

Environmental Accounting Information Disclosure and Financial Performance: An Empirical Analysis

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Abstract

Purpose: This study tries to determine whether the financial performance of Bangladeshi-listed banks on the Dhaka Stock Exchange (DSE) is significantly associated with the environmental accounting information disclosure (ENVI).

Design/methodology/approach: This study uses panel data from the annual reports of 34 from 36 domestic commercial banks listed on the Dhaka Stock Exchange (DSE) in Bangladesh, comprising 238 observations for the period 2018–2024. The non-probability sampling method (convenience procedure) was used. A robust dynamic panel estimation approach is employed, using two-step system GMM with clustered standard errors for ROA and ROE to address dynamic endogeneity and within-firm correlation, and RegHDFE with firm and year fixed effects for EPS.

Findings: The study establishes that Bangladeshi banks' ENVI has a differential consequence on financial related performance. Under robust estimation, ENVI does not exhibit a statistically significant effect on ROA, ROE, or EPS. The consistently positive direction of ENVI coefficients, however, suggests a initial relationship that may strengthen as disclosure practices mature.

Originality/value: These findings provide that increasing environmental accountability by raising awareness and offering tax advantages can encourage businesses to adopt more sustainable practices. Future research should consider broader samples, longer observation periods, social governance, and other variables to better understand the enduring effects of financial performance on banking stability in emerging economies like Bangladesh.

Keywords: Environmental accounting, Information disclosure, Financial performance, Banks

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1. Introduction

Bangladesh, which emerged as South Asia's dynamic economy, has a bank-dominated financial system (Dutta & Saha, 2021). Bangladesh also ranked as the ninth most disaster-prone nation, making environmental accountability of its commercial banks a matter of national economic significance (World Bank, 2024; Bangladesh Bank, 2024; World Risk Report, 2024). Bangladesh Bank formalised environmental accounting information disclosure (ENVI) as a regulatory requirement for all scheduled banks. Environmental accounting information disclosure (ENVI) involves the process by which companies communicate their environmental performance, sustainability efforts, and environmental risks to stakeholders (Mohobbot et al., 2010). As stakeholders such as regulators, investors, and customers demand greater transparency, the importance of environmental reporting has grown, especially in developing economies like Bangladesh (Khan, 2019). The study examines whether environmental transparency affects key financial metrics like as Earnings Per Share (EPS), Return on Equity (ROE), and Return on Assets (ROA), while accounting for control variables like Financial Leverage (LEV), Bank Size (BSIZE), and Bank Age (BAGE). Environmental accounting, as part of corporate social responsibility (CSR), involves reporting environmental costs and benefits related to a company's activities, to enhance transparency and accountability (Deegan & Gordon, 1996). The promotion of green banking environmentally beneficial enterprises by reducing interest costs. Bangladesh Bank's circular on green banking identifies Bangladesh as one of the world's most vulnerable nations (Hossain et al., 2016). The International Organization for Standardization, or ISO, has described ISO 14000, which consists of a series of guidelines that handle many aspects of environmental care. These requirements lead to a boost in the productivity of institutions, as standards provide guidance for environmental performance (Nor et al., 2016). The nature of disclosure and the relationship between disclosure and factors influencing information reporting were the main topics of the majority of earlier research (Sobhani et al., 2009). Banks have a direct and indirect impact on environmental issues because they are the primary financial institutions that fund major enterprises.

Despite the growing body of literature on ENVI disclosure globally, there is a lack of empirical studies exploring the consequence of such disclosures on the financial related performance of banks in Bangladesh. The limited use of variables prevented a fuller knowledge of the complex factors driving outcomes, leaving potential for future investigation with larger datasets and greater variable diversity. Much of the existing research focuses on manufacturing or industrial sectors, where the environmental impacts are more direct. However, the banking sector's indirect influence on environmental sustainability, through lending policies and financing projects, is substantial, yet under-researched. Furthermore, while some researches have explored the connection between ENVI and financial success in developed markets, there has been minimal emphasis to how this relationship operates in emerging economies like Bangladesh. This research addresses the gap by analyzing the association between ENVI and financial results in the Bangladeshi banking sector, considering control variables such as leverage, bank size, and bank age.

This study is among the earliest to apply a dynamic system Generalized Method of Moments (GMM) framework to examine the effect of environmental accounting information

disclosure on the financial performance of Bangladeshi Banks. Many studies link environmental disclosure to financial performance using dynamic panel methods, including system GMM, but most of them are non-financial firms. Previously, Environmental Social and Governance (ESG) disclosure and performance have been studied using system GMM at the multi-country level, rather than a single-country focus on Bangladesh.

1.1 Research Questions

RQ: What is the relationship between environmental accounting information disclosures impact the financial performance (EPS, ROE and ROA) of Bangladeshi-listed banks on the DSE?

RQ1: Does ENVI disclosure significantly affect the earnings per share of Bangladeshi commercial banks?

RQ2: Does ENVI disclosure significantly affect the return on assets of Bangladeshi commercial banks?

RQ3: Does ENVI disclosure significantly affect the return on equity of Bangladeshi commercial banks?

1.2 Research Objectives

The fundamental goal of this research is to determine whether the environmental accounting information disclosure is significantly correlated with the financial performance of Bangladeshi-listed banks on the Dhaka Stock Exchange (DSE). In addition, the following objectives are planned:

- i. To investigate if environmental accounting information disclosure and EPS are significantly correlated.
- ii. To examine if environmental accounting information disclosure and ROA are significantly correlated.
- iii. To determine if environmental accounting information disclosure and ROE are significantly associated.

The remainder of this paper is structured as follows. Section 2 reviews the theoretical framework and relevant empirical literature. Section 3 and 4 outlines the research questions, research methodology, including sample selection, variable measurement, and econometric model specification. Section 5 presents the descriptive statistics and regression results. Section 6 discussion of the results, and Section 7 concludes with implications, limitations, and directions for future research.

2. Literature Review and Theoretical Discussion

This study examines two important theories that explain how disclosure levels of ENVI influence several critical factors (such as business size, age, financial leverage, profitability, auditor, and so on) in Bangladeshi listed banks. The following are covered in the theoretical reviews: Legitimacy and responsibilities theory, stakeholder theory and cost & benefit theory.

2.1 *Legitimacy Theory and ENVI*

Legitimacy theory holds that firms must align their operations with societal expectations to maintain their social license to operate (Guthrie & Parker, 1989). Legal theory discusses the obligation of firms to implement environmental accounting, as the need for such an accounting system stems from societal demands, government displeasure, and pressure from stakeholders, workers, and customers (Mohamed et al., 2014). Bank disclose environmental information in order to justify their operations and enhance their reputation, both of which are advantageous to them (Lindblom, 1994). Therefore, revealing environmental data to the public in yearly reports is a calculated way for the bank to market itself. This tactic suggests that the bank is doing socially conscious and lawful business.

2.2 *Stakeholder Theory and ENVI*

Stakeholder theory is a capitalist viewpoint that emphasizes the interconnected relationships between a corporation and its consumers, vendors, workforce, investors, communities, and other stakeholders. According to the notion, a firm should add value to all stakeholders, not only shareholders. According to Freeman (1984), Firms must create value for all stakeholders, not for shareholder. Ullmann (1985) provided an explanation of stakeholder theory, saying that if a stakeholder has influence over a significant source of revenue, the company would find a means to meet their demands. Disclosure of ENVI is regarded as a successful governance tactic that takes care of stakeholder demands and connections.

The banks all over the globe are under pressure from stakeholders, such as Jeucken (2001), Bhattacharya & Sen (2004), Coupland(2006) that are expected to act ethically and sustainably because they offer the funding in some important sectors. Hopkins (2003) argue that operations which are socially irresponsible may have adverse effects on the share price of a bank and the value of its brand. Implementing good quality stakeholders can enhance the operation performance, build up the relational aspect and control risk.

To meet these, stakes of interests (Gamerschlag et al., 2010), organizations should release the environmental accounting information through the dissemination media which according to Khan et al. (2011), are annual reports, brochures, magazine, policy guidelines, Internet sites or sustainability reports.

2.3 *Empirical Literature Review and Hypotheses Development*

ENVI and Financial Performance

Xi et al. (2022) shows that better environment information Disclosure helpful in increasing the financial performance in the banking sectors resulted in positive policy support, subsidizes and tax incentives due to better image. According to Xi et al. (2022), high-quality environmental information disclosure has a good effect on financial performance, with the most significant results obtained in the current period and one-period lag for national banks as opposed to regional banks. On the other hand, environmental reporting has an adverse influence on banks' ROA and ROE, but the impact on EPS is not statistically significant (Pawar & Munuswamy, 2024).

H1: ENVI has a significant positive relationship with Financial Performance.

ENVI and EPS

Environmental disclosures positively and significantly affect EPS in the Ghanaian firms, suggesting a positive correlation between EAI and financial performance in the firms during the two crises periods (Opuni-Frimpong et al., 2024). On the other hand, Using environmental accounting information disclosure, the paper fails to explain the impact on earnings per share (EPS) of banks (Gutiérrez-Ponce & Wibowo, 2023). Sedky, (2019) investigate to a certain extent, the paper does not directly investigate how environmental accounting information disclosure influences the banks' earnings per share. Akter & Teesha (2023) also showed that the measure of profitability such as; EPS does not influence the level of environmental accounting disclosure by Bangladeshi listed banks. The report demonstrated that environmental accounting information disclosure is not related with the 'profits per share' (EPS) of Turkish commercial banks in the sense that the disclosure level does not have the capacity to improve or reduce the EPS (Feneir, 2023).

H1a: ENVI has a significant positive effect on EPS.

ENVI and ROE

The information expressed in environmental accounting to the users make a better decision leading to better financial performance that can boost Return on Equity (ROE) in companies (Sedky, 2019). Mashudi & Nurasik (2018) evidence shows that environmental accounting disclosures significantly influence financial performance, therefore enhancing factors such as ROE. Siwei (2022) indicates that Environmental accounting disclosure has an empirical relationship with the level of corporate profitability in a way that is likely to support increase in ROE via increased transparency and better governance in heavily polluting industries. Wang et al.(2020) also explores that Environmental information disclosure has a favorable association with corporate financial performance, with ROE potentially increasing due to improved stakeholder trust and efficiency. On the other hand, Environmental cost disclosure influences Return on Equity (ROE) in the negative direction and is statistically significant for listed oil and gas firms in Nigeria suggestive of future profitability issues (Seiyaibo Carl MADAWA PhD & Frank, 2022).

H1b: ENVI has a significant positive effect on ROE.

ENVI and ROA

From the literature review, the results indicated that this environmental performance disclosure leads to enhanced financial performance, such as a higher ROA. This relationship is as a result of customer satisfaction and hence higher customer loyalty implying higher profitability (Luo & Bhattacharya, 2006). Luo & Bhattacharya, (2006) should be mentioned that while these coefficients denote short-term costs, long-term benefits including enhanced operation effectiveness and minimized environmental impacts contribute to the growth of ROA figures in future. Clarkson et al. (2011) revealed that an improved environmental performance and enhanced environmental reporting are associated with better financial performance, including improved ROA. This is because there has been enhancement on the operational efficiency of the organizations and reduction of regulatory risks factors. On other hand, Environmental disclosure has a negative relation with ROA suggesting that increased

environmental reporting does not necessarily contribute to improved profitability, and may even result in reduced business performance for the mining firms (Lutfillah & Amadea, 2022).

H1c: ENVI has a significant positive effect on ROA.

3. Research Methodology

The study uses a quantitative research approach to investigate the relationships between various independent variables (ENVI) and dependent variables (financial performance), considering the control variable (leverage, bank age, bank size) in the context in Bangladeshi listed bank on DSE. This layout enables a methodical review of the data gathered from 34 chosen commercial banks from the 36 Bangladeshi listed bank on DSE, during a seven-year period (2018–2024).

3.1. Sample and Data Collection

The study uses secondary data from the annual reports and sustainability reports of 34 Bangladeshi-listed commercial banks and 36 Bangladeshi-listed banks on the Dhaka Stock Exchange (DSE). The data covers six years, from 2018 to 2024, allowing for a complete evaluation of the relationship between ENVI disclosure and financial performance. Using panel data, this study spans the years 2018 through 2024. Data for this study were collected from the published annual reports of 34 domestic commercial banks. The financial data used in this study were obtained from the annual reports. Firstly, BANKAGE and EPS are directly collected as disclosed in the annual report. Secondly, key financial information, such as total assets, total liabilities, total equity and profit after tax, was extracted from the annual report to calculate the financial ratios needed for the study. To ensure consistency and reliability, the following formula is used to calculate the variable.

$$\text{Leverage (LEV)} = \text{Total Liabilities} / \text{Total Assets}$$

$$\text{ROE} = \text{Profit After Tax} / \text{Total Equity}$$

$$\text{ROA} = \text{Profit After Tax} / \text{Total Assets}$$

Environmental Accounting Information Disclosure (ENVI) data were collected through structured content analysis from the sustainability-related disclosure of the annual reports. For content analysis, relevant sections such as sustainability reporting, green banking and corporate social responsibility sections were carefully examined. The environmental accounting reporting scores for 34 banks over 2018 and 2024 are reported in the appendix.

The extracted report information was codified in a pre-determined framework based on the Global Reporting Initiative (GRI, 2013) guidelines. Following the framework, environmental disclosure is evaluated on the basis of 12 categories. Each category is evaluated and assigned a score of 0 to 3 (none for 0, quantitative for 1, qualitative for 2, both for 3). The score of each category is then aggregated and divided by 36 (maximum possible score 12 multiplied by 3) to reach the ENVI score of each bank.

Table 1: Total ENVI disclosure Ranking

Rank	Bank Name	Total Disclosures	Rank	Bank Name	Total Disclosures
1	City Bank	199	18	SOUTHEASTB	119
2	Ebl	196	19	SHAHJABANK	117
3	Dhakabank	172	20	TRUSTBANK	116
4	Alarabank	169	21	UTTARABANK	114
5	Bracbank	163	22	SIBL	113
6	Eximbank	161	23	BANKASIA	112
7	Dutchbangl	159	24	ABBANK	109
8	Mutual Trust Bank	157	25	NBL	98
9	Jamunabank	145	26	ONEBANKPLC	98
10	Mercanbank	141	27	RUPALIBANK	98
11	Firstsbank	140	28	PUBALIBANK	95
12	Ific	134	29	PRIMEBANK	89
13	Islamibank	128	30	NRBCBANK	88
14	Nccbank	126	31	GIB	87
15	Premierban	124	32	UCB	81
16	Icbibank	123	33	UNIONBANK	72
17	Standbankl	123	34	SBACBANK	42

Note: Developed by the authors

3.2. Data Analysis Techniques

The acquired data is examined statistically to investigate correlations between variables and make relevant findings. The study applies regression analysis to evaluate the effect of independent factors (ENVI, control variables) on dependent variables (ROA, ROE, EPS).

The analysis proceeds through descriptive statistics, Correlation Analysis and Multicollinearity, Model Specification and Diagnostic Tests, final estimation, post estimation test and model fit are all created as part of the sophisticated data analysis conducted using the STATA software.

3.3. Variables and Measurement

3.3.1. Dependent variables

Earnings Per Share: EPS is arrived at by using the formula Net Income available /Number of Shares of common Stock available. EPS translates the overall profitability of a firm directly to the per-share-profitability of the common stock that investors possess by showing the amount of profit a company makes for its shareholders.

Return on Equity: The study examines how the chosen factors impact the bank's capacity to produce profits from the equity staked by shareholders. A successful use of shareholder capital is indicated by a higher ROE. It is typically expressed as a percentage. It shows the rate of return a company is generating on the equity invested by its shareholders.

Return on Assets: Better operational efficiency is indicated by higher ROA. ROA is a valuable comparing tool since it allows the evaluation of the profitability of several firms of varying sizes. However, while analyzing ROA, it is critical to consider the industry, company strategy.

Table 2: Measurement of Dependent Variables

Variable Name	Variable Symbol	Measurement Criteria	References
Earnings Per Share	EPS	Net Income available /Number of Shares of common Stock available	Emmanuel et al., 2024; Gündüz & Gündüz, 2025; Khandelwal & Chaturvedi, 2021
Return on Equity	ROE	Net profit / Total equity	Emmanuel et al., 2024; M. S. Hossain & Ahamed, 2021; Loan et al., 2024; Pawar & Munuswamy, 2024
Return on Assets	ROA	Net profit / Total assets	Gündüz & Gündüz, 2025; M. S. Hossain & Ahamed, 2021; Xi et al., 2022

3.3.2. Independent variables

Environmental accounting information disclosure: Environmental Accounting is understood as the way how costs and benefits related to environmental effect of a firm are recognized, measured and disclosed. Banks that disclose EAID transparently can lead to enhancing the image of a bank and its sustainable approach, which in turn wows the green consumers and investors. This increased reputation can be an advantage in power struggles and lower customer churn, which affects the financial result (Clarkson et al., 2011). In light of the Global Reporting Initiative's (2013) Sustainable Development Report Guidelines, the total quantity of disclosure of mandatory environmental accounting information contains 34 items in the 12 relevant fields, as shown in Table 3:

Table 3: Items for Mandatory Environmental Information Disclosures

No	Sectors	No	Sectors
1	Material	7	Information about product and service labels
2	Energy	8	Compliance
3	Water	9	Transportation
4	Biodiversity	10	Overall
5	Emissions	11	Suppliers Review of the environmental
6	Waste management	12	complaints mechanism

Table 4: Method for Evaluating Disclosure Levels of Environmental Information

Information Disclosure Level	Score
Publication information is both quantitative and qualitative	3
Only qualitative information disclosure	2
Only quantitative information disclosure	1
No information disclosure	0

3.3.3. Control variables

Bank Size: The stability and effectiveness of a bank may be impacted by its size. Even though their businesses may be more varied, larger banks could have trouble managing their operations effectively. Larger banks usually have much more capital which they can use towards making technology improvements, developing efficient processes, and acquiring the best risk management processes, all of which not only makes them more productive, but also reduces the cost of operations (Kostevc, 2007).

Bank Age: The operations and reputation of a bank can be affected in different ways depending on its age. Given that it has endured economic downturns and proven its capacity to provide clients with long-term service, a bank that has been around for a longer time may be seen as more stable and reliable (Işık & Ersoy, 2022). Older banks may have built more trust and have more practical expertise, which can improve stability and performance (Brissimis & Delis, 2008).

Financial Leverage: A percentage is frequently used to represent the leverage ratio. It shows how much capital a bank has to cover all of its assets without taking into account the risk weights that the risk-based capital framework assigns to certain assets. The Leverage Ratio considers all assets identically, in contrast to risk-based metrics that take into account an asset's riskiness, making it easier to determine a bank's capital buffer. The leverage ratio shows how much debt a bank is using. An ideal leverage ratio may help to balance risk and reward in a developing economy.

Table 5: Measurement of Control Variables

Variable Symbol	Measurement Criteria	References
BSIZE	Natural Log (Total Assets) which is found by $\ln(\text{Total Assets})$	Al-Homaidi et al., 2018; Budhathoki et al., 2020; Gidage et al., 2025
BAGE	The number of years from the start of operation until the end of 2024	(Gazi et al., 2024; Gidage et al., 2025)
LEV	Total Liability / Total Assets	(Al-Homaidi et al., 2018; Budhathoki et al., 2020; Gazi et al., 2024)

3.4. Econometric Model Specification

This study uses dynamic panel regression analysis to investigate the relationship between different ENVI scores and bank financial performance. Based on diagnostic results, the final estimation changed across the dependent variables. Particularly, dynamic panel GMM estimation is applied for ROA and ROE to address endogeneity and dynamic effects, while a fixed effects model with firm and year dummies is used for EPS.

System GMM is preferred over pooled OLS and fixed effects estimators for three specific reasons. First, OLS is inconsistent in the presence of endogeneity between ENVI disclosure and financial performance, as banks with better financial performance may also have more resources to invest in environmental disclosure. Second, the fixed effects estimator, while controlling for time-invariant unobserved heterogeneity, is subject to Nickell bias when the time dimension is short, as is the case in this study ($T = 7$). Third, system GMM exploits both level and difference equations simultaneously, generating more efficient estimates when variables are persistent — as confirmed for ROA and ROE in this study. This approach follows an established precedent in banking and corporate finance research employing sys-GMM (Blundell & Bond, 1998; Flannery & Hankins, 2013; Wintoki et al., 2012).

The study assumes a dynamic endogenous relationship between ENVI and financial performance. In particular, a bank's prior financial performance (specifically, ROA and ROE) influences the current level of environmental accounting information disclosure. More profitable banks tend to invest more in sustainability reporting, while financially distressed

banks deemphasise environmental reporting. Concurrently, recent environmental disclosures affect the future financial outcomes through investor confidence and reputational goodwill. This bidirectional feedback creates endogeneity that violates the exogeneity assumption underlying fixed- and random-effects models (Arellano & Bond, 1991). Here, robust (cluster) standard errors are used to address the heteroskedasticity and within-firm correlation, while lag limits are used to optimize the instrument set and identify the dynamic persistence of bank performance. But the EPS model does not exhibit significant dynamic endogeneity. The EPS model retained a high-dimensional fixed effects specification (RegHDFE), which ensures consistent estimates without requiring GMM.

This regression model can be formulated as follows:

- i. $ROA_{it} = \beta_0 + \beta_1 ROA_{it-1} + \beta_2 ENVI_{it} + \beta_3 LEV_{it} + \beta_4 BSIZE_{it} + \beta_5 BAGE_{it} + \eta_{it} + \epsilon_{it}$
- ii. $ROE_{it} = \beta_0 + \beta_1 ROE_{it-1} + \beta_2 ENVI_{it} + \beta_3 LEV_{it} + \beta_4 BSIZE_{it} + \beta_5 BAGE_{it} + \eta_{it} + \epsilon_{it}$
- iii. $EPS_{it} = \beta_0 + \beta_1 ENVI_{it} + \beta_2 LEV_{it} + \beta_3 BSIZE_{it} + \beta_4 BAGE_{it} + \epsilon_{it}$

Where,

ROA_{it} , ROE_{it} and EPS_{it} are the return on assets, return on equity, and earnings per share for bank i in year t , respectively

β_0 is the intercept or constant term

β_1 to β_5 are the coefficients representing the impact of the factors on the dependent variables

$ENVI_{it}$, LEV_{it} , $BSIZE_{it}$, $BAGE_{it}$ are the values of the independent and control variables for bank i in year t

η_{it} unobserved individual effects

ϵ_{it} idiosyncratic error

$it-1$ indicates one year lagged

4. Results and Findings

4.1. Descriptive Statistics

Table 6 displays the descriptive statistics of the samples for each variable. These descriptive data provide vital information on the financial features of Bangladeshi banks. The data for the variables are collected from the 34 Dhaka Stock Exchange (DSE)-listed banks among the 36 banks over the period 2018 to 2024. After every step of calculations, the pattern of the data is examined, and only if the pattern is consistent are further statistical tests performed. So, the discussion of the descriptive statistics of the variables in the context of Bangladeshi banking data: these statistics provide insights into various financial measures for a sample of 238 observations. It is important to keep in mind that, without additional context, these statistics should be interpreted broadly.

Table 6: Descriptive Statistics

Variable	Min	Max	Mean	SD	Median	IQR	Skewness	Kurtosis
ROA	-79.41	1.76	0.06	5.34	0.62	0.49	-14.03	208.64
ROE	-401.22	104.83	7.8	29.45	9.87	5.97	-11.41	159.06
EPS	-248.91	10.72	1.07	16.51	1.99	1.95	-14.69	222.69
ENVI	0.08	0.92	0.49	0.19	0.5	0.31	-0.16	2.31
LEVERAGE	0.13	2.49	0.97	0.22	0.94	0.02	4.66	28.46
BANKSIZE	22.95	28.82	26.53	0.81	26.63	0.62	-2.02	10.48
BANKAGE	5	59	26.47	10.73	25	14	0.36	3.47

Following standard literature in banking and finance, we have done winsorization of financial variables (ROA, ROE, EPS, Leverage, and Bank Size) at the 1st and 99th percentiles. Because the descriptive statistics show high levels of kurtosis, 208.64 for ROA and 159.06 for ROE, indicating the presence of extreme outliers. Winsorization ensures that the estimated coefficients are robust and not skewed by distinctive shocks to individual banks (Adams & Ferreira, 2009). Winsorization improves the reliability of the Fixed Effects and System GMM results.

4.2. Correlation Analysis and Multicollinearity

Pairwise correlation analysis provides deep insight into variables. The results indicate that ROA is positively correlated with EPS, $r=0.768$ ($p<0.01$), suggesting a close connection between asset-based and earnings-based financial performance. On the other hand, ROA has a negative relationship with LEVERAGE $r=-0.696$ ($p<0.01$), which indicates that debt financing negatively affects asset profitability.

Table 7: Pairwise Correlations

Variables	VIF	ROA	ROE	EPS	ENVI	LEVERAGE	BANKSIZE	BANKAGE
ROA	—	1.000						
ROE	—	0.373***	1.000					
EPS	—	0.768***	0.411***	1.000				
ENVI	1.12	0.040	0.091	0.180***	1.000			
LEVERAGE	2.61	-0.696***	-0.012	-0.302***	0.009	1.000		
BANKSIZE	2.58	0.383***	-0.051	0.233***	0.231***	-0.686***	1.000	
BANKAGE	1.38	-0.198***	-0.215***	0.085	0.205***	0.267***	0.142**	1.000

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

EPS is negatively correlated with LEVERAGE, $r=-0.302$ ($p<0.01$), indicating the adverse effect of debt on banks' earnings performance. BANKSIZE shows a negative correlation with leverage, $r=-0.686$ ($p<0.01$), suggesting that large banks rely less on external debt. ENVI is significantly and positively correlated with BANKSIZE, $r=0.231$ ($p<0.01$), and BANKAGE, $r=0.267$ ($p<0.01$), indicating that larger and mature banks are more concerned about environmental disclosure practices. The remaining correlations are statistically insignificant. Here, VIF values range from 1.12 to 2.61, which confirms that multicollinearity is not a concern in the model.

4.3. Model Specification and Diagnostic Tests

This study conducts a series of diagnostic tests in which each method is applied, with the outcome of informing the choice of the next method. The analysis starts with descriptive statistics to

characterize the distribution of each variable and identify extreme values. Due to extreme values present in the data, financial data are winsorized at the 1st and 99th percentiles to prevent outlier-related problems. Pairwise correlation analysis examines relationships among variables. Calculating the Variance Inflation Factor (VIF) ensures the absence of multicollinearity before any regression is estimated.

Table 8: Model Specification Test

Tests	Estimations	Decision
Ramsey RESET test	$F = 1.62$ (ROA); $F = 5.54^{**}$ (ROE); $F = 7.54^{***}$ (EPS)	Omitted variable bias is present in the models
Delgado and Manteiga test	$P = .008$ (ROA), $P = .13$ (ROE), $EPS = .126$ (EPS)	No measurement error detected
Hausman specification test	$\chi^2 = 72.83^{***}$ (ROA); $\chi^2 = 24.10^{***}$ (ROE); $\chi^2 = 61.22^{***}$ (EPS)	Fixed effects model for all three.
Time fixed effects (Year dummies)	$F = 1.43$ (ROA); $F = 7.27$ (ROE); $F = 2.05$ (EPS)	Time effects significantly improve model fit only for ROE
Pesaran's test for cross-sectional dependency	$CD = 11.283^{***}$ (ROA); $CD = 2.414$ (ROE); $CD = 3.108$ (EPS)	Cross-sectional dependency in residuals.
Shapiro-Wilk test for normality	$Z = 9.470^{***}$ (ROA); $Z = 10.048^{***}$ (ROE), $Z = 9.795^{***}$ (EPS)	Residuals significantly deviate from normality (SHAPIRO & WILK, 1965)
BP-LM test for heteroscedasticity	$\chi^2 = 25.97^{***}$ (ROA), $\chi^2 = 28.67^{**}$ (ROE), $\chi^2 = 25.97^{***}$ (EPS) $\chi^2 = 122.32^{***}$	Heteroscedasticity present in ROE model
Wooldridge test for autocorrelation	$F = 42.149^{***}$ (ROA); $F = 4.303^{**}$ (ROE); $F = 1.857$ (EPS)	Autocorrelation is present in ROA and ROE
Modified Wald test for heteroscedasticity	$\chi^2 = 119943.71^{***}$ (ROA); $\chi^2 = 23230.04^{***}$ (EPS)	Heteroscedasticity present in panel data
Nickell bias (Lagged Dependent Variable (DV) on fixed effects)	$t = 3.54^{***}$ (ROA); $t = 1.97^{**}$ (ROE); $t = 1.76^*$ (EPS)	Strong dynamic panel bias exists, justifying the use of GMM
Dynamic panel bias (Lagged DV on Random effects)	$Z = 5.96^{***}$ (ROA); $Z = 6.96^{***}$ (ROE); $Z = 10.79^{***}$ (EPS)	Dynamic bias present in ROE and EPS
Dynamic endogeneity (Lagged DV on GMM)	$z = 10.03^{***}$ (ROA); $t = 5.84^{***}$ (ROE)	GMM captures dynamic endogeneity (Arellano & Bond, 1991)

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

To determine the most appropriate panel estimator, the BP-LM test is applied first to distinguish between pooled Ordinary Least Squares (OLS) and random effects. After that, the Hausman specification test determines whether to use random effects or fixed effects. The Ramsey RESET test and the Delgado–Manteiga nonparametric test are additionally applied to assess whether the functional form of each model is correctly specified.

We perform a comprehensive set of diagnostic tests to detect violations of assumptions that would make the regression estimator inconsistent. The Shapiro–Wilk test examines whether model residuals deviate significantly from normality; the Pesaran Cross-Sectional Dependence (CD) test detects cross-sectional dependence arising from unobserved common shocks across banks;

the Wooldridge test identifies the presence of serial autocorrelation in panel residuals; and the Modified Wald test diagnoses group-wise heteroscedasticity. The Nickell bias test and the dynamic endogeneity test are applied to determine whether the inclusion of a lagged dependent variable is warranted and whether dynamic panel bias is present. These tests confirm dynamic endogeneity in ROA and ROE. That's why a two-step system GMM estimator with robust clustered standard errors is adopted, following Arellano and Bond (1991) and Blundell and Bond (1998), with instrument validity verified through Arellano–Bond, First-Order Autocorrelation AR(1) and Second-Order Autocorrelation AR(2) tests and the Hansen test of overidentifying restrictions. On the other hand, EPS does not show dynamic endogeneity. That's why a high-dimensional fixed effects regression (RegHDFE) absorbing both firm and year fixed effects is retained, with the final specification selected on the basis of Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) criteria compared across competing fixed effects models. This step-by-step approach ensures that no method is applied arbitrarily; each technique responds to a specific econometric concern identified in the preceding stage.

4.4. Multivariate Regression Results and Discussion

GMM is used as the preferred estimator as there is a dynamic endogeneity with ROA and ROE, consistent with (Wintoki et al., 2012). Here, the lagged dependent variable is used to control for this dynamic bias.

Table 9: Regression Results: Effect of ENVI on ROA, ROE, and EPS

Variables	ROA	ROE	EPS
L.ROA	1.230 (1.66)	—	—
L.ROE	—	0.541*** (5.84)	—
ENVI	0.074 (0.18)	3.076 (0.87)	0.152 (0.18)
LEV	-3.112 (-0.92)	14.739 (0.92)	-18.090*** (-8.84)
BSIZE	-0.324 (-0.82)	3.323 (0.99)	2.115*** (2.95)
BAGE	0.029 (1.20)	-0.146 (-0.59)	Omitted
Constant	10.648 (0.89)	-95.771 (-0.98)	-36.481* (-1.90)
AR(1) p-value	0.249 [z = -1.37]	0.456 [z = -0.74]	—
AR(2) p-value	0.229 [z = 1.21]	0.363 [z = -0.91]	—
Hansen test χ^2	4.03 (p = 0.402)	4.03 (p = 0.402)	—
Adjusted R ²	—	—	0.649
F-statistic	—	—	30.16***
Observations	204	204	238
No. of Banks	34	34	34
Estimator	Sys-GMM	Sys-GMM	RegHDFE

Note: *t-values in parentheses.* *** $p < .01$, ** $p < .05$, * $p < .10$. ROA and ROE estimated by two-step system GMM; EPS estimated by RegHDFE absorbing firm and year fixed effects. Robust clustered standard errors used throughout. BAGE is omitted in the EPS model due to collinearity with firm fixed effects.

ROA Model (GMM Estimation)

The dynamic panel estimation for ROA shows a positive but insignificant coefficient of the lagged dependent variable, indicating weak persistence in bank profitability over time. The absence of significance implies that past asset returns do not determine current performance within the dynamic framework.

Here, the variables ENVI, leverage, bank size, and bank age do not have statistically significant effects on ROA. This implies that these factors may not directly influence asset-based profitability. We can conclude that their effects are mediated through other unobserved channels

ROE Model (GMM Estimation)

The dynamic panel estimation shows that the lagged dependent variable (ROE) is positive and highly significant, indicating that bank profitability is persistent over time. This suggests that past profitability strongly influences current performance.

The key explanatory variables ENVI, leverage, bank size, and bank age do not show statistically significant effects on ROE. These results suggest that their direct influence on profitability is limited within the dynamic specification. Among the control variables only the year 2024 dummy shows weak significance, suggesting possible recent macroeconomic effects.

The post-estimation diagnostics confirm the validity of both GMM models. For the ROA model, the Arellano-Bond test for second-order autocorrelation is insignificant ($z = 1.21$, $p = 0.226$), and for the ROE model it is similarly insignificant ($z = -0.91$, $p = 0.362$). This confirms the absence of second-order serial correlation in the first-differenced residuals, validating the use of lagged levels as instruments (Arellano & Bond, 1991). Although the AR(1) test does not reach conventional significance thresholds for either model, this is not uncommon in panels with a short time dimension ($T = 7$), where first-differencing removes a substantial portion of within-firm variation (Roodman, 2009). The critical condition for GMM validity the absence of AR(2) is satisfied in both models.

The Hansen test for the ROA model and for the ROE model, both confirming the exogeneity of the instrument set. The Difference-in-Hansen tests further confirm the validity of the level instruments used in the system GMM framework ($\chi^2 = 1.33$, $p = 0.659$ for ROA; $\chi^2 = 0.30$, $p = 0.581$ for ROE). Robust (clustered) standard errors are employed throughout both GMM models to account for heteroskedasticity and within-firm serial correlation across time, following the recommendation of the journal reviewers and consistent with best practice in dynamic panel estimation (Roodman, 2009).

For the EPS model estimated using RegHDFE with absorbed firm and year fixed effects, the adjusted R^2 of 0.649 indicates strong explanatory power, and the F-statistic of 30.16 ($p < 0.01$) confirms the joint significance of the explanatory variables. BANKAGE is omitted in this model due to collinearity with the firm fixed effects, as its variation is fully absorbed at the firm level.

EPS Model (Fixed Effects Estimation)

Leverage has a strong negative and highly significant effect on EPS, indicating that increased reliance on debt financing substantially reduces per-share earnings. On the other hand, bank size shows a positive and statistically significant relationship with EPS, implying that larger banks benefit from economies of scale and improved operational efficiency. ENVI although positively signed, is statistically insignificant, indicating that environmental disclosures or practices do not have a direct and measurable impact on short-term earnings performance. This suggests that the financial benefits of environmental engagement may materialize over a longer horizon or through indirect channels. Bank age is omitted due to its time-invariant nature within firms, which is fully absorbed by firm fixed effects. This is consistent with standard panel data econometric practice. Overall, the model is statistically significant and explains a substantial portion of the variation in EPS. The results highlight capital structure and firm size as key determinants of profitability, while environmental factors appear to have a limited immediate financial effect.

Overall, the findings show that ENVI has no significant impact on EPS. This rejection could be attributed to the indirect nature of banks' environmental practices. Banks primarily participate in financial services. Prior research indicated that environmental accounting information disclosure is not associated with 'earnings per share' (EPS) of the Turkish commercial banks in the sense that disclosure level does not bear the potential to increase or decrease the EPS (Feneir, 2023). Prior research indicated that ENVI has an insignificant negative relationship on ROA of Indian banking sectors (Munjal et al., 2021). Environmental cost disclosure influences return on equity (ROE) in the negative direction (Lutfillah & Amadea, 2022). The findings indicate a statistically insignificant result between the ENVI and financial performance relationship in Bangladesh's banking sector. Environmental accounting disclosure does not yet have measurable returns, but an insignificant positive direction indicates that it will have potential future returns with maturity. Future research with longer observation windows, broader samples, and richer disclosure measures may be better positioned to detect the financial payoff of environmental accountability in emerging market banking.

5. Conclusion

In this way, the study adds to the investigation of environmental accounting in the banking business, which may be overlooked in favor of the industrial sector, by examining banks' impact on environmental sustainability through lending. The findings and conclusions of this study will be valuable to not only the stakeholders of banks but also the stakeholders of others business organizations to protect our environment. This research contributes to the environmental preservation by revealing that environmental accounting reporting has an impact on the financial performance of Bangladeshi banks. Furthermore, the findings of the research will aid to the financial experts, investors, customers, and the government in making business decisions regarding environmental protection. Finally, it calls for other research to examine other governance mechanisms for a better appreciation of the effects of sustainability on financial performance.

Despite its contributions, this study has several limitations. First, this research only focuses on the environmental accounting information disclosure of Bangladeshi listed banks

and does not focus widely on ESG. Future studies could expand the social governance and social environmental governance of banks or examine multiple countries to offer comparative insights. Second, there is a lack of data. Bangladeshi institute is not included in the ESG score. Only seven institutes include ESG scores (such as Grameenphone, BAT, Marico Bangladesh, Brac Bank Limited, IDLC Finance, Square Pharmaceuticals, and Walton).

Further research could look into how alternative performance measures (such as cost of capital and Tobin's Q), influencing factors (such as capital adequacy and non-performing loan ratios), and moderating factors (deposit ratio) affect the outcomes of financial performance on DSE-listed banks. Moreover, different best-fit techniques with the best software may be used for further research. This study offers valuable new insights into banking sector environmental disclosure in Bangladesh despite being limited to the country, and second, the work has some shortcomings: a regional focus and a lack of sufficient ESD-data. Future research should have more diverse geographical coverage, and objectives should measure using more parameters, and analysts should use more sophisticated methods.

Funding Declaration: The authors would like to thank Kishoreganj University for providing funding to the corresponding author for this research. The remaining authors declare that they received no specific funding for the research.

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Appendix

Environmental Accounting Reporting Scores

Bank Name	2024	2023	2022	2021	2020	2019	2018
BRAC Bank PLC	26	29	29	17	27	25	10
AB Bank PLC	16	10	14	9	17	22	21
Al Arafah Islami Bank PLC	18	24	23	27	26	28	23
Bank Asia PLC	20	6	8	21	19	19	19
City Bank PLC	22	33	31	31	30	27	25
Dhaka Bank PLC	20	27	27	22	25	26	25
Eastern Bank PLC	30	30	33	27	27	26	23
First Security Islami Bank PLC	7	21	21	21	22	23	25
IFIC Bank PLC	16	28	28	22	13	15	12
ICB Islamic Bank PLC	21	20	18	16	16	16	16
Islami Bank Bangladesh PLC	29	16	17	16	16	18	16
Mercantile Bank PLC	21	20	20	20	20	20	20
Dutch-Bangla Bank PLC	23	22	22	22	24	24	22
Jamuna Bank PLC	25	20	20	20	20	20	20
EXIM Bank PLC	23	23	23	23	23	23	23
Mutual Trust Bank PLC	24	20	24	24	23	24	18
National Bank PLC	14	18	15	14	15	11	11
NCC Bank PLC	22	24	22	16	14	14	14
One Bank PLC	29	10	13	8	15	15	8
Premier Bank PLC	27	17	17	12	10	24	17
Prime Bank PLC	18	13	18	12	12	6	10
Pubali Bank PLC	30	8	13	12	15	11	6
Rupali Bank PLC	25	17	11	12	13	10	10
Shahjalal Islami Bank PLC	28	20	20	15	17	12	5
Social Islami Bank PLC	26	13	20	13	13	23	5
Southeast Bank PLC	23	8	8	18	20	23	19
Standard Bank PLC	15	19	17	11	20	20	21
Trust Bank PLC	27	24	24	14	9	14	4
United Commercial Bank PLC	21	14	12	12	8	8	6
Uttara Bank PLC	21	15	17	18	18	18	7
Global Islamic Bank PLC	20	9	11	10	15	15	7
NRBC Bank PLC	25	20	7	8	8	10	10
SBAC Bank PLC	24	3	3	3	3	3	3
Union Bank PLC	17	13	12	12	6	6	6

Note: Developed by the authors