table 1. Sample Selection Details

No.	Criteria	Total
1	Manufacturing companies on the Indonesia Stock Exchange during the period 2021-2023	232
2	Manufacturing companies on the Indonesia Stock Exchange and published consecutive Annual Reports during the period 2021-2023	(30)
3	Manufacturing companies that consistently disclosed complete data information for research variables in sustainability reports during the period 2021-2023	(71)
	Number of companies sampled	131
	Number of observations over 3 years	393

Source: Eviews 12 Data Processing Results (2025)

a) Descriptive Analysis

Descriptive statistics (Table 4) reveal considerable heterogeneity in all three variables: Return on Equity (ROE), Carbon Tax (CT), and Green Finance (GF). The profitability variable has a mean of 0.21 with a maximum of 48.42 and a minimum of -4.96, indicating substantial variation among firms. The carbon tax data show a highly skewed distribution with extreme outliers, as shown by a skewness value of 10.29. Meanwhile, green finance has a moderately symmetrical distribution with a mean of 83.34, suggesting a relatively consistent implementation across companies. These descriptive results illustrate that although green finance practices are somewhat commonly applied, carbon tax exposure varies greatly, likely due to differences in emission levels, reporting practices, or compliance behavior. Similarly, profitability outcomes differ significantly across firms, which could be influenced by external economic conditions or internal operational efficiencies.

Table 2. Descriptive Analysis Results

	ROE	CT	GF
Median	0.08	107208480050.91	86.67
Maximum	48.42	8832193151783.72	100.00
Minimum	-4.96	-40000000000.00	40.00
Mean	0.21	107541367428.01	83.34
Std. Dev.	2.47	589899733950.67	14.01
Skewness	19.02	10.29	-0.71
Number of Observations	393	393	393

Source: Eviews 12 Data Processing Results (2025)

b) Model Selection and Classical Assumptions

To determine the most appropriate panel regression model, three diagnostic tests were conducted: Chow, Hausman, and Lagrange Multiplier (LM). The Chow test favored the Fixed Effect Model (FEM) ($p < 0.05$), but the Hausman test ($p = 0.22$) supported the use of the Random Effect Model (REM). However, the LM test result ($p = 0.87$) indicated that the Common Effect Model (CEM) is more appropriate. Based on these test results, CEM was selected for further analysis.

Table 3. Chow Test Result

Effects Test	Statistic	d.f	Prob.
Cross-section F	1.00	(130,260)	0.49
Cross-section Chi-square	159.37	130	0.04

Source: Eviews 12 Data Processing Results (2025)

Table 4. Husman Test Result

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f	Prob.
Cross-section random	2.99	2	0.22

Source: Eviews 12 Data Processing Results (2025)

Table 5. Langrange Multiple Test Result

	Cross-section	Time	Both
Breusch-Pagan	0.03	0.03	0.05
	(0.87)	(0.86)	(0.82)

Source: Eviews 12 Data Processing Results (2025)

Furthermore, classical assumption tests show that multicollinearity is not present in the model (VIF < 10 for all variables), and heteroscedasticity is not detected based on the Glejser test ($p > 0.05$). These diagnostics confirm that the data meet the assumptions required for regression analysis using CEM, ensuring that the estimation results are valid.

Table 6. Multicollinearity Test Result

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.58	37.12	NA
CT	0.00	1.04	1.01
GF	0.00	36.87	1.01

Source: Eviews 12 Data Processing Results (2025)

Table 7. Heteroscedasticity Test Using the Glejser Test

F-statistic	0.90	Prob. F(2,180)	0.41
Obs*R-squared	1.80	Prob. Chi-Square(2)	0.41
Scale explained SS	4.82	Prob. Chi-Square(2)	0.09

Source: Eviews 12 Data Processing Results (2025)

c) Regression and Hypothesis Testing

The multiple linear regression analysis indicates that neither carbon tax nor green finance significantly affects profitability. The regression model produced the following equation:

$$\text{Profitability} = 0.67 - 0.00 * \text{Carbon Tax} - 0.01 * \text{Green Finance}$$

This means that both independent variables have negative coefficients, though their p-values are greater than 0.05, making them statistically insignificant.

Table 8. Multiple Linear Regression Analysis Test Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.67	0.76	0.88	0.38
CT	-0.00	0.00	-0.41	0.68
GF	-0.01	0.01	-0.60	0.55

Source: Eviews 12 Data Processing Results (2025)

Further hypothesis testing reinforces this conclusion. The Adjusted R^2 value is -0.00389, meaning that only 0.39% of the variance in profitability is explained by carbon tax and green finance, with the remaining 99.61% explained by other variables. Additionally, the F-test value of 0.24 ($p = 0.79$) confirms that the regression model is not statistically significant. The t-tests for individual variables show that both carbon tax ($p = 0.68$) and green finance ($p = 0.55$) do not significantly influence ROE.

Table 9. Results of Individual Parameter Significance Test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.67	0.76	0.88	0.38
CT	-0.00	0.00	-0.41	0.68
GF	-0.01	0.01	-0.60	0.55

Source: Eviews 12 Data Processing Results (2025)

Table 10. Simultaneous Parameter Significance Test Results

F-statistic	0.24
Prob(F-statistic)	0.79

Source: Eviews 12 Data Processing Results (2025)

Table 11. Determination Coefficient Test Results

R Square	0.001232
Adjusted R Square	-0.003890

Source: Eviews 12 Data Processing Results (2025)

DISCUSSION

The Effect of Carbon Tax on Profitability

The results of this study indicate that carbon tax implementation has no significant effect on the profitability of manufacturing companies listed on the Indonesia Stock Exchange during the 2021–2023 period. The regression analysis shows a probability value of 0.68 and a coefficient close to zero, indicating no meaningful relationship between the carbon tax variable and Return on Equity (ROE). This outcome is likely influenced by the early and partial application of the carbon tax policy in Indonesia, which, during the observed period, was only enforced on a limited scale, particularly targeting coal-based energy sectors with a relatively low tax rate.

From a theoretical standpoint, this finding challenges the expectation derived from Legitimacy Theory, which suggests that companies aligning with environmental regulations should benefit from improved public image and, eventually, stronger financial performance. However, without strict enforcement or complementary incentives such as green financing schemes or carbon credit mechanisms, companies may treat carbon taxes merely as compliance formalities. Empirical evidence from other studies also supports this; several researchers found that carbon taxes only affect financial outcomes when combined with broader environmental policy support and clear cost implications.

In the Indonesian context, the low impact of carbon tax on profitability may reflect a transitional phase where firms have not yet felt the economic pressure or incentives needed to implement strategic environmental changes. Limited access to green technology, absence of a functioning emission trading system, and a lack of robust financial incentives may further reduce the policy's effectiveness. As a result, carbon tax has yet to function as a catalyst for innovation, efficiency, or profitability in the manufacturing sector.

The Effect of Green Finance on Profitability

The analysis reveals that green finance does not exert a statistically significant effect on the profitability of manufacturing companies listed on the Indonesia Stock Exchange during the 2021–2023 period. This is evidenced by a p-value of 0.55, which surpasses the standard significance level of 0.05, indicating that variations in green finance activities do not correspond to meaningful changes in Return on Equity (ROE). The negative coefficient of -0.01 suggests an inverse but weak relationship between green finance and profitability. However, due to its lack of statistical significance, this effect cannot be considered robust or generalizable. This outcome supports the framework of Legitimacy Theory (Dowling & Pfeffer, 1975), where companies implement sustainability-oriented practices, such as green finance not necessarily to boost financial performance but to maintain legitimacy in the eyes of stakeholders. These efforts, while symbolically important, may not translate into short-term gains, especially when driven more by regulatory compliance than strategic integration. This aligns with earlier studies by Hasanah and Hariyono (2022) and Afifah et al., (2020), which observed that green financial initiatives often increase operational burdens, such as administrative complexity and credit risk, while offering limited immediate returns.

In the broader context, the Indonesian green finance ecosystem remains at an early stage. Despite regulatory initiatives like POJK No. 51/2017 and POJK No. 60/2017 promoting sustainable finance and green bond issuance, adoption among firms has been uneven. According to the Financial Services Authority (2021) Sustainable Finance Roadmap, green lending still accounts for a relatively small share of total bank credit. Structural challenges, including low public awareness, limited fiscal incentives, and the incomplete implementation of Indonesia's Green Taxonomy continue to hinder the financial efficacy of green finance. As a result, companies may engage in environmentally driven financing more for image-building than for profitability. Until these constraints are addressed and green finance becomes more embedded in core business strategies, its financial impact is likely to remain indirect and long-term rather than immediate or significant.

CONCLUSION

This study concludes that the implementation of carbon tax and green finance initiatives does not significantly influence the profitability of manufacturing companies listed on the Indonesia Stock Exchange (IDX) between 2021 and 2023. While these environmental instruments are designed to enhance sustainability and promote efficient resource management, their financial impact measured using Return on Equity (ROE) has yet to materialize. Several factors may contribute to this outcome, including the early stages of policy implementation, limited regulatory enforcement, insufficient technological adaptation, and the lack of direct financial incentives. These findings suggest that, in the short term, the adoption of green policies may be driven more by compliance than by profit motives.

From a theoretical perspective, the results challenge assumptions rooted in Legitimacy Theory, which posits that aligning with environmental norms and regulations enhances firm legitimacy and financial performance. In practice, however, the outcomes imply that such alignment does not necessarily generate immediate profitability in developing economies like Indonesia. This has important implications for various stakeholders. Companies should view environmental efforts as long-term strategic investments rather than short-term financial levers. Investors are encouraged to evaluate firms based on sustainability commitments and ESG performance rather than immediate returns. Meanwhile, regulators must enhance carbon tax mechanisms, develop standardized green finance frameworks, and offer greater institutional support to increase adoption and effectiveness. Public awareness campaigns can also strengthen external pressure on firms to implement more meaningful sustainability practices.

Despite its contributions, this research is limited in scope, covering only one sector over a three-year period and relying solely on ROE as a profitability measure. Future studies are encouraged

to incorporate other financial indicators such as ROA or Net Profit Margin and expand the observation period to capture long-term effects. Additionally, the use of secondary data through content analysis may not fully reflect internal sustainability efforts due to varying disclosure quality or greenwashing risks. Employing mixed methods, including interviews, third-party ESG data, or sentiment analysis can enhance validity and depth. By addressing these limitations, future research can provide a more nuanced and accurate understanding of the financial implications of environmental policy in corporate settings.

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