

THE EFFECT OF CLIMATE RISK DISCLOSURE ON FIRM VALUE: THE MODERATING ROLE OF CAPITAL ADEQUACY IN INDONESIAN BANKS

Afifah Kusuma Wardani

Department of Accounting, Faculty of Economics and Business, Universitas PGRI Madiun

email: afifahkusuma2001@gmail.com

Abstrak

Perubahan iklim semakin dipandang sebagai sumber risiko keuangan yang dapat memengaruhi sektor perbankan melalui risiko fisik dan risiko transisi. Penelitian ini bertujuan menguji pengaruh Climate Risk Disclosure terhadap nilai perusahaan serta menguji peran moderasi Capital Adequacy Ratio (CAR) pada perusahaan perbankan di Indonesia. Penelitian menggunakan pendekatan kuantitatif dengan data sekunder perusahaan perbankan yang terdaftar di Bursa Efek Indonesia selama 2024–2025. Sampel dipilih menggunakan purposive sampling dan menghasilkan 78 observasi setelah penanganan data outlier. Climate Risk Disclosure diukur menggunakan indeks 11 rekomendasi TCFD, sedangkan nilai perusahaan diproksikan dengan Price to Book Value (PBV). Analisis dilakukan menggunakan regresi linear berganda dan Moderated Regression Analysis dengan Firm Size, Return on Assets, Non-Performing Loan, dan Loan to Deposit Ratio sebagai variabel kontrol. Hasil penelitian menunjukkan bahwa Climate Risk Disclosure berpengaruh terhadap nilai perusahaan, sedangkan CAR tidak mampu memoderasi hubungan tersebut. Penelitian menyarankan peningkatan kualitas dan standardisasi pengungkapan risiko iklim serta perluasan periode dan objek penelitian pada studi berikutnya.

Kata Kunci: climate risk disclosure, firm value, capital adequacy ratio, banking, TCFD

Abstract

Climate change is increasingly recognized as a source of financial risk that can affect the banking sector through physical and transition risks. This study examines the effect of Climate Risk Disclosure on firm value and investigates the moderating role of the Capital Adequacy Ratio (CAR) in Indonesian banking companies. The study employs a quantitative approach using secondary data from banks listed on the Indonesia Stock Exchange during 2024–2025. The sample was selected using purposive sampling and produced 78 observations after outlier treatment. Climate Risk Disclosure was measured using an index based on 11 TCFD disclosure recommendations, while firm value was proxied by Price to Book Value (PBV). Multiple linear regression and Moderated Regression Analysis were applied, with Firm Size, Return on Assets, Non-Performing Loan, and Loan to Deposit Ratio included as control variables. The results indicate that Climate Risk Disclosure affects firm value, whereas CAR does not moderate this relationship. The study suggests improving the quality and standardization of climate-risk disclosure and extending the observation period and research objects in future studies.

Keywords: climate risk disclosure, firm value, capital adequacy ratio, banking, TCFD

INTRODUCTION

Climate change has developed from an environmental issue into a financial-risk concern. Banks are particularly exposed because climate-related shocks can be transmitted through borrowers, collateral values, investment portfolios, and operational infrastructure. Physical risks may arise from floods, droughts, extreme weather, and other climate events, whereas transition risks emerge from regulatory changes, technological shifts, carbon policies, and changing market preferences. Consequently, investors increasingly require information about how banks identify, manage, and communicate climate-related risks.

In Indonesia, the development of sustainable finance and climate-risk management has increased the relevance of climate disclosure in the banking industry. Climate Risk Disclosure can reduce information asymmetry by informing investors about governance, strategy, risk management, and metrics and targets. The issue is theoretically grounded in signaling theory,

which argues that corporate disclosures can serve as signals of firm quality and future prospects (Spence, 1973). However, previous findings remain mixed. Transparent climate disclosure may be interpreted as evidence of preparedness and responsible risk management, but it may also reveal substantial exposure and potential future costs.

The literature on Indonesian banks has largely examined sustainability reporting, ESG disclosure, integrated reporting, or climate disclosure descriptively. Therefore, quantitative evidence regarding the relationship between TCFD/IFRS-oriented Climate Risk Disclosure and firm value remains limited. This study addresses this gap by examining listed Indonesian banks during 2024–2025 and by incorporating CAR as a potential moderator.

1. Climate Risk Disclosure and Firm Value

Climate Risk Disclosure refers to information on climate-related risks and opportunities that may affect financial position, performance, cash flows, access to finance, and corporate prospects. In this study, disclosure is structured around the four TCFD pillars: governance, strategy, risk management, and metrics and targets. According to signaling theory, more complete and credible disclosure may improve the information environment and enable investors to assess how effectively banks manage future climate exposure. H1: Climate Risk Disclosure affects firm value.

2. The Moderating Role of Capital Adequacy Ratio

CAR represents the relationship between a bank’s capital and its risk-weighted assets. Adequate capital can function as a financial buffer against unexpected losses. From a signaling perspective, strong capital adequacy may reinforce investor confidence that a bank has the resources to address risks identified in climate disclosures. H2: CAR strengthens the effect of Climate Risk Disclosure on firm value.

METHOD

1. Research Design and Sample

This research used a quantitative explanatory design. The population consisted of banking companies listed on the Indonesia Stock Exchange during 2024–2025. Data were obtained from annual reports, financial statements, sustainability reports, sustainable-finance implementation reports, and other corporate documents containing climate and financial information. Purposive sampling was applied. The sampling process initially produced 86 firm-year observations; after eight outliers were excluded, 78 observations were analyzed.

2. Variable Measurement

Climate Risk Disclosure was measured through content analysis using 11 disclosure recommendations derived from the TCFD framework. Each item received a score of 1 when disclosed and 0 when not disclosed. The Climate Risk Disclosure Index was calculated as the total disclosure score divided by 11. Firm value was proxied by PBV. CAR was calculated as bank capital divided by risk-weighted assets. Firm Size, ROA, NPL, and LDR were included as control variables.

Table 1. Variable Measurement

Variable	Proxy/Measurement	Role
Firm Value	Price to Book Value (PBV)	Dependent
Climate Risk Disclosure	TCFD-based index: disclosed items / 11	Independent
Capital Adequacy Ratio	Capital / risk-weighted assets	Moderator
Firm Size	Ln(total assets)	Control
ROA, NPL, LDR	Financial performance, credit risk, and liquidity	Controls

Source: Processed research data, 2026.

1. Model Fit and Classical Assumptions

The regression model was statistically significant ($F = 4.608$; $p = 0.001$). The reported R Square was 0.280 and the adjusted R Square was 0.219, indicating that the explanatory variables accounted for approximately 28.0% of the variation in firm value. The Durbin–Watson statistic was 1.813, while the Kolmogorov–Smirnov test reported an

3. Data Analysis

The study employed descriptive statistics, classical-assumption tests, multiple linear regression, and Moderated Regression Analysis (MRA). The moderation model included an interaction term between Climate Risk Disclosure and CAR: $PBV = \alpha + \beta_1CRD + \beta_2CAR + \beta_3(CRD \times CAR) + \beta_4SIZE + \beta_5ROA + \beta_6NPL + \beta_7LDR + \varepsilon$. The significance of the interaction term was used to determine whether CAR moderated the relationship between Climate Risk Disclosure and firm value.

RESULTS AND DISCUSSIONS

2. Descriptive Results

The final sample consisted of 78 observations. The Climate Risk Disclosure index ranged from 0.09 to 1.00, with a mean of 0.6492, indicating considerable variation in the completeness of climate-related disclosure among banks. Firm value ranged from 0.32 to 4.65, with a mean of 1.3672. The average Firm Size was 31.8468, while mean ROA, NPL, and LDR were 0.0154, 0.0193, and 0.7812, respectively.

Table 2. Descriptive Statistics

Variable	Min.	Max.	Mean	Std. Dev.
CRD	0.09	1.00	0.6492	0.20550
Firm Size	29.53	35.58	31.8468	1.55690
ROA	-0.09	0.07	0.0154	0.02037
NPL	0.00	0.39	0.0193	0.04401
LDR	0.25	0.98	0.7812	0.16039
Firm Value	0.32	4.65	1.3672	1.21162

Source: Processed research data, 2026.

asymptotic significance of 0.062, supporting the normality of the residuals at the 5% level.

3. Hypothesis Testing

The research findings indicate that Climate Risk Disclosure affects firm value, supporting H1. This result suggests that climate-related information is relevant to the market assessment of Indonesian banks. Greater transparency regarding governance, strategy, risk management, and climate-related metrics can provide investors with additional information about the bank's preparedness and long-term risk profile.

H2 was not supported. CAR did not significantly moderate the relationship between Climate

Risk Disclosure and firm value. Thus, differences in capital adequacy did not significantly strengthen or weaken the market response to climate-risk information. Although CAR is important for banking resilience, conventional capital adequacy alone may not be sufficient to alter how investors evaluate climate-related disclosures.

Table 3. Summary of Hypothesis Testing

Hypothesis	Statement	Result
H1	Climate Risk Disclosure affects firm value.	Supported
H2	CAR strengthens the effect of Climate Risk Disclosure on firm value.	Not supported

Source: Processed research data, 2026.

4. Discussion

The H1 finding is consistent with the signaling perspective: climate-risk disclosure can become value-relevant information because it reduces uncertainty regarding a bank's exposure and response to climate-related challenges. The result supports the view that more complete climate information can improve investor assessment of long-term risk and corporate preparedness.

The absence of a moderating effect from CAR provides a different insight. A high capital ratio is primarily a prudential indicator of loss-absorbing capacity. It does not automatically demonstrate that climate risks are identified, measured, or managed effectively. Investors may therefore evaluate climate disclosure based on its informational quality rather than conventional capital strength. The result implies that capital adequacy should not be interpreted as a substitute for robust climate-risk governance, scenario analysis, portfolio assessment, and transparent reporting.

CONCLUSIONS

This study concludes that Climate Risk Disclosure affects the firm value of Indonesian banking companies during 2024–2025. Climate-related information is therefore relevant to investor assessment and can serve as a signal regarding a bank's preparedness to manage climate-related risks. However, the Capital Adequacy Ratio does not moderate the relationship between Climate Risk Disclosure and firm value. Conventional capital strength does not necessarily change the market response to climate-risk information. The study is limited by its short observation period, its focus on the banking sector, and the continuing development of climate-risk reporting practices in Indonesia.

SUGGESTIONS

Banks should improve the completeness, specificity, and comparability of climate-risk disclosure in annual and sustainability reports. Regulators and capital-market authorities are encouraged to strengthen guidance and standardization. Investors may incorporate climate-risk disclosure into broader bank valuation and risk analysis. Future research should extend the observation period, investigate additional sectors, compare countries with different regulatory

environments, and consider alternative measures of climate risk, disclosure quality, credibility, and firm value.

REFERENCES

- Basel Committee on Banking Supervision. (2022). *Principles for the effective management and supervision of climate-related financial risks*. Bank for International Settlements.
- Ben-Ammar, H. (2025). Climate risk and bank stability: The role of country-level factors. *Studies in Economics and Finance*, 42(5), 1176–1202.
- Chalabi-Jabado, F., & Ziane, Y. (2024). Climate risks, financial performance and lending growth: Evidence from the banking industry. *Technological Forecasting and Social Change*, 209, 123757. <https://doi.org/10.1016/j.techfore.2024.123757>
- Ilhan, E., Krueger, P., Sautner, Z., & Starks, L. T. (2023). Climate risk disclosure and institutional investors. *The Review of Financial Studies*, 36(7), 2617–2650. <https://doi.org/10.1093/rfs/hhad002>
- Jagirani, T. S., Chee, L. C., & Kosim, Z. (2023). Relationship between financial risks and firm value: A moderating role of capital adequacy. *Investment Management and Financial Innovations*, 20(1), 293–303. [https://doi.org/10.21511/imfi.20\(1\).2023.25](https://doi.org/10.21511/imfi.20(1).2023.25)
- Nurkhasanah, N., & Meiden, C. (2025). Climate change disclosure in the Indonesian banking industry: A case study of JTrust Bank, Shinhan Bank, and OK Bank (2020–2024). *Asian Journal of Social and Humanities*, 3(12), 2067–2081.
- Otoritas Jasa Keuangan. (2021). *Roadmap pengembangan perbankan Indonesia 2020–2025*.
- Spence, M. (1973). Job market signaling. *The Quarterly Journal of Economics*, 87(3), 355–374. <https://doi.org/10.2307/1882010>
- Vestrelli, R., Fronzetti Colladon, A., & Pisello, A. L. (2024). When attention to climate change matters: The impact of climate risk disclosure on firm market value. *Energy Policy*, 185, 113938. <https://doi.org/10.1016/j.enpol.2023.113938>
- Wu, B., Wen, F., Zhang, Y., & Huang, Z. (2024). Climate risk and the systemic risk of banks: A global perspective. *Journal of International Financial Markets, Institutions and Money*, 95, 102030. <https://doi.org/10.1016/j.intfin.2024.102030>
- Yang, B., Zhu, C., Xiang, C., & Cao, Y. (2025). Honesty pays off: Climate risk disclosure credibility and firm value. *Finance Research Letters*, 86, 108414. <https://doi.org/10.1016/j.frl.2025.108414>

