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Comparing ESG disclosure standards and firm value: Mediating role of credit-based loan loss provision in Indonesian banking

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Abstract: This study investigates how different ESG disclosure standards influence firm value in the Indonesian banking sector, with a focus on the mediating role of Credit-based Loan Loss Provision (CLLP) as a proxy for credit risk governance. Using unbalanced panel data from 17 listed conventional banks between 2010 and 2022, the study compares the impact of Bloomberg's investor-oriented ESG scores and the Global Reporting Initiative (GRI)'s stakeholder-driven indices. A two-stage least squares (2SLS) estimation is applied to address endogeneity and test the indirect effect of ESG on firm value through CLLP. The findings reveal that GRI-based ESG disclosures—particularly in the social and governance dimensions—exert a consistent and statistically significant indirect effect on firm value through conservative credit provisioning. In contrast, Bloomberg-based ESG scores show weaker or statistically insignificant relationships, indicating limited local relevance. These results validate the mediating role of CLLP and support both signaling and stakeholder theories in explaining the ESG–firm value nexus. The study suggests that adopting context-sensitive ESG standards like GRI can enhance disclosure credibility, strengthen credit risk governance, and improve firm valuation. The findings also have practical implications for regulators aiming to align ESG frameworks with domestic institutional contexts in emerging markets such as Indonesia.

Keywords: *Banking sector, Credit-based loan loss provision (CLLP), ESG disclosure, Firm value, GRI vs Bloomberg.*

1. Introduction

The growing global emphasis on sustainability has driven the banking sector to strengthen its Environmental, Social, and Governance (ESG) practices as a strategic governance agenda. ESG is increasingly recognized not only as a metric of sustainability performance but also as an integral component of risk management and long-term value creation within the financial sector [1, 2]. In Indonesia, ESG adoption has accelerated due to regulatory mandates—such as the Financial Services Authority (OJK) Regulation No. 51/POJK.03/2017, which requires financial institutions to issue sustainability reports—and the rising market awareness of banks' social and environmental responsibilities [3]. However, the extent to which ESG contributes to firm value remains contested, especially in emerging markets characterized by complex governance structures and relatively inefficient capital markets [4, 5].

One major source of inconsistency in prior empirical findings lies in the variability of ESG measurement methods across different data providers [6, 7]. For instance, Bloomberg's ESG scores are constructed using a quantitative, investor-oriented framework focused on codified disclosures [8, 9]. In contrast, the Global Reporting Initiative (GRI) emphasizes narrative, stakeholder-inclusive disclosures, applying a different materiality principle [10]. This fundamental divergence may create interpretive bias in how markets perceive corporate sustainability performance, particularly in emerging economies

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like Indonesia, which are marked by regulatory density, limited transparency, and underdeveloped market orientation [11].

Furthermore, in examining the ESG–firm value relationship, it is critical to explore the mediating mechanisms that may underlie this connection. In the banking sector, Credit-based Loan Loss Provision (CLLP) serves as a potential channel reflecting credit risk governance practices. As an accounting component that encapsulates forward-looking credit loss expectations, CLLP functions as an indicator of prudential discipline rooted in ESG commitment [12]. ESG disclosure, therefore, can be interpreted not merely as a reputational signal but as a proxy for the quality of long-term risk governance [13]. Given these considerations, this study aims to:

- Compare the effects of ESG disclosures—measured by Bloomberg and GRI—on firm value, proxied by Tobin's Q, in the Indonesian banking sector.
- Examine the mediating role of CLLP in linking ESG disclosure to firm value as part of a broader credit risk governance framework.

This research utilizes a panel dataset comprising 17 publicly listed conventional banks in Indonesia from 2010 to 2022. ESG information is drawn from two major sources—Bloomberg and GRI-based reports—and merged with financial and credit risk data. Using robust fixed-effects and random-effects panel regressions, this study provides empirical evidence on how differing ESG disclosure standards produce heterogeneous market signals and highlights the critical role of credit risk governance in translating ESG performance into firm value.

2. Literature Review and Hypothesis Development

2.1. ESG Disclosure and Firm Value

The literature on the relationship between ESG disclosure and firm value presents mixed findings, particularly in emerging market contexts. From a stakeholder theory perspective [14], transparent ESG practices are believed to reduce information asymmetry and build stakeholder trust, thereby enhancing corporate reputation and long-term firm value. Several studies support this argument, indicating that firms with superior ESG disclosure tend to enjoy higher market valuations [15, 16].

However, other studies argue that ESG investments do not always enhance firm value, especially when disclosures are symbolic or merely intended to satisfy regulatory requirements without genuine operational transformation [17, 18]. In the banking sector, the implications of ESG are further complicated by regulatory constraints and the intangible nature of sustainability outcomes. For instance, [19] suggest that stringent regulations and strong investor protections can amplify the positive impact of CSR practices on bank performance.

A key source of divergence in these findings lies in the methods used to construct ESG scores. Bloomberg's scores are developed using a top-down, quantitative, and investor-focused approach [8, 9] whereas GRI standards emphasize narrative disclosures grounded in materiality and stakeholder inclusivity [20, 21].

Accordingly, the effect of ESG on firm value may vary depending on the disclosure standard employed. This study contributes to the literature by directly comparing the effects of Bloomberg- and GRI-based ESG disclosures on the valuation of Indonesian banks.

H_{1a}: ESG disclosure based on Bloomberg has a positive effect on firm value (Tobin's Q).

H_{1b}: ESG disclosure based on GRI has a positive effect on firm value (Tobin's Q).

2.2. ESG Disclosure and Credit-based Loan Loss Provision (CLLP)

Credit-based Loan Loss Provision (CLLP)—measured as the ratio of total gross loans to loan loss provisions—reflects an ex-ante approach to credit risk management and serves as a proxy for prudential governance in banking. Banks with strong ESG commitments are expected to adopt more conservative credit loss expectations, signaling a risk-averse and long-term management orientation.

Empirical studies have found that higher ESG scores are associated with lower non-performing loan

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(NPL) ratios [22]. Other studies demonstrate that environmental and social factors can be embedded into credit risk assessments [2, 23]. Moreover, firms with comprehensive ESG disclosure often exhibit stronger internal control systems, enhancing the accuracy of risk-related reporting [24].

Thus, ESG disclosure may signal not only sustainability commitment but also the quality of internal risk governance, which in turn affects provisioning behavior as reflected in CLLP.

H_{2a} ESG disclosure based on Bloomberg has a positive effect on CLLP.

H_{2b} ESG disclosure based on GRI has a positive effect on CLLP.

2.3. The Mediating Role of CLLP between ESG and Firm Value

In the banking sector, the relationship between ESG and firm value may not be direct. According to the resource-based view [25] the institutional capacity to manage risk effectively is considered a strategic asset that links ESG performance to financial outcomes. CLLP may serve as a mediating mechanism in this relationship.

When CLLP reflects prudent risk management aligned with ESG narratives, it reinforces the credibility of ESG as a meaningful signal. Conversely, a disconnect between disclosed ESG commitments and actual credit risk practices—such as aggressive provisioning—may cause investors to question the authenticity of a bank's sustainability agenda.

H_{3a} CLLP mediates the relationship between Bloomberg-based ESG disclosure and firm value.

H_{3b} CLLP mediates the relationship between GRI-based ESG disclosure and firm value.

3. Research Methodology

3.1. Research Design

This study employs a quantitative approach with a causal-comparative design utilizing panel data. The primary objective is to compare the effects of Environmental, Social, and Governance (ESG) disclosures—measured using two distinct frameworks, Bloomberg and the Global Reporting Initiative (GRI)—on firm value (proxied by Tobin's Q), while considering the mediating role of Credit-based Loan Loss Provision (CLLP) as a reflection of credit risk governance.

The causal-comparative design enables the identification of differences in the effects of ESG disclosure standards within a uniform context, specifically the Indonesian banking sector. The use of panel data allows for control of individual heterogeneity across banks and captures temporal dynamics throughout the observation period.

Furthermore, a Two-Stage Least Squares (2SLS) estimation approach is employed to address potential endogeneity issues, which are common in ESG studies, particularly when ESG disclosure is simultaneously influenced by firm value. The 2SLS model is also appropriate for estimating indirect relationships involving a mediating variable (CLLP), consistent with a partial mediation framework [26, 27]. Accordingly, this study evaluates both the direct effect of ESG on firm value and the mediating pathway through credit risk conservatism.

3.2. Sample and Data Sources

The sample consists of 17 conventional banks listed on the Indonesia Stock Exchange (IDX), observed annually from 2010 to 2022. This yields a maximum of 221 observations (17 banks × 13 years), although the panel is unbalanced due to data limitations in certain years or variables.

Sample selection follows three main criteria:

1. The bank publishes a sustainability report or annual report with ESG information during the observation period;
2. The bank has available ESG data from Bloomberg and/or GRI-based reports;
2. Complete financial and market data are accessible for the study period.

GRI-based ESG data were obtained from the ESGI Data Center at Universitas Airlangga (https://www.esgi.ai/dataset/), developed with reference to the latest GRI Standards. This dataset is widely used in Indonesian ESG research and is curated through validation of official corporate reports.

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Meanwhile, Bloomberg ESG scores, financial data, and market value information were sourced from the Bloomberg Terminal, a global financial data platform. Data accuracy was cross-verified with primary sources such as annual reports and official bank websites.

3.3. Variable Definitions and Measurements

This study classifies variables into dependent, mediating, independent, fitted mediating, and control categories. The measurement strategy aligns with standard practices in financial research, with a key innovation being the construction of the credit risk proxy—CLLP—which distinguishes this study from existing ESG literature.

CLLP is measured as the ratio of total gross loans to loan loss provisions, capturing ex-ante credit risk conservatism embedded in governance practices. This reverses the conventional LLP-to-loan ratio by emphasizing provisioning intensity relative to exposure, thus offering a more risk-sensitive indicator aligned with ESG-informed banking practices.

A summary of all variable definitions and measurement methods is provided in Table 1.

Table 1.
Variable Definitions and Measurements.

Variable	Type	Definition	Measurement
Tobin's Q	Dependent	Market value relative to book value	Total market value of assets / Total book value of assets
CLLP	Mediating	Indicator of conservative credit risk management	Total gross loans / Loan loss provision (LLP)
EDS	Independent (Bloomberg)	Environmental disclosure score	Bloomberg ESG score for environmental disclosure
SDS	Independent (Bloomberg)	Social disclosure score	Bloomberg ESG score for social disclosure
GDS	Independent (Bloomberg)	Governance disclosure score	Bloomberg ESG score for governance disclosure
ENV	Independent (GRI)	Environmental index	GRI-based index for environmental practices
SOC	Independent (GRI)	Social index	GRI-based index for social practices
GOV	Independent (GRI)	Governance index	GRI-based index for governance practices
CLEDS	Fitted Mediating (Bloomberg)	Fitted CLLP from EDS	Predicted CLLP from first-stage regression using EDS
CLSDS	Fitted Mediating (Bloomberg)	Fitted CLLP from SDS	Predicted CLLP from first-stage regression using SDS
CLGDS	Fitted Mediating (Bloomberg)	Fitted CLLP from GDS	Predicted CLLP from first-stage regression using GDS
CLENV	Fitted Mediating (GRI)	Fitted CLLP from ENV	Predicted CLLP from first-stage regression using ENV
CLSOC	Fitted Mediating (GRI)	Fitted CLLP from SOC	Predicted CLLP from first-stage regression using SOC
CLGOV	Fitted Mediating (GRI)	Fitted CLLP from GOV	Predicted CLLP from first-stage regression using GOV
ROA	Control	Return on assets	Net income / Total assets
CMC	Control	Current market capitalization	Natural logarithm of market capitalization

3.4. Analytical Model and Estimation Strategy

The study employs a Two-Stage Least Squares (2SLS) estimation to investigate the indirect relationship between ESG disclosures and firm value via CLLP. The first stage estimates the mediating variable (CLLP) using ESG indicators as instruments, while the second stage evaluates the impact of the fitted CLLP on Tobin's Q.

First stage – Estimating CLLP:

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$$CLLP_{it} = \alpha + \beta 1\ ESG_{it} + \mu_{it}$$

This regression is performed separately for Bloomberg ESG scores (EDS, SDS, GDS) and GRI indices (ENV, SOC, GOV). The resulting fitted values (CLEDS, CLSDS, CLGDS, CLENV, CLSOC, CLGOV) represent instrumented CLLP.

Second stage – Estimating the impact on firm value:

$$TQ_{it} = \alpha + \beta 1\ CL\_ESG_{it} + \beta 2\ ROA_{it} + \beta 3\ CMC_{it} + \varepsilon_{it}$$

Each model includes a different fitted CLLP variable as the key predictor (CL_ESG_it), depending on the ESG dimension and data source.

3.5. Analytical Techniques

All models are estimated using panel data regression techniques, including both the Fixed Effects Model (FEM) and the Random Effects Model (REM). Model selection is based on the Hausman test results, which indicate that Models 8 and 10 are better estimated using FEM, with chi-square statistics of 7.84 ($p = 0.049$) and 9.62 ($p = 0.022$), respectively. These results reject the null hypothesis that REM is more efficient and consistent [28].

To ensure the statistical validity of the regression results, heteroskedasticity was tested using the Breusch-Pagan test [29] while autocorrelation was tested using the Wooldridge test for panel data [30]. Both issues were detected in several models, prompting the use of robust standard errors clustered at the bank level, following the recommendation of Hoechle [31]. This method ensures consistent coefficient estimation and accurate standard errors in the presence of heterogeneity and serial correlation across panels. All estimations were conducted using Stata 17 software.

3.6. Descriptive Statistics and Multicollinearity Test

Descriptive statistics are used to illustrate the distribution and core characteristics of the study variables. As part of data cleaning, all primary variables underwent a 5% winsorization process to reduce distortion caused by extreme outliers that could disproportionately affect inferential estimation results.

The descriptive results show that average Bloomberg-based ESG scores are relatively low for the environmental (EDS: 7.86) and social (SDS: 23.42) dimensions, but notably higher for the governance dimension (GDS: 73.11). This indicates that Indonesian banks tend to prioritize governance-related disclosures over environmental and social aspects.

The Credit-based Loan Loss Provision (CLLP) variable exhibited a wide range before winsorization, with values ranging from -2,561.81 to 2,876.44. These extreme negative values likely reflect accounting treatments such as reserve reversals following loan settlements, rather than data entry errors. After winsorization, the CLLP range was stabilized between 0 and 472.51, resulting in a more representative distribution for inferential analysis.

Similarly, Tobin's Q displayed high variation across banks, reflecting considerable differences in market perception regarding each bank's current valuation and future prospects. Winsorization ensures that the analysis is not unduly influenced by extreme values in market capitalization and profitability.

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Table 2.
Descriptive Statistics of Research Variables.

Variables	N	Min.	Max.	Mean	Std. deviation
EDS	168	0.000	34.099	7.928	9.916
EDS (winsorized)	168	0.000	29.840	7.860	9.752
ENV	142	0.000	32.000	17.592	11.067
ENV (winsorized)	142	0.000	32.000	17.592	11.067
SDS	168	0.000	55.260	23.556	16.742
SDS (winsorized)	168	0.000	49.033	23.422	16.520
SOC	142	0.000	45.000	25.148	12.571
SOC (winsorized)	142	7.000	45.000	25.239	12.419
GDS	168	27.152	90.849	72.560	10.855
GDS (winsorized)	168	58.128	88.742	73.105	9.183
GOV	142	1.000	22.000	10.190	8.695
GOV (winsorized)	142	1.000	22.000	10.190	8.695
CLLP	202	-2561.812	2876.441	116.091	383.493
CLLP (winsorized)	202	0.000	472.511	107.776	115.672
CLEDs	168	66.592	119.185	105.331	17.188
CLENV	142	83.414	134.617	111.562	17.708
CLSDS	168	61.258	145.637	105.331	28.430
CLSOC	142	66.239	160.665	111.562	30.859
CLGDS	168	63.177	145.707	105.331	24.755
CLGOV	142	102.224	123.562	111.562	8.835
CMC	183	25.986	34.591	31.264	1.608
CMC (winsorized)	183	28.796	33.874	31.349	1.318
ROA	203	-12.284	11.224	1.524	2.598
ROA (winsorized)	203	-1.526	3.743	1.560	1.256
Tobin's Q	181	0.868	21.850	1.574	2.592
Tobin's Q (winsorized)	181	0.933	2.400	1.191	0.346

Source: Authors' calculations based on STATA v.17.0 (2025).

Table 3.
Multicollinearity Diagnostics (VIF) for Models 1–11 by ESG Dataset.

Model	ESG Dataset	Dependent Variable	Independent Variable	VIF	1/VIF
1	Bloomberg	Tobin's Q	SDS	2.39	0.419
			EDS	2.23	0.448
			CMC	2.07	0.483
			GDS	2.03	0.494
			ROA	1.75	0.570
2	GRI	Tobin's Q	SOC	3.30	0.303
			ENV	3.22	0.310
			ROA	1.79	0.558
			CMC	1.71	0.583
			GOV	1.03	0.969
3	Bloomberg	CLLP	SDS	2.30	0.436
			EDS	2.25	0.444
			GDS	1.86	0.538
4	GRI	CLLP	SOC	3.05	0.328
			ENV	3.04	0.329
			GOV	1.01	0.991
5	Bloomberg	Tobin's Q	ROA	1.63	0.614
			CMC	1.54	0.648
			CLLP	1.07	0.930
6	Bloomberg	Tobin's Q	CMC	1.79	0.557
			ROA	1.66	0.602
			CLEDS	1.14	0.875
7	GRI	Tobin's Q	CMC	1.68	0.595
			ROA	1.64	0.610

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			CLENV	1.03	0.968
8	Bloomberg	Tobin's Q	CMC	1.93	0.519
			ROA	1.74	0.575
			CLSDS	1.23	0.813
9	GRI	Tobin's Q	CMC	1.70	0.588
			ROA	1.70	0.588
			CLSOC	1.05	0.950
10	Bloomberg	Tobin's Q	CMC	1.99	0.503
			ROA	1.68	0.596
			CLGDS	1.27	0.787
11	GRI	Tobin's Q	ROA	1.66	0.602
			CMC	1.64	0.609
			CLGOV	1.02	0.981

Note:

- VIF values below 5 confirm no serious multicollinearity among predictors across all models.
- Bloomberg ESG variables represent ESG disclosure scores indicating the extent and quality of ESG-related information disclosed by banks.
- GRI ESG variables refer to ESG indices constructed based on the Global Reporting Initiative (GRI) standards, reflecting the presence or absence of ESG-related practices.

To verify the validity of the regression model specification, multicollinearity tests were conducted on all independent variables using the Variance Inflation Factor (VIF). All models reported VIF values below the conservative threshold of 5, indicating no serious collinearity among predictors. This supports the assumption of non-redundancy in the panel regression models.

4. Results

4.1. Direct Effects of ESG and CLLP on Firm Value

Table 4.
Robust Random Effects Regression Results (Models 1–5).

Variables	Model 1: TQ (Bloomberg ESG)	Model 2: TQ (GRI ESG)	Model 3: CLLP (Bloomberg ESG)	Model 4: CLLP (GRI ESG)	Model 5: TQ ~ CLLP
Environmental	-0.0044 (0.0033)	-0.0022 (0.0012)*	-0.0906 (0.6948)	-2.0127 (0.7855)**	—
Social	-0.0015 (0.0009)*	0.0038 (0.0014)**	-1.4743 (0.8573)*	3.6616 (0.9605)***	—
Governance	0.0037 (0.0027)	0.0014 (0.0008)*	-1.8259 (1.5359)	0.5875 (0.8095)	—
CLLP	—	—	—	—	-0.0003 (0.0002)*
CMC	0.1946 (0.0468)***	0.1182 (0.0320)***	—	—	0.1580 (0.0482)***
ROA	0.0474 (0.0357)	0.0241 (0.0180)	—	—	0.0635 (0.0205)***
Constant	-5.0390 (1.4668)***	-2.4794 (0.9848)**	266.0320 (114.0090)**	45.1350 (21.9680)**	-4.1049 (1.2335)***
Observations	165	139	168	142	181
Groups (Bank ID)	17	17	17	17	17
Wald χ^2 (df)	53.03*** (5)	34.99*** (5)	17.10* (3)	14.91** (3)	46.82*** (3)
Within R^2	0.52	0.46	0.16	0.13	0.53
Between R^2	0.01	0.01	0.00	0.04	0.03
Overall R^2	0.05	0.10	0.08	0.10	0.05
Rho (ρ)	0.92	0.94	0.36	0.55	0.96

Note:

- Standard errors in parentheses are robust to heteroskedasticity and clustered at the bank level.
- Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ for both coefficient estimates and Wald χ^2 tests.
- "—" indicates that the variable was not included in the respective model.
- Environmental, Social, and Governance represent disclosure scores from Bloomberg ESG data and index scores from GRI data.
- CMC = Current Market Capitalization; ROA = Return on Assets; CLLP = Credit-based Loan Loss Provision; TQ = Tobin's Q.

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Table 4 presents the robust random-effects regression results for Models 1 through 5, with standard errors clustered at the bank level (17 clusters). These models examine the direct effects of ESG disclosure dimensions and Credit-based Loan Loss Provision (CLLP) on firm value, proxied by Tobin's Q.

In Model 1, which uses Bloomberg ESG scores, both the environmental and social dimensions show negative coefficients. The social dimension is statistically significant at the 10% level ($\beta = -0.0015$; SE = 0.0009), suggesting that increased social disclosure may be perceived as costly or not yet yielding tangible value. The governance dimension shows a positive but statistically insignificant coefficient. Among the control variables, current market capitalization (CMC) has a significant positive impact on firm value ($\beta = 0.1946$; $p < 0.01$), while return on assets (ROA) is insignificant.

In Model 2, which employs GRI-based ESG indices, the environmental index has a significant negative effect ($\beta = -0.0022$; $p < 0.10$), reinforcing the perception of environmental compliance as a cost factor in emerging markets. By contrast, both the social ($\beta = 0.0038$; $p < 0.05$) and governance ($\beta = 0.0014$; $p < 0.10$) indices have positive and statistically significant relationships with Tobin's Q. These results suggest that stakeholder-oriented ESG disclosures, particularly those aligned with GRI standards, are more credible in signaling value to the market. CMC remains significant, while ROA remains insignificant.

Models 3 and 4 assess the effect of ESG dimensions on CLLP. In Model 3, Bloomberg's social score is negatively associated with CLLP ($\beta = -1.4743$; $p < 0.10$), indicating that greater social disclosure may be linked to more prudent credit loss provisioning. In Model 4, GRI's environmental index shows a significant negative effect on CLLP ($\beta = -2.0127$; $p < 0.05$), implying that increased environmental disclosure may correspond with greater credit risk conservatism. Interestingly, the social index under GRI is positively and significantly associated with CLLP ($\beta = 3.6616$; $p < 0.01$), suggesting that comprehensive social disclosure may enhance internal risk governance.

Model 5 evaluates the direct effect of CLLP on firm value. The CLLP coefficient is negative and significant at the 10% level ($\beta = -0.0003$; SE = 0.0002), indicating that more conservative credit provisioning may reduce perceived market value. CMC and ROA are both highly significant, reaffirming the relevance of firm fundamentals in explaining market valuation.

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Table 5.
Robust Random Effects Regression Results (Models 1–5).

Variables	Model 6 (Bloomberg) CLEDS	Model 7 (GRI) CLENV	Model 8 (Bloomberg) CLSDS	Model 9 (GRI) CLSOC	Model 10 (Bloomberg) CLGDS	Model 11 (GRI) CLGOV
ESG-CLLP (fitted)	0.0022* (0.0012)	0.0008* (0.0004)	0.0011* (0.0006)	0.0009** (0.0003)	0.0001 (0.0007)	0.0012** (0.0006)
CMC	0.188 (0.051)***	0.107 (0.034)***	0.194 (0.045)***	0.115 (0.035)***	0.165 (0.042)***	0.106 (0.032)***
ROA	0.054 (0.036)	0.045 (0.017)***	0.061 (0.032)*	0.033 (0.017)*	0.083 (0.027)***	0.051 (0.017)***
Constant	-4.859 (1.585)***	-2.162 (1.080)**	-5.127 (1.401)***	-2.416 (1.100)**	-4.133 (1.305)***	-2.199 (0.992)**
Model Type	RE	RE	FE	RE	FE	RE
Observations (N)	165	139	165	139	165	139
Banks (Groups)	17	17	17	17	17	17
R^2 (within)	0.50	0.40	0.50	0.43	0.48	0.39
Wald χ^2 / F	31.40***	14.74***	14.82***	18.53***	13.75***	22.48***
ρ (rho)	0.92	0.96	0.94	0.97	0.94	0.97

Note:

- Standard errors are robust and clustered at the bank level (17 clusters).
- Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
- CLEDS, CLENV, CLSDS, CLSOC, CLGDS, CLGOV: Fitted values from 2SLS Stage 1 (ESG → CLLP).
- ESG-CLLP represents the fitted value of the Credit-based Loan Loss Provision instrumented by individual ESG dimensions.
- CMC = Current Market Capitalization; ROA = Return on Assets.

Overall, the Wald χ^2 statistics across all models are statistically significant, confirming the joint explanatory power of the independent variables. The within R^2 ranges from 0.13 to 0.53, reflecting moderate model fit. High intraclass correlation coefficients ($\rho > 0.90$) in Tobin's Q models highlight substantial between-bank effects, which justify the use of panel data estimation.

These results underscore the nuanced and data-source-dependent nature of ESG's relationship with firm value. They also affirm the importance of credit risk governance—represented by CLLP—as a mediating channel linking ESG to firm valuation in the Indonesian banking sector.

4.2. Indirect Effects of ESG on Firm Value via CLLP (2SLS Results)

Table 5 reports the second-stage 2SLS regression results for Models 6 to 11, which examine the indirect effects of each ESG dimension—via fitted CLLP—on firm value. The fitted CLLP values were generated from the first-stage regressions, using ESG dimensions as instruments.

In Model 6, the fitted CLLP from Bloomberg's total ESG score (CLEDS) is positively associated with Tobin's Q ($\beta = 0.0022$; $p < 0.10$), suggesting that improved ESG performance, when reflected in conservative credit practices, enhances market valuation.

Model 7, based on the GRI environmental index (CLENV), also shows a significant positive effect ($\beta = 0.0008$; $p < 0.10$), indicating that standardized environmental disclosures under GRI may support market trust through enhanced credit risk governance.

In the social dimension, Models 8 (Bloomberg – CLSDS) and 9 (GRI – CLSOC) both show positive and significant effects on firm value ($\beta = 0.0011$ and $\beta = 0.0009$, respectively). The GRI-based model is more robust ($p < 0.05$), highlighting the relevance of stakeholder-focused social reporting in improving market perception through risk governance.

In Model 10, Bloomberg's governance dimension (CLGDS) has a positive but insignificant effect, suggesting limited signaling strength. In contrast, Model 11 shows that the GRI governance index (CLGOV) has a significant positive impact ($\beta = 0.0012$; $p < 0.05$), reinforcing the idea that contextual, qualitative governance disclosures are more credible in the Indonesian banking context.

Across all models, control variables (CMC and ROA) remain positive and statistically significant,

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underscoring the persistent importance of firm fundamentals.

Model diagnostics—including within R^2 (0.39–0.50), significant Wald χ^2/F-statistics, and high ρ values—confirm model validity and support the mediation hypothesis. These results demonstrate that ESG influences firm value not only directly but also indirectly through credit risk governance mechanisms, particularly in the social and governance dimensions under the GRI framework.

5. Discussion

The findings of this study confirm that the effect of Environmental, Social, and Governance (ESG) disclosure on firm value is not uniform. The variation depends on the ESG reporting framework used, the specific ESG dimension assessed, and the presence of a mediating mechanism—Credit-based Loan Loss Provision (CLLP)—which reflects risk governance practices. Notably, ESG disclosure based on the Global Reporting Initiative (GRI), particularly the social dimension, demonstrates the most consistent and statistically significant influence on firm value via CLLP.

he superiority of the GRI framework can be attributed to its contextual and stakeholder-oriented approach, which emphasizes local materiality principles. The GRI social index captures dimensions such as financial inclusion, customer protection, and community engagement—issues that are particularly salient in emerging markets like Indonesia. These findings are consistent with previous studies suggesting that participatory, narrative-driven disclosure frameworks are more effective in aligning sustainability strategies with stakeholder expectations [21, 32].

Conversely, Bloomberg's investor-focused and quantitatively standardized ESG scores appear to provide weaker signals in the domestic context. When local markets and regulators emphasize social and governance concerns as critical to long-term resilience, Bloomberg-style disclosures may lack the contextual richness needed to influence market perception.

From a methodological perspective, this study also validates the mediating role of CLLP in linking ESG practices to firm value. Measured as the ratio of gross loans to loan loss provisions, CLLP reflects the degree of conservatism in a bank's credit risk management. When ESG disclosures are credible and context-sensitive—particularly under GRI standards—market perceptions of credit loss risk tend to improve. This leads to greater investor confidence and higher firm valuation.

Theoretically, the results support an integration of signaling theory and stakeholder theory. ESG practices operate not only as external communication tools but also as internal governance mechanisms that strengthen financial discipline. This is particularly relevant in emerging markets where institutional opacity and information asymmetry remain substantial challenges [4, 16]. By reducing these asymmetries, ESG disclosures aligned with stakeholder expectations can increase the credibility of corporate governance and long-term risk management.

Therefore, the effectiveness of ESG in driving firm value depends not only on the volume of information disclosed but also on the quality and contextual relevance of the reporting framework. GRI's structure, which incorporates local concerns and participatory materiality, appears more effective in mediating ESG's market value implications through mechanisms such as CLLP. This reinforces the importance of tailoring ESG reporting standards to the institutional realities of emerging economies.

6. Conclusion and Implications

This study investigates the relationship between ESG disclosure, credit risk governance, and firm value in the Indonesian banking sector. By comparing two widely adopted ESG reporting frameworks—Bloomberg and the Global Reporting Initiative (GRI)—the results demonstrate that GRI-based disclosures, particularly in the social dimension, have the strongest indirect effect on firm value through conservative credit provisioning (measured by CLLP). In contrast, Bloomberg's aggregated, investor-oriented scores exhibit weaker associations, highlighting their limited effectiveness in the local institutional context.

These findings underscore that ESG should not be viewed solely as a reputational tool, but rather as a reflection of internal risk management quality. The mediating role of CLLP illustrates how credible

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ESG disclosures can signal prudential discipline, thereby reducing perceived credit risk and contributing to higher firm valuation. This perspective aligns with the concept of risk-adjusted firm value, as emphasized in recent ESG-finance literature [13, 16].

Theoretically, this study contributes to the integration of signaling theory and stakeholder theory by demonstrating that ESG operates both as an external legitimacy device and an internal governance mechanism. In emerging economies characterized by regulatory underdevelopment and information asymmetry, context-sensitive frameworks such as GRI provide more reliable signals to both investors and stakeholders [14, 19].

From a practical standpoint, the results call for regulators and policymakers to promote the adoption of GRI as the primary ESG reporting framework for the banking sector. GRI-based disclosures offer a clearer representation of actual risk exposure and more credible communication of sustainability practices. Banks are also encouraged to integrate ESG considerations into their credit risk assessment and provisioning policies, moving beyond symbolic compliance toward substantive implementation.

At the policy level, aligning national ESG regulations with GRI standards can enhance the quality of sustainability reporting, strengthen financial system resilience, and support the transition toward an inclusive and sustainable finance ecosystem. In a global context of rising demand for green and socially responsible finance, the effectiveness of ESG depends not only on disclosure quantity, but also on alignment with domestic institutional realities.

7. Future Research Agenda

To extend the contributions of this study, several future research directions are proposed:

1. Cross-Sectoral Expansion

Future studies should explore the ESG–risk–value mechanism in other sectors such as energy, manufacturing, and technology to assess its generalizability beyond banking.

2. Longitudinal and Nonlinear Designs

Employing longer time horizons and advanced econometric techniques—such as nonlinear regressions, threshold models, or machine learning—could provide insights into dynamic and non-monotonic ESG effects.

3. Institutional Moderators

Investigating how regulatory quality, enforcement mechanisms, and sustainability audit standards moderate the ESG–firm value relationship would deepen the understanding of context-specific drivers.

4. Behavioral and Narrative-Based ESG Proxies

Future research could develop content- or sentiment-based ESG proxies to complement or replace purely quantitative ratings, capturing disclosure quality and authenticity more accurately.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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