

## Unveiling the Impact of Green Financing and Sustainability Reporting on Indonesian Banks: Two-Fold Analysis Using Tobins' Q and RoRWA

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### Abstract

The primary objective of this research is to investigate the two-fold impacts of portfolio Green Financing (GF) and GRI-based Sustainability Reporting Disclosure (SRD) on the financial performance of Indonesian banks. At the focal points of the country's sustainability transition, banks play a catalytic role in directing capital between environment protection, climate risk policy, societal impact, industry adaptation, and long-term financial resilience. Using a panel data set of 44 IDX-listed commercial banks from 2021-2023, the research applies a dual-lens empirical framework: Tobin's Q to measure market perception and Return on Risk Weighted Assets (RoRWA) to capture internal regulatory-aligned profitability. The result reveals that Green Finance and Sustainability Reporting Disclosure consistently improved RoRWA, confirming the strategic financial merit of green lending. Nonetheless, Tobin's Q revealed that GF does not have a substantial effect, suggesting that the market may undervalue banks' sustainable business initiatives. SRD initially demonstrates significance but loses its explanatory power when the full model is introduced, indicating immaturity and narrative-heavy disclosure, which lack integrated rigorous financial materiality. Research emphasizes the importance of aligning SRD transparency and GF execution to accelerate new taxonomy-based reporting, develop RoRWA-linked ESG metrics, and explore potential macro and micro-prudential incentives. This research provides policy and managerial insight to support the scalability of green finance and credible sustainability reporting in Indonesia and other emerging markets.

**Keywords:** Green Finance, Tobin's Q, RoRWA, Sustainability Reporting Disclosure, GRI, Indonesian Banks.

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### A. INTRODUCTION

Global financial services are paradigm-shifting, with climate risk and sustainability emerging as the spearhead of strategic policymaking and efficient capital allocation. In this transition, the banking sector is catalytic in the intersection of environmental policy, industrial transformation, circular economy, and inclusive financing. As Financial intermediaries, the bank is uniquely positioned to influence real-sector business and behavior by channeling capital toward environmentally responsible activities while safeguarding stability through potential systemic risk. Indonesia's ambition to be a high-income nation by 2045 is accompanied by its growing responsibility as the world's largest GHG emitter. In response to climate risk, Indonesia has enacted several major policy reforms, including ratifying the Paris Agreement and issuing POJK No.51/POJK.03/2017 by Indonesia's Financial Service Authority (OJK), mandating Sustainable disclosure by financial institutions. Recently, OJK has refreshed Green Taxonomy 2.0 by the end of 2024 to signal further commitment toward standardizing high-quality, sustainable classification and scale sustainable finance.

In academic and professional discourse, green finance is often used interchangeably with green investments. Concepts are multifaceted and evolving, with several trending concepts of finance, economics, and environmental sciences. However, there is no consensus on a particular definition. Green finance is foreseen as the best-fit alternative and vital aspect of a low-carbon economy due to its linkage toward the financial sector and Sustainable Development Goals (SDGs). Over the last decades, the company's sustainability reporting disclosure has been a trending topic, drawing attention from global media, regulators, and scholars (Wang et al., 2023). Promoting positive ESG information in sustainability reporting disclosure has also become urgent. By integrating green finance with ESG strategies, firms can enhance their non-financial attributes like market perception, good reputation, consumer satisfaction, and social values. (Rabaya et al., 2022) opined that aligning green finance with ESG disclosure can improve a firm's long-term sustainable policy and investment decision. Despite this

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momentum, critical gaps persist. Green finance adoption in the banking sector remains limited, with an average exposure of 20% of total loan disbursement among listed banks. Commercial banks only contribute 9% of the estimated USD 281.25 Bn required to meet Indonesia's 2030 climate Goals. Meanwhile, Sustainability Reporting Disclosure remains largely narrative-driven with inconsistent depth and materiality across bank tiers, reflecting compliance orientation rather than strategic integration. This raises the key question: Do green finance initiatives and sustainable disclosure translate into better financial outcomes for the banking industry beyond compliance and symbolic sustainable commitment? Despite the global literature linking ESG and sustainability with firm performance (Gehrig et al., 2024), many studies rely on external market-based indicators such as stock returns or static disclosure indices, as suggested by (Laskar, 2024). The study rarely combines dual analysis from both perspectives of investor/external with the management of the banks /internal. In developing markets such as Indonesia, empirical research evaluating whether sustainability initiatives – including green finance and GRI-based disclosure- enhance capital efficiency and improve the risk-adjusted return performance of the banks remains limited (Dao and Nguyen, 2020; Laskar, 2024; Botshekan et al., 2022). Moreover, ESG literacy among investors remains nascent, with sustainability often undervalued in capital markets.

This research aims to address those gaps by applying a dual-lens analytical framework. It will offer empirical understanding for academia, practitioners, and policy-makers on how GF and SRD will impact banking performance based on Tobin's Q as a market-based valuation proxy and RoRWA as internal risk-adjusted profitability. It pursues four primary objectives: First, it assesses Green Finance's effect on bank performance through Tobin's Q & RoRWA. Second, the effectiveness of SRD based on the GRI 2021 framework in signaling and enhancing the bank's performance will be evaluated. Third, investigate the role of key control variables (Bank Size, CAR, BOPO, LDR, and NPL) in shaping sustainability, and fourth, propose policy and business implications for Indonesia's Sustainable finance roadmap, particularly in the light of Green Taxonomy 2.0 and potential capital-based incentive for sustainable finance. The research will employ Fixed Effect panel regression with Robust Standard Error using 132-panel observations covering 44 publicly listed commercial banks on the Indonesia Stock Exchange (IDX) from 2021-2023.

## B. LITERATURE REVIEW

This research is grounded on Stakeholder and Signalling Theory to explain how Green Finance and Sustainability Reporting Disclosure may influence bank performance. Stakeholder Theory (Freeman et al., 2010) argues that an organization shall balance the interests of various stakeholders – customers, regulators, society, and financial institutions - not just shareholders, particularly in the importance of environmental protection and social benefit. Green Financing is one of various means that will help to consider all stakeholders' interests to transform into healthy and steady development to increase good reputation, broaden societal goals, and achieve long-term competitive advantage. Signaling theory by (Hu et al., 2021) argues that environmental regulation may encourage firms to standardize their behavior to transmit favorable signals to the public by sending credible and hard-to-replicate signals. In the Banking context, sustainability disclosure, especially aligned with the global standard of GRI Frameworks, acts as a signal of responsible governance, financial discipline, and long-term risk awareness that is favorably perceived by the market.

### *ESG-Linked Analysis using Tobin's Q vs RoRWA*

A bank's valuation is often characterized by accounting-based measures such as ROA or ROE and market-based indicators such as Market Book Equity or market capitalization. In emerging markets, Tobin's Q was brought by (Klapper and Love, 2004) to capture investor sentiment by comparing a firm's market value to its asset replacement cost, providing insight toward future market expectations. However, its relevance in banking is limited due to the sector's dependence on intangible assets and regulatory capital structure. To address this challenge, the research adopts RoRWA. In contrast with ROA (Return on Asset), which measures profitability relative to total assets, RoRWA will measure how efficiently a bank will generate a return per each unit of risk-adjusted asset. Botshekan et al. (2022) emphasized that RoRWA offers a straightforward metric by linking returns directly to the asset's risk profile and comparable across the banks. Additionally, it fosters global banking supervision under the Basel framework. Despite its growing importance, few studies have examined how RoRWA responds to Green Finance and Sustainability Reporting Disclosure.

### ***Green Finance, Bank Performance, and Market Perception***

Green Finance emerged in the EU and US, marked respectively by the Sustainable Finance Framework for banking issuance in 2005 and Climate Change and Energy Security issuance. Today, green finance refers to a brand-new financial model integrating resource conservation and environmental protection into economic growth to promote ESG development, economy, resources, and ecological environment (Soundarrajan and Vivek, 2016). (Feng et al., 2024) suggest that banks at all levels should incorporate green finance into their overall strategic planning. In Indonesia, green banking is regulated under Financial Services Authority Regulation No.51/POJK.03/2017. To help banks, OJK has set 12 recognized green business classifications, which are renewable energy, energy efficiency, natural resource management, pollution prevention and control, biodiversity conservation, water and water waste management, environmentally friendly transportation, climate change adaptation, eco-efficient products, other sustainable activities, and financing for MSMEs.

(Sutrisno et al., 2024; Siauwijaya et al., 2023) found that green credit in Indonesia increases the profitability of banks. Nonetheless, GF adoption remains low, accounting for an average of persistent structural challenges, particularly regarding liquidity and operational costs. (Sutrisno et al., 2024) emphasized that the operational risk from the elevated cost of banking operations to earn income might lower the bank's profitability without efficiency. Liquidity risk presence dual contrast in literature. (Sutrisno et al., 2024) suggested higher liquidity, meaning higher loans and a likelihood of generating high-interest income. On the contrary, (Tran et al., 2022) suggested that higher liquidity means higher credit risk that will impact bank stability. Yet despite the theoretical appeal that green lending influences profitability by reallocating capital into less volatile and government-backed sectors, very few studies have been done to link green finance proportion with internal bank metrics. Therefore, the impact of green finance must be tested for both external market valuation and internal risk-adjusted return of the bank:

*H1: Green Finance Portion has a positive impact on Tobin's Q*

Banks allocate more credit disbursement into sustainable business activities: green projects and/or supporting access to finance for MSMEs will signal strong ESG commitment, enhancing market trust and expectation.

*H3: Green Finance Portion has a positive impact on RoRWA*

Sustainable finance is often characterized by lower-risk sectors such as renewable energy and public infrastructure backed by guarantee or mobilized blended finance. Consequently, it improves profitability on a risk-adjusted basis through lower capital charges and credit quality enhancement.

### ***Sustainable Reporting Disclosure, Sustainability Banking, and Market Perception***

According to (Toli et al., 2020), there are three primary dimensions of disclosure for a holistic perspective and sustainability-focused strategy: economic, social, and environmental value. Moreover, Sustainability Reporting Disclosure is mandated by POJK 51/2017, but questions remain on whether such disclosure brings financial performance benefits to banks. (Wang et al., 2023) argued that SRD will enhance market trust; however (Laskar, 2024) warns that narrative-heavy disclosure without measurable outcomes will fail the purpose. Studies by (Botshekan et al., 2022) show the importance of internal banking's health by promoting the risk-adjusted indicator to improve bank performance. Global Reporting Initiative (GRI) standards have been introduced to create accountability mechanisms to ensure companies adhere to responsible economic, environmental, and social products. It is an interconnected modular system that allows organizations to publicly report their activities' impact to stakeholders transparently. However, in the Indonesia banking sector, sustainability disclosure remains uneven, immature, and narrative-driven with limited impact on investors. Hence, we need to test whether SRD is material for market valuation and can internally improve risk-adjusted profitability:

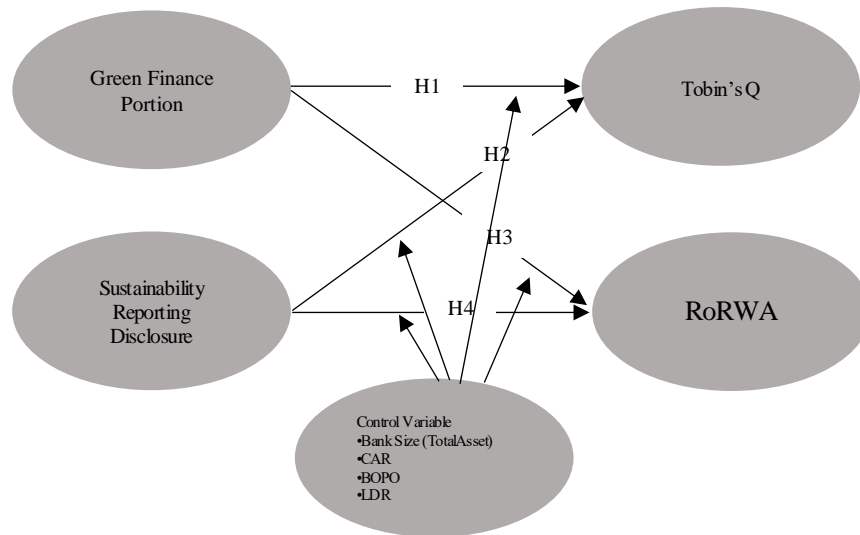
*H2: Sustainability Reporting Disclosure has a positive impact on Tobin's Q*

Transparency and comprehensive sustainability reporting disclosure are expected to reduce information asymmetry and amplify the bank's reputation. It signals compliance and governance quality with a long-term commitment, improving overall market valuation.

*H4: Sustainability Reporting Disclosure has a positive impact on RoRWA*

GRI standard SRD signals material and auditable sustainable disclosure that possesses internal control environmental and social risk awareness and hence will improve internal bank performance, particularly when integrated with core strategy

Research develops a dual-lens conceptual framework to assess the impact of Green Finance and Sustainability Reporting Disclosure on banking. Tobin's Q captures market-based valuation, and Return on Risk-Weighted-Asset (RoRWA) captures internal risk-adjusted profitability shaped by regulatory capital. The research will use control variables based on bank structural ratio to ensure the robustness of the model and effectively isolate the effect of GF\_Port and SRD.



**Figure 1. Conceptual Framework**  
 Source: Research data, 2025

### C. METHODS

A study using panel regression with Fixed Effect examines the influence of the Green Finance (GF\_Port) & Sustainability Reporting Disclosure (SRD) GRI index on Indonesian Banks. The fixed effect model with robust standard error panel data executed in STATA is appropriate for mitigating omitted variable bias from unobserved heterogeneity as it accounts for both cross-sectional (commercial banks) and time series (2021-2023). The population of the research is commercial banks in Indonesia, including state-owned banks, private banks, and regional banks listed in IDX. The total sample is 44 banks from tier 1-4 that provide green financing from 2021-2023. These banks disclosed the green finance portion under the label of Sustainable Business Credit (SBC) or Sustainable Business Activities Credit (SBAC), commonly referred to as Kredit Usaha Berkelanjutan (KUB). These credit categories align with 12 recognized green business classifications under POJK 51, a sustainable finance disclosure regulatory foundation. SBC / SBAC are audited and published in the Annual Sustainability Report or Integrated Annual Report. SRD information is retrieved from the same reports and constructed using 84 material items disclosures under the GRI 1 Foundation 2021 Framework comprising economic, environmental, and social. Banks without explicit initiative on green finance or transparency toward sustainability reporting disclosure are excluded. These results balance the panel dataset of 132 Observations.

Two key dependent variables are used to capture bank performance using a dual-lens approach: Tobin's Q as a proxy of market perception and Return on Risk-Weighted- Asset (RoRWA) as a proxy of internal measurement of risk-adjusted profitability. The Green Finance portion is collected from each bank's annual report, SRD from material items indexed in the sustainable report, and bank performance control variables are sourced from the audited annual financial statement. Panel Regression Model 1 measures Tobin's Q of total value investors place on the banks based on the stock price and compares it to what the banks have in the asset. This is adapted from (Klapper & Love, 2004) and is suitable for capital-intensive industries whereby asset value is easily at the market price. Banking mostly operates in intangible assets such as credit lines, and Tobin's Q reflects perceived governance strength rather than direct asset productivity. Thus, it introduces limitations as banking sector regulatory constraints may weaken the connection between market perception and banking fundamentals.

$$Tobin\_Q_{it} = \beta_0 + \beta_1 GF_{it} + \beta_2 SRD_{it} + \beta_3 Size_{it} + \beta_4 CAR_{it} + \beta_5 BOPO_{it} + \beta_6 LDR_{it} + \beta_7 NPL_{it} + \epsilon_{it}$$

Panel Regression Model 2 to measure Return on Risk Weighted Asset (RoRWA), a Basel regulatory aligned measurement of risk-adjusted profitability. (Botshekan et al., 2022) echoed that RoRWA is an accurate and practical metric to examine the efficiency of bank capital allocation relative to risk, providing insight into the internal profitability of the banks within regulatory constraints. RoRWA is a prudential banking metric synchronized with sustainability credit strategy, providing a risk-adjusted return to meet banks' and investors' requirements.

$$RoRWA_{it} = \beta_0 + \beta_1 GF_{it} + \beta_2 SRD_{it} + \beta_3 Size_{it} + \beta_4 CAR_{it} + \beta_5 BOPO_{it} + \beta_6 LDR_{it} + \beta_7 NPL_{it} + \epsilon_{it}$$

Where:

i represent banks,

t denotes the year 2021-2023, and

$\epsilon_{it}$  captures error terms for unobserved factors over time

Two independent variables consist of: (1) Green Financing Portion (GF\_Port), which is calculated by isolating the green finance disbursement relative to total lending that is adapted from the study of Feng et al. (2024). (2) Sustainability Reporting Disclosure (SRD) is constructed using a binary scoring method based on GRI 1 Foundation 2021 Framework, for each of the 84 material disclosure items (containing: Economy, Environment, and Social), a score of "1" is assigned if the item is disclosed in the bank's sustainability report and "0" if otherwise. The final SRD index is calculated as a ratio of total disclosed items to the maximum of 84 items following prior works (Laskar, 2024; Sun et al., 2022). Both variables represent a sustainable initiative commitment by banks hypothesized to positively affect Tobin's Q (external-market perception) and RoRWA (internal performance metrics) in line with stakeholder and signaling theories.

To ensure the robustness of the research, models also include control variables that are widely adopted by a majority of empirical banking studies:

- Size (Natural Log of Total Asset) positively impacts performance in which larger banks may have stronger capital, more diversified green portfolios, larger economies of scale (Huong et al., 2021), and better disclosure; however, they will face more complexities.
- BOPO (Cost-to-Income Ratio) is expected to negatively affect profitability, suggesting that high operational inefficiency will deteriorate profitability (Dao and Nguyen, 2020).
- LDR (Loan-to-Deposit Ratio) indicating liquidity allocation and credit aggressiveness may have different contrast interpretations between market and internal metrics. It may positively influence profitability but at the same time also negatively impact market value due to posing stability risk (Siddique et al., 2022)
- CAR (Capital Adequacy Ratio) reflects the bank's buffer for credit risk and losses. OJK Minimum capital requirement is 8%. Large Banks will gain more trust from customers and more capital for loans, which may positively impact profitability and bank performance (Ikpesu and Oke, 2022)
- NPL\_Net (Net Non-Performing Loan) indicates the quality of asset, lending portfolio, and credit risk management performance. Banks encounter high credit risk, which is perceived as the low quality of the asset and the high potential of write-off, which will reduce profitability and negatively impact bank performance (Supiyadi et al., 2023).

**Table 1. List of Variables**

Variable	Code	Formula	Source
<b>Dependent</b>	Tobin's Q	Total Asset + Market Value Asset ( <i>stock price</i> * <i>Number of Shares Outstanding</i> ) – Shareholder's Equity / Total Asset	Klapper, L. F., & Love, I. (2004)
	RoRWA	Net Income / Risk-Weighted Assets	Botshekan et al. (2022)
<b>Independent</b>	GF Portion	Green Financing/ Total Loan Disbursement	Feng et al. (2024)
	SRD	The sum of Disclosure Items / Maximum Expected Disclosure	Laskar, N. (2024)
<b>Control</b>	Size	Natural Logarithm Total Asset	Huong et al. (2021)
	CAR	Tier 1 + Tier 2 Capital/ Risk -Weighted Asset X 100%	Haris et al. (2020)
	BOPO	Operating Expense / Operating Income	Dao and Nguyen (2020)
	LDR	Total Loan/ Third-Party Fund	Siddique et al. (2022)
	NPL	Bad Debt/Total Loan	Widarjono et al. (2023)

Source: Research data, 2025

### D. RESULTS AND DISCUSSION

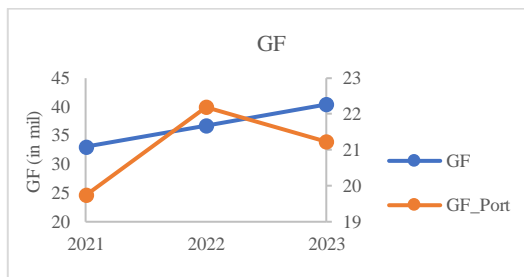
The first model uses Tobin's Q to portray a market-based perception of the bank's sustainability efforts. The second model uses RoRWA (Return on Risk Weighted Asset) to assess an internal bank's performance. Furthermore, Chow, Hausman, and LaGrange multiplier tests have been conducted to ensure appropriate model specifications. The descriptive Statistic table shows 44 Indonesia Commercial Banks listed on IDX (2021-2023). On average, GF\_Port constitutes 21% of total loans. Sharia Banks bring significant contributions as the ESG principal is aligned with Islamic Financing. SRD shows a total average score of 0.387, ranging from 0.131 to 0.952, reflecting varying disclosure immaturity between the Bank's Tier. It indicates modest compliance toward the GRI framework. Tobin's Q on average is 1.584, suggesting premium market value; nevertheless, there are outliers with high ratios in 2021, reflecting speculative investors in 2021 toward technology-oriented neo banks. RoRWA is showing 0.71%, signaling low-risk adjusted profitability. However, this should not be interpreted as under-performance as most banks are more familiar with using ROA than RoRWA. Control variables presented various samples reflecting different sizes, strategies, and efficiency.

**Table 2. Descriptive Statistics**

Stats	GF	GF_Port	SRD	TobinQ	RORWA	SIZE	CAR	BOPO	LDR	NPL_Net
Mean	36,700,000	21.047	0.387	1.584	0.710	17.732	41.189	92.893	86.807	1.178
SD	113,000,000	21.149	0.167	2.405	6.138	1.674	41.741	47.906	39.617	1.014
Min	0	0.000	0.131	0.810	-45.488	14.592	10.780	43.800	0.000	0.000
Max	777,000,000	99.900	0.952	18.498	12.481	21.500	390.505	428.400	373.610	4.830

Source: Research data, 2025

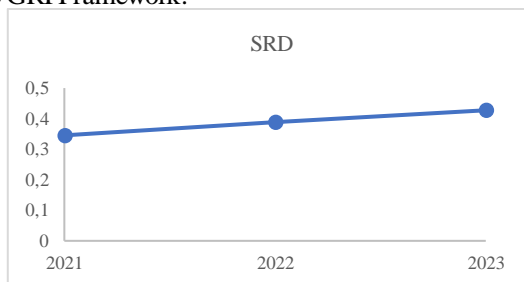
Trend analysis observes year-on-year movement across key variables to uncover a big-picture perspective. In contrast, the increasing trend of Green Finance each year reflects the growing commitment of banks to sustainability; however, the relative portion of green finance within total bank's credit portfolio is slightly declining in 2023.



**Figure 2. Trend of Green Finance and Green Finance Portion**

Source: Research data, 2025

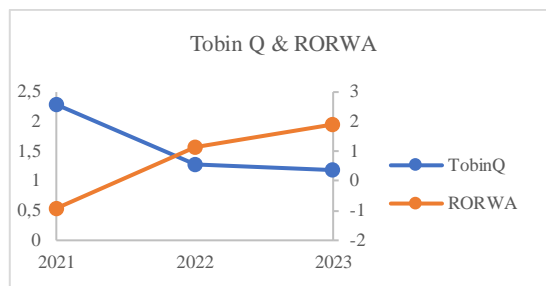
The average Sustainability Reporting Disclosure score shows an upward trajectory from 2021-2023, reflecting the progress implementation of OJK Regulation No 51/POJK.03/2017 and the right trend to move into narrative disclosure within the GRI Framework.



**Figure 3. The Trend of Sustainability Reporting Disclosure**

Source: Research data, 2025

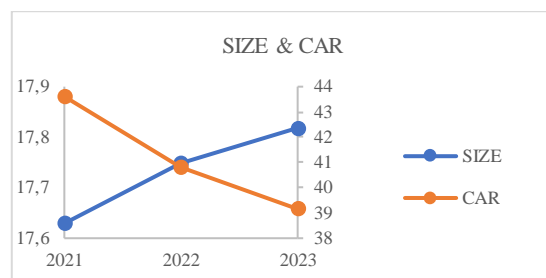
Tobin's Q experienced a dramatic decline, especially in 2022, suggesting the market premium perceived by the early covid period amidst the raising of digital-bank and normalized as speculative sentiment flickered. On the contrary, average RoRWA steadily increases, suggesting robust risk management and an increment of internal profitability per unit of risk.



**Figure 4. The Trend of Tobin's Q & RoRWA**

Source: Research data, 2025

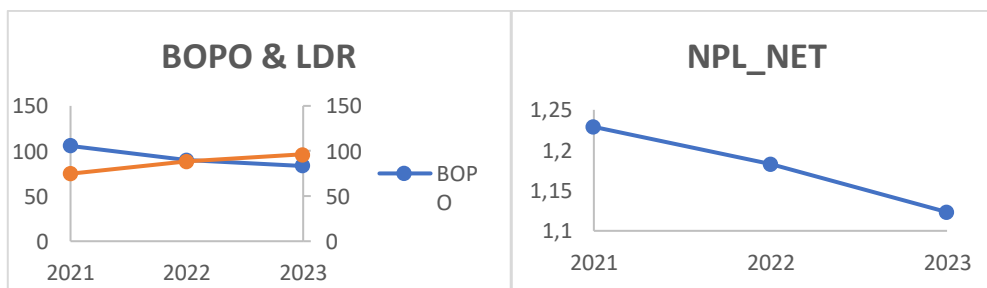
Bank size has steadily increased year on year, indicating continuous asset growth among banks reflecting post-pandemic recovery. Conversely, CAR declined from 43.5% to 39%, suggesting a reduction in the capital cushion.



**Figure 5. The Trend of Bank Size & CAR**

Source: Research data, 2025

BOPO indicates improvement in operational efficiency. However, LDR has increased to align with the increment in green portfolio expansion. Lastly, lower and declining Non-Performing Loans have signaled better underwriting and improvement in asset quality.



**Figure 6. Trend of BOPO & LDR**

Source: Research data, 2025

**Figure 7. Trend of NPL**

Source: Research data, 2025

To estimate the static panel regression model, research will apply the Chow test, Hausman test, and Lagrange Multiplier (LM) test. Chow Test is to determine whether FEM is better than CEM, Hausman Test is to determine whether to use FEM or REM and Lagrange Multiplier Test is to test CEM or REM. Based on the diagnostic result presented in the following tables, the Fixed Effect Model is determined to be the most suitable panel regression for both Tobin's Q and RoRWA.

**Table 3. Model Estimation – Tobin's Q**

Test	Purpose	Parameter	P value	Selected Model
Chow	FE vs CE	FE when p value < 0.05	0.0007	Fixed Effect
Hausman	FE vs RE	FE when p value < 0.05	0.0027	Fixed Effect
Lagrange	RE vs CE	RE when p value < 0.05	0.0010	Random Effect

Source: Research data, 2025

**Table 4. Model Estimation – RoRWA**

Test	Purpose	Parameter	P value	Selected Model
Chow	FE vs CE	FE when p value < 0.05	0.0000	Fixed Effect
Hausman	FE vs RE	FE when p value < 0.05	0.0000	Fixed Effect

Test	Purpose	Parameter	P value	Selected Model
Lagrange	RE cs CE	RE when p value < 0.05	0.0000	Random Effect

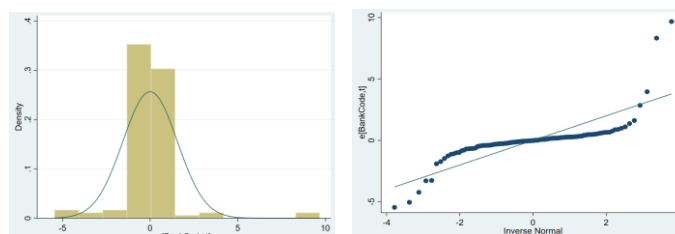
Source: Research data, 2025

Classical assumption. To avoid bias, classic assumption tests are conducted; these include Normality to ensure residuals are normally distributed, non-multicollinearity to ensure independent variables are not highly correlated, Heteroskedasticity to check if the error variance/absolute residual value of all observations in the regression model is constant. Autocorrelation to detect if residuals are correlated over time. Tobin's Q Model. As shown in Table 5, Tobin's Q successfully passed all multicollinearity tests with VIF < 10 and correlation < 0.75. However, Wald and Wooldridge Tests indicate heteroskedasticity and autocorrelation. Normality is mildly violated and negligible in panel regression, as suggested by Histogram and Q-Norm in Figure 8.

**Table 5. Classical Assumption – Tobin's Q**

Classical Assumption	Test	Parameter	Score	Result
Multicollinearity	Correlation Test	< 0.75	< 0.75	Supported
	VIF	< 10	1.8	Supported
	Tolerance	> 0.1	0.554	Supported
Heteroskedasticity	Wald Test	P Value > 0.05	0	Violated
Autocorrelation	Wooldridge Test	P Value > 0.05	0	Violated
Normality	Shapiro-Wilk Test	P Value > 0.05	0	Mild-Violation
	Histogram	Figures	Less Appropriate	Mild-Violation
	Q-Q Plot	Figures	Less Appropriate	Mild-Violation

Source: Research data, 2025



**Figure 8. Histogram & Q-Norm – Tobin's Q**

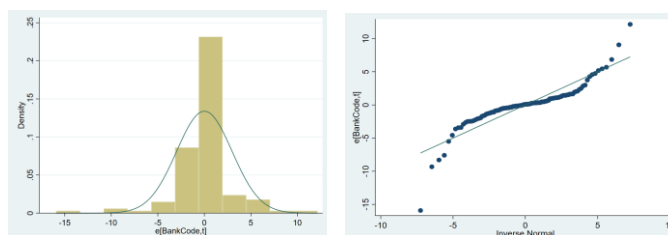
Source: Research data, 2025

RoRWA Model. As shown in Table 6, RoRWA successfully passed all multicollinearity tests with VIF < 10 and correlation < 0.75. However, Wald and Wooldridge Tests indicate heteroskedasticity and autocorrelation based on p-value < 0.05. Normality is mildly violated and negligible in panel regression, as suggested by Histogram and Q-Norm in Figure 9.

**Table 6. Classical Assumption – RoRWA**

Classical Assumption	Test	Parameter	Score	Result
Multicollinearity	Correlation Test	< 0.75	< 0.75	Supported
	VIF	< 10	1.8	Supported
	Tolerance	> 0.1	0.554	Supported
Heteroskedasticity	Wald Test	P Value > 0.05	0	Violated
Autocorrelation	Wooldridge Test	P Value > 0.05	0.0003	Violated
Normality	Shapiro-Wilk Test	P Value > 0.05	0	Mild-Violation
	Histogram	Figures	Less Appropriate	Mild-Violation
	Q-Q Plot	Figures	Less Appropriate	Mild-Violation

Source: Research data, 2025



**Figure 9. Histogram & Q-Norm – RoRWA**

Source: Research data, 2025

Since Heteroskedasticity and Autocorrelation are present in both models, the research will do a robustness test by comparing Fixed Effects with Robust Standard Errors (Fe-Ro) and Generalized Least Squares (GLS). Based on the STATA result presented in Table 7, the Fixed Effect model with Robust Standard Errors (Fe-Ro) demonstrates relatively stronger explanatory power, evidenced by lower p-value in the F-Test ( $0.1243 < 0.2191$  for Tobin's Q and  $0.0009 < 0.0086$  for RoRWA). Hence, Fe-Ro is selected as the most appropriate model for final regression.

**Table 7. Fe-RO vs GLS on Model**

Models	Fe-RO	GLS
	F Test Value (Prob>F)	F Test Value (Prob > Chi2)
Tobin's Q	0.1243	0.2191
RoRWA	0.0009	0.0086

Source: Research data, 2025

### **Rethinking Tobin's Q as a Proxy for Sustainability in Banking**

F-Test is statistically significant (p-value: 0), and an R-squared value of 0.508 indicates approximately 50.8% of variation in the dependent variable can be explained when control variables are included. This captures the ability to explain market perception in Tobin's Q; however, it calls for critical reflection on the suitability of Tobin's Q to measure sustainability in the banking sector.

**Table 8. Summary of Fe-Ro Regression – Tobin's Q**

Variable	Coefficient	P Value
GF_Port	0.039	0.317
SRD	-3.829	0.359
SIZE	-5.89	0.13
CAR	0.023	0.313
BOPO	-0.003	0.76
<b>LDR</b>	-0.009	<b>0.046 **</b>
NPL_Net	-0.236	0.468
_cons	107.212	0.121
<b>Model Fit</b>		
F-Test	<b>0 ***</b>	
R-Squared	<b>0.508</b>	

The p-values are presented in parentheses \*\*\*p < 0.01, \*\*p < 0.05, and \*p < 0.1

Source: Research data, 2025

Tobin's Q regression model using Fixed Effect with Robust Standard Error (Fe-Ro) reveals that neither GF\_Port nor SRD are statistically insignificant. This suggests that banks' sustainability efforts remain underpriced by the capital market. Tobin's Q, which compares a firm's market valuation to the replacement cost of its assets, is designed for capital-intensive industries where asset value is tangible and easily market-priced. In contrast, the bank operates in intangible assets (e.g., loans) and regulatory bonds that are not easily revalued by the market. Moreover, financial risk plays a more dominant role in valuation. As a result, Tobin's Q may offer limited sensitivity in capturing the financial impact of green finance and sustainability initiatives by banks. This critique aligns with (Lins et al., 2017), who mentioned that trust between firms and stakeholders, which is built using investment in social capital, is often overlooked during stable conditions; however, it pays off during periods of crisis or market shocks.

Furthermore, (Friede et al., 2015) clearly highlighted that the robustness of ESG and Corporate Financial Performance is more prominent in regions where disclosures are mature and standardized. A further compounding issue is that the Green Finance portion remains underdeveloped. Moreover, it is inconsistently adopted across the commercial banking sector in Indonesia. As of the observation period, the GF portion stands at only ~20% of total lending and decreases year on year. According to (Khan et al., 2022), the adoption of green finance by banks in developing countries is hindered by a range of institutional and systemic barriers. Beyond that, (Baharudin and Arifin, 2023) suggested that even if green financing has strategic intent, its limited materiality in the annual report clearly explains why it does not move the market valuation and remains invisible in the eyes of investors.

Notably, the Loan-to-Deposit Ratio appeared as a negatively significant variable in Tobin's Q, indicating that investors will react immediately to liquidity risk. This suggests that LDR, a conventional indicator of banking health, serves as a stronger predictor of market valuation rather than sustainability in Indonesia. (Sutrisno et al., 2024) suggested that LDR negatively affects a bank's stability due to risk increment in the impaired loan, and the potential of a high bad loan will reduce the bank's performance and stability. (Diamond and Rajan, 2021)

suggested that investors prioritize solvency and near-term safety, supported by (Flannery and Rangan, 2008), who found that market valuation in financial institutions is closely tied to liquidity buffers. SRD findings reveal signs of narrative fatigue and disclosure immaturity, with an average SRD index score of 0.387. This suggests most banks are still in the early stage of Sustainability Reporting with limited depth and standardization. Notably, only KBMI 4 banks demonstrate effort for full disclosure due to greater resource and institutional readiness. There are two main underlying reasons: First, banks continue to treat SRD as a compliance checklist, providing a heavy narrative with limited financial integration toward ESG metrics. (Yatim et al., 2023) find that many disclosures appear to be compliance-oriented instead of impact-driven. Hence, it reduces investor's trust in informative value. Second, sustainability disclosure focuses on Scope 1 and 2 emissions that are irrelevant for banks while overlooking Scope 3, which is material. These symptoms have weakened the market's ability to assess ESG-related financial exposure and made it difficult to price sustainability impact into market valuation directly. Tobin's Q may not fully capture the impact of sustainability on banking, especially in emerging markets like Indonesia, where SRD is still narrative-driven and shallow. This underscores the need for complementary metrics, such as RoRWA, that measure more accurate reflections of internal performance in response to sustainability initiatives by banks.

**RoRWA as a Strategic Banking Metric To Align Green Finance, Risk And Return**

The f-test is highly significant (p-value: 0), and the R-squared value of 0.912 indicates that almost 91% of the variation in the dependent variable can be strongly explained when control variables are influenced. This captures RoRWA's ability to be a suitable bank performance metric.

**Table 9. Summary of Fe-Ro Regression – RoRWA**

Variable	Coefficient	P Value
GF_Port	0.124	0.03 **
SRD	2.391	0.243
SIZE	-2.338	0.024 **
CAR	-0.007	0.507
BOPO	-0.107	0.000 ***
LDR	0.022	0.005 ***
NPL_Net	0.291	0.187
_cons	46.645	0.007 ***
Model Fit		
F-Test	0 ***	
R-Squared	0.912	

The p-values are presented in parentheses \*\*\*p < 0.01, \*\*p < 0.05, and \*p < 0.1  
 Source: Research data, 2025

RoRWA clearly emerges as the most practical and relevant performance metric, enabling banks to manage internal bank performance with prudent, prudent savvy-risk reward decisions. Unlike Tobin's Q, which is externally captured market perception, RoRWA's strength lies in risk-weighted assets as denominators, making it a more precise proxy for risk by integrating the internal balance-sheet perspective with revenue & cost of the bank business. The base model shows that GF\_Port and SRD both have positive and significant effects on RoRWA. This indicates that green financing and transparent sustainability reporting will improve the bank's risk-adjusted return. When banks' specific financial performance controls - Size, BOPO, LDR, CAR, and NPL -are introduced, the model's explanatory power increases substantially, with R-squared 91.2%. However, under full model regression, SRD loses its statistical significance (p-value: 0.243) while GF\_Port remains significant (p-value: 0.030).

The positive relationship of GF\_Port supports the interpretation that a higher portion of green financing will enhance asset quality, as it allows banks to diversify their portfolio with more profitable niche projects and favorable risk profiles backed by government guarantees and stable cash flow. In contrast with Tobin's Q, RoRWA is the more robust lens in capturing the impact of sustainability for banks in Indonesia as it incorporates risk and regulatory factors that are core principles of sustainable finance. Although sustainable disclosure is critical, narrative-heavy SRD alone appears insufficient to influence financial outcomes unless it is embedded in the bank's lending strategy, which includes improvement in operational efficiency, better social and environmental risk assessment, and efficient capital allocation toward sustainable activities. Gehrig et al. (2024) echoed that ESG disclosure serves as a trust-building activity contributing to market resilience toward systemic risk in the long term; however, its effectiveness shall be embedded in risk-banking levels with concrete EGS-

related strategies. These will reduce systemic risk rather than directly impact short-term profitability/return. The model's explanatory power strengthens significantly with control variables, emphasizing the importance of structural bank performance metrics as below implications:

1. Balance sheet management

GF\_Port remains the most robust and consistently significant variable affecting RoRWA, encouraging banks in Indonesia to shift toward green, sustainable, and MSME financing urgently. From a balance sheet perspective, green finance demonstrates inherent prudence as it typically involves lower risk. This is due to loans being backed with a government guarantee or SBLC from banks, involvement with ESG-compliant borrowers, and association with projects that generate stable and predictable cash flow. Moreover, allocating a larger portion of lending toward green and sustainable sectors is not only aligned with regulatory risk-adjusted profitability but also financially rewarding, as captured by RoRWA. These characteristics make green finance compatible with prudent balance sheet optimization to support long-term capital efficiency and financial resilience.

2. Lending and Cross-Selling

Lending efficiency becomes a key lever in driving risk-adjusted profitability. In this context, the Loan-to-Deposit Ratio (LDR) serves as an indicator of how a bank effectively converts its third-party deposit into revenue-generating lending (e.g., green finance or sustainable business activity lending). Higher LDR reflects a more aggressive lending approach and indicates deeper client engagement with cross-selling potential that contributes to better returns for the bank. Moreover, under Bank Indonesia's macroprudential framework, green finance is qualified for incentives in terms of GWM relaxation that further supports lending expansion and strengthens LDR. Thus, LDR not only captures liquidity efficiency but also monetizes deep customer relationships, translating into better risk-adjusted performance.

3. Cost Structure

BOPO (Cost to Income Ratio) is significantly negative (p-value: 0,000), indicating that the efficiency of operational cost is the most critical driver affecting RoRWA. High BOPO will drag the bank's revenue or income and leave a thin margin for risk-adjusted return. Consequently, it will result in suppressed RoRWA. Banks that are involved with green finance are expected to benefit from lower BOPO due to loan is often backed by government guarantees, are involved with ESG-compliant borrowers, and are associated with lower default risk. These characteristics lead to lower risk-weighted assets and improve capital efficiency. Moreover, those clients of the banks may gain preferential access to monetized blended finance or sustainable-linked loans with favorable pricing. This will further enhance their cost structure and improve overall RoRWA.

4. Cost of Risk

Non-Performing Loans (NPL) are insignificant in affecting RoRWA. It is caused by current traditional credit risk measures such as NPL, which do not materially differentiate risk-adjusted profitability across banks, particularly in the context where NPL ratios have consistently been below the 2% threshold. This reflects stringent credit risk awareness. Additionally, based on the Basel framework, NPL is the central input toward CAR calculation and directly impacts risk-weighted assets. Nonetheless, Similar to NPL, CAR is not significant. It indicates regulatory uniformity across banks to meet with POJK No 11/POJK.03/2016: The requirement regarding minimum capital provision based on risk profile ranges from 8% to > 11% for high-risk institutions.

## E. CONCLUSIONS

Study unveils financial impact of Green Finance Portion and Sustainability Reporting Disclosure on Indonesia's commercial banks listed in IDX, using the dual lens of analytical framework: Tobin's Q as external valuation metric based on market perception and RoRWA (Return on Risk-Weighted Asset) as internal performance barometer based on risk-adjusted profitability metric. Panel regression on 44 listed banks over 2021-2023 provides the empirical findings below: 1) Green financing significantly increases RoRWA, emphasizing its applicability in enhancing internal risk-adjusted profitability. However, Green Finance is insignificant on Tobins'Q, suggesting notable facts that capital markets do not fully price banking initiative of green financing into market valuation; 2) SRD initially appeared significant but lost explanatory power after introducing control variable highlighting on narrative fatigue and immature ESG integration. The structural weakness of SRD is unstandardized across banks, limited actual green-finance capital allocation and misalignment of disclosure

emphasizing Scope 1 & 2 emission, which are negligible for banks; 3) Control variables exhibit meaningful insight on dual-effect of LDR that is positively influencing RoRWA but negatively affecting Tobin's Q due to investor sensitivity on liquidity risk. Moreover, structural financial drivers such as BOPO and bank size are negatively significant, indicating mismanaged cost efficiency and scale-driven complexity will erode RoRWA; 4) RoRWA outperforms Tobin's Q in assessing Green Finance and Sustainability integration in banks, especially for developing markets like Indonesia. The structure of grounded regulatory risk weight, operational efficiency, and productive capital allocation has allowed it to reflect factual internal outcomes of sustainability efforts.

This research is limited by reliance on quantitative panel data, with secondary data collection using audited reports, literature reviews, and desktop research. It excludes qualitative drivers such as managerial ESG strategy, stakeholder analysis, and regulatory enforcement intensity. Future research could combine research methods with expert interviews involving risk, ESG division, IDX Sustainability Expert, and investor relations. Additionally, it could explore another market-based indicator beyond Tobin's Q, such as market to-book ratio, additional materiality of ESG disclosure using ESG assurance ratings, and combination of RoRWA with CE/FF ratio: Clean Energy Financing to Fossil Fuel to help banks assess alignment with decarbonization target.

### ***Theoretical Contribution***

This research contributes to sustainable finance literature by introducing a dual-lens empirical framework that integrates Tobin's Q as a proxy of external market perception with RoRWA as an internal performance metric aligned with regulatory capital risk. This dual framework provides a holistic view of how a bank's sustainability initiatives affect both investor sentiment and internal bank profitability. Additionally, research will also fill the gap in the absence of measurement /metrics that capture the spread between profitability and ESG initiatives from the investor's perspective. By embedding ESG in the risk-weighted assets of banks, research introduces sustainability that aligns with financial prudence. By recognizing Tobin's Q limitation for the banking sector, which is dominated by intangible assets, this paper proposes alternatives beyond Tobin's Q, such as stock return volatility and market-to-book ratio, for future research.

### ***Practical and Policy Implication***

Findings offer not only theoretical but also actionable insights for Regulators, Banker Practitioners, and Sustainable enthusiasts as follows:

1. For Regulator (OJK & IDX): Adopt RoRWA as a bank performance indicator to connect between sustainability and risk-adjusted profitability; enhance sustainability disclosure by aligning RAKB (Rencana Aksi Keuangan Berkelanjutan) with IFRS 1&2 and GRI Framework incorporating scenario planning on climate risk and decarbonization, Accelerate refreshment POJK N0 51/POJK.03/2017 & implementation of Green Taxonomy 2.0 mandating credible and measurable sustainability disclosure, and Introduce carbon pricing indicator for banks and macro-prudential incentives such as: GWM reduction to scale green financing
2. For Banks: Utilize RoRWA as a practical metric to evaluate capital efficiency and profitability yields per unit risk of an asset, Establish Green and Sustainable Product Framework, Publish measurable and externally assured Impact Reports, Leverage blended finance to scale up green loan portfolios, and Consider to use CE/FF: Clean Energy financing to Fossil Fuel Financing as forward-looking transition metric.
3. For Investor and ESG Rating Agency: Recognize RoRWA as an eligible practical metric for banking performance and use findings as a new pathway to embed ESG strategy into risk-adjusted performance of sustainable banking

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