Corporate Social Responsibility, Profitability, and Non-Interest Income in Bangladesh's Banking Sector: Evidence from Fixed-Effect Panel Analysis

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ABSTRACT
The purpose of this study is to examine the role of Corporate Social Responsibility (CSR) spending and profitability in generating non-interest income in Bangladesh's banking sector. Non-interest income refers to bank revenue generated from sources other than loan interest, such as fees, commissions, card services, remittance services, trade finance, and other service-based banking activities. The analysis is based on a balanced panel of 20 Bangladeshi commercial banks over five years, producing 100 bank-year observations for 2020-2024. The dependent variable is the non-interest income ratio; the main explanatory variable is the CSR expenditure ratio, and the profitability variable is the return on assets (ROA). The empirical approach uses bank fixed-effects and two-way bank-year fixed-effects regressions with robust standard errors to account for bank heterogeneity and common annual shocks. The results show that CSR expenditure has a positive and statistically significant impact on the non-interest income ratio. Additionally, non-interest income is positively and significantly associated with profitability. The two-way fixed-effects model results suggest that every 1% increase in the CSR expenditure ratio (scaled by 1000) is associated with an estimated 0.092 increase in the non-interest income ratio, whereas ROA is correlated with non-interest income. The results indicate that CSR investments can support income diversification through reputation, customer trust, and stakeholder legitimacy. Meanwhile, the banks that enjoy profits seem better suited to build profitable fee- and service-based revenue streams. The findings of the study will add to the CSR and banking literature by highlighting the shift from the traditional link between CSR and profitability to the CSR-income diversification channel in an emerging banking market.

Keywords: corporate social responsibility; non-interest income; profitability; income diversification; fixed effects; Bangladesh banking sector

1. INTRODUCTION

Commercial banks are increasingly dependent on sources of income other than the traditional lending spread. Therefore, in recent years, there has been an emphasis on the

importance of non-interest income generated from fees and commissions, brokerage, payment cards, remittance services, trade services, and other operating activities as an indicator of income diversification. Such diversification can help emerging banking systems not rely so heavily on interest-based loans. Still, it can also rely on customers' trust, digital and service capacity, risk management, and managerial efficiency.

All the while, CSR has become a tangible aspect of bank strategy. The CSR spending of banks in Bangladesh is typically treated as a social contribution, but it can also bring economic gains through enhanced institutional legitimacy, customer relationships, and stakeholder confidence. The CSR-financial performance correlation in the Bangladeshi banking sector remains debatable. The relationship between CSR and financial performance remains inconclusive in previous studies conducted in Bangladesh's banking sector. Some studies, such as that by Kabir and Chowdhury (2023), suggest that improved financial performance leads to increased CSR spending, whereas increased CSR spending does not directly contribute to financial performance. This uncertainty raises a new question: Given the uncertainty around immediate conventional profitability gains, can CSR serve as a catalyst for income diversification through non-interest income?

In this article, the author seeks to answer this question by analyzing the impact of CSR spending and profitability on the non-interest income ratio of Bangladeshi banks. The use of ROE, ROA, or net income in studies of the financial performance of financial institutions is a limited approach. In contrast, this paper uses non-interest income as the outcome variable. This is significant because CSR can take a variety of forms, including positive reputation and relationship development that can result in greater customer interaction with fee-based services, rather than necessarily a short-term boost to profits. The study also investigates whether there is a net positive relationship between CSR expenditures and non-interest income, while conditioning on bank size, credit risk, liquidity, capital strength, cost efficiency, lending intensity, bank unobserved heterogeneity, and year shocks.

The paper has three contributions. Firstly, it relates CSR spending to income diversification, which is not well explored in research on Bangladesh banking. Secondly, it provides a higher level of precision in measuring the income diversification effect of banks' CSR spending. Second, it employs fixed-effects panel models to account for the time-invariant nature of bank characteristics, which would otherwise introduce bias. Third, it provides empirical evidence of positive and significant links between CSR expenditure and profitability, and between CSR expenditure and non-interest income. This applies in practice to bank managers, regulators, and investors, since it relates responsible banking spending not just to social image but also to revenue sources.

Therefore, the objective of this study is to examine whether CSR expenditure and bank profitability help Bangladeshi commercial banks generate higher non-interest income. Unlike many previous studies that focus mainly on CSR and profitability, this study shifts attention to income diversification and examines whether CSR can support fee-based and service-based revenue generation in the banking sector.

2. Literature Review and Hypothesis Development

2.1 CSR expenditure in banking

The concept of CSR in a bank differs from that of non-financial companies due to factors such as trust, reputation, risk screening, and long-term customer relationships. A CSR investment by a bank can enhance the bank's public legitimacy and its relationship with stakeholders, particularly when it is clearly visible, credible, and relevant to community needs. Regulatory expectations, disclosure practices in annual reports, and competition in the sector also influence CSR among banks in Bangladesh. Previous research has investigated the link between CSR and financial performance as both a determinant and a result of financial performance, but insufficient effort has been devoted to examining the association between CSR and the generation of non-interest income.

2.2 Non-interest income and income diversification

Non-interest income is a portion of banks' income not derived from interest on lending. The diversification literature suggests that banks can benefit from diversification, though the benefits are contingent upon bank capacity, risk profile, and business model. Income based on fees may be steadier, whereas trading or activities tied to market sensitivities may be more volatile. The transition towards non-interest income might thus demand a more robust customer focus, competency, and reputation for the emerging market banks.

2.3 Profitability and non-interest income

Profitability can be used as a lever to invest in technology, human resources, service channels, and product diversity, thereby generating non-interest income. A sounder institution might be better able to create card services, digital banking, remittance services, advisory services, trade finance, and commission-based products. ROA is therefore added as a profitability indicator and is expected to have a positive relationship with the non-interest income.

2.4 Hypotheses

Based on the theoretical argument and the empirical focus of this study, two main hypotheses are tested:

Since the empirical model focuses on the direct effects of CSR expenditure and profitability on non-interest income, two core hypotheses are developed.

Hypothesis 1 (H1). Higher corporate social responsibility expenditure is positively associated with non-interest income generation among commercial banks in Bangladesh.

Hypothesis 2 (H2). Higher profitability, measured by return on assets, is positively associated with the generation of non-interest income among commercial banks in Bangladesh.

2.5 Conceptual framework

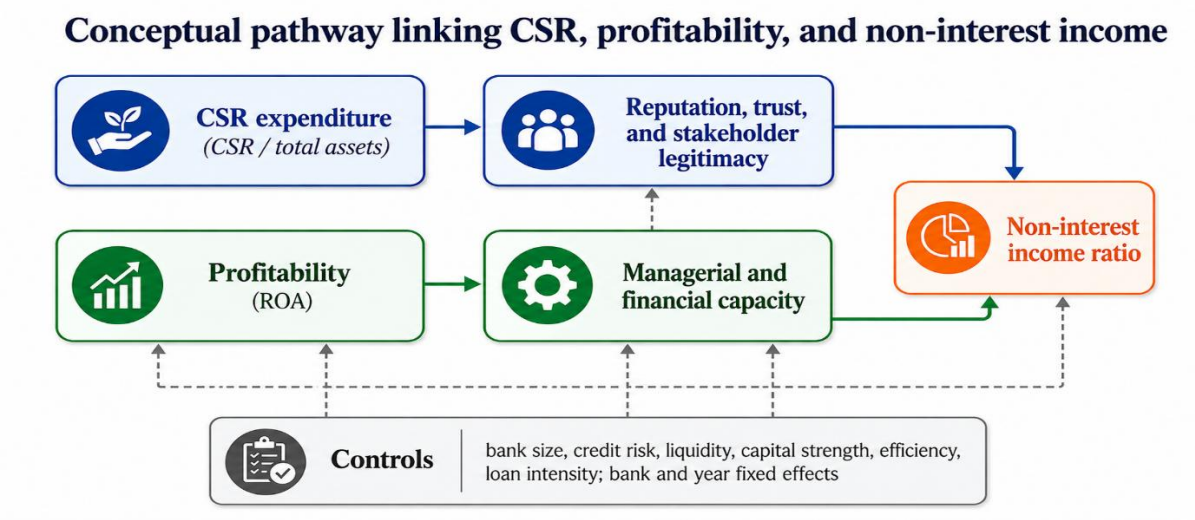


Figure 1. Conceptual framework of CSR expenditure, profitability, and non-interest income generation.

3. Data and Methodology

3.1 Data and sample

Bank panel data are used in the empirical analysis and are drawn from the Regression Data sheet in the provided workbook. The final data set includes 20 commercial banks over the period 2020-2024, with one observation for each bank per year, resulting in a balanced panel of 100 bank-year observations. On the financial statement basis, it is that of an entity (standalone, separate bank statement, where applicable). The CSR variable is measured by reported CSR/social cause/CSR contribution/expenditure. If direct CSR expenditure is not separately reported, donations or similar social contribution lines are used as a proxy, in line with the workbook source log.

The data were collected from publicly available secondary sources, mainly the annual reports of selected Bangladeshi commercial banks for 2020-2024. Information on CSR expenditure, total assets, non-interest income, operating income, net income, loans, liquidity, capital, and operating expenses was extracted from the financial statements and relevant notes of the annual reports. The collected data were organized in the regression workbook and cross-checked with the source log to ensure consistency. No questionnaire, interview, or survey data were used because this study follows a quantitative archival panel-data design.

Table 1. Sample design

Item	Description
Country context	Bangladesh
Sector	Commercial banking sector
Panel period	2020-2024
Number of banks	20
Bank-year observations	100
Panel structure	Balanced panel
Main dependent variable	Non-interest income ratio
Main explanatory variables	CSR expenditure ratio and ROA

3.2 Variable measurement

Table 2. Variable definition and measurement

Variable	Role	Measurement	Expected sign
NII_Ratio_DV	Dependent variable	Non-interest income / total operating income	Outcome
CSR_1000	Main independent variable	CSR expenditure / total assets × 1000	+
ROA	Profitability variable	Net income / total assets	+
Bank_Size_lnTA	Control	Natural log of total assets	+
NPL_Ratio	Control	Non-performing loans / total loans	-
Liquidity_Ratio	Control	Liquid assets / total assets	+/-
Capital_Strength	Control	Equity / total assets	+
Efficiency_Ratio	Control	Operating expenses / operating income	-
Loan_Intensity	Control	Total loans / total assets	+/-

CSR expenditure is scaled by total assets to reduce size-driven measurement bias. For interpretability, the regression model uses CSR_1000, which is CSR_Ratio_IV multiplied by 1000. Scaling changes coefficient readability but does not change statistical significance.

To improve measurement validity, CSR expenditure was measured using reported CSR, social contribution, or donation-related expenditure disclosed in bank annual reports. Where a separate CSR expenditure item was not available, comparable donation or social contribution items were used as a proxy. The CSR amount was scaled by total assets and multiplied by 1000 to reduce bank-size bias and improve coefficient interpretation. This approach ensures that CSR is measured consistently across banks using available reported financial data.

3.3 Model specification

The baseline fixed-effect model is specified as follows:

$$NII_{it} = \beta 0 + \beta 1 CSR_{it} + \beta 2 ROA_{it} + \beta 3 SIZE_{it} + \beta 4 NPL_{it} + \beta 5 LIQ_{it} + \beta 6 CAP_{it} + \beta 7 EFF_{it} + \beta 8 LOAN_{it} + \mu_i + \varepsilon_{it}$$

The preferred two-way fixed-effect model is specified as follows:

$$NII_{it} = \beta 0 + \beta 1 CSR_{it} + \beta 2 ROA_{it} + \beta 3 SIZE_{it} + \beta 4 NPL_{it} + \beta 5 LIQ_{it} + \beta 6 CAP_{it} + \beta 7 EFF_{it} + \beta 8 LOAN_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

In these equations, μ_i denotes bank fixed effects, and λ_t denotes year fixed effects. Bank fixed effects control for time-invariant bank-specific characteristics, while year fixed effects control for common annual shocks. Robust standard errors are used because panel banking data can contain heteroskedasticity and outlier-sensitive observations.

4. Results

4.1 Descriptive statistics

Table 3. Descriptive statistics

Variable	N	Mean	SD	Min	Median	Max
NII_Ratio_DV	100	0.5565	0.2472	-0.5807	0.5760	1.2389
CSR_1000	100	0.5094	0.4290	0.0000	0.4389	2.1922
ROA	100	0.0060	0.0066	-0.0468	0.0058	0.0172
Bank_Size_lnTA	100	26.9316	0.5405	26.1136	26.8256	28.4474
NPL_Ratio	100	0.0812	0.0993	0.0220	0.0486	0.6714
Liquidity_Ratio	100	0.1435	0.0853	0.0068	0.1093	0.3388
Capital_Strength	100	0.0667	0.0167	0.0117	0.0656	0.1212
Efficiency_Ratio	100	0.5228	0.1551	-0.5364	0.5260	1.0005
Loan_Intensity	100	0.6566	0.1068	0.3307	0.6879	0.8096

The descriptive statistics indicate that the average non-interest income ratio is 0.5565, and the average CSR expenditure ratio, scaled by 1000, is 0.5094. The mean ROA is 0.0060. These values show meaningful variation across bank-year observations, which is necessary for panel regression estimation.

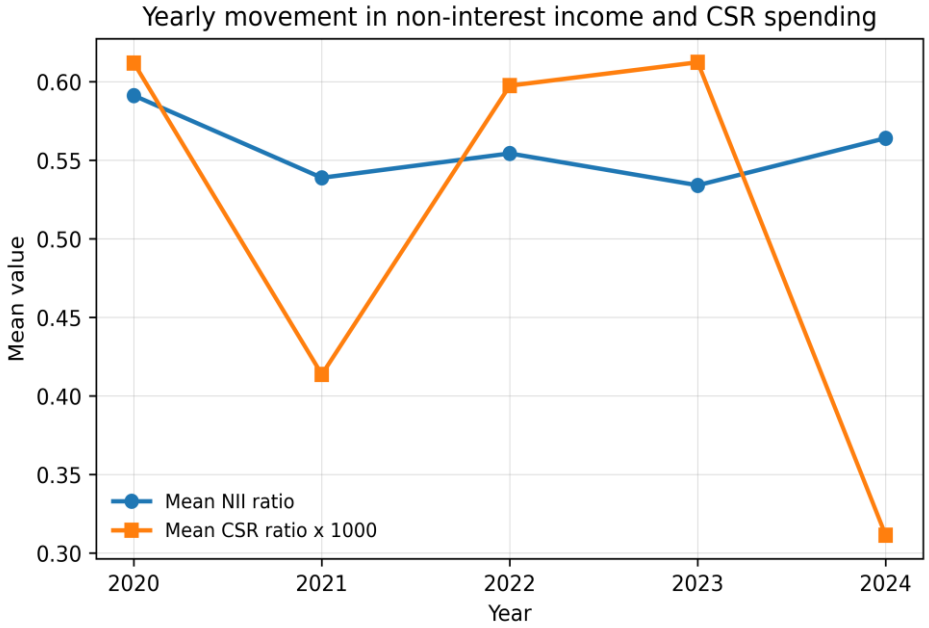


Figure 2. Yearly mean values of non-interest income ratio and CSR expenditure ratio scaled by 1000.

4.2 Correlation and multicollinearity diagnostics

Table 4. Pairwise correlation matrix

Variable	NII	CSR	ROA	Size	NPL	LIQ	CAP	EFF	LOAN
NII	1.00	0.00	0.20	0.17	-0.11	0.14	-0.16	0.08	-0.25
CSR	0.00	1.00	0.18	-0.20	-0.27	-0.18	0.12	0.11	0.24
ROA	0.20	0.18	1.00	-0.14	-0.73	0.00	0.61	0.44	-0.06

Size	0.17	-0.20	-0.14	1.00	0.16	0.06	-0.52	0.06	-0.33
NPL	-0.11	-0.27	-0.73	0.16	1.00	-0.22	-0.43	-0.26	0.14
LIQ	0.14	-0.18	0.00	0.06	-0.22	1.00	-0.17	-0.03	-0.18
CAP	-0.16	0.12	0.61	-0.52	-0.43	-0.17	1.00	0.32	0.03
EFF	0.08	0.11	0.44	0.06	-0.26	-0.03	0.32	1.00	-0.13
LOAN	-0.25	0.24	-0.06	-0.33	0.14	-0.18	0.03	-0.13	1.00

The correlation matrix does not show extreme pairwise correlations among the main explanatory variables. The raw correlation between CSR and non-interest income is weak, which justifies using adjusted panel models, as the CSR effect is expected to operate after controlling for bank heterogeneity, profitability, and other bank-level characteristics.

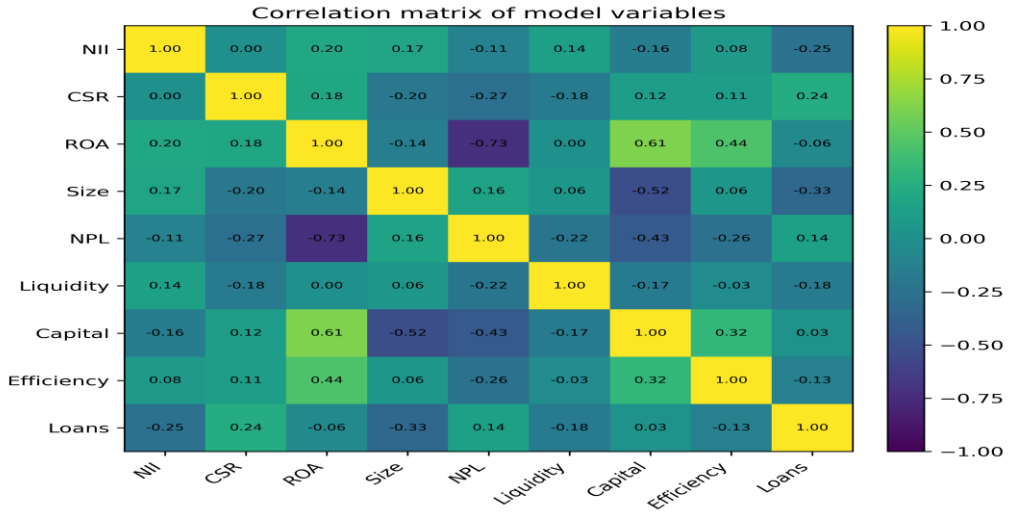


Figure 3. Pairwise correlation matrix for dependent, independent, and control variables.

Table 5. Variance inflation factor diagnostics

Variable	VIF
CSR_1000	1.29
ROA	3.23
Bank_Size_lnTA	1.82
NPL_Ratio	2.70
Liquidity_Ratio	1.29
Capital_Strength	2.60
Efficiency_Ratio	1.34
Loan_Intensity	1.30

All reported VIF values are below the conventional threshold of 5, suggesting that

multicollinearity is not a major threat to the regression estimates.

4.3 Fixed-effect regression results

Table 6. Fixed-effect regression results

Variable	Model 1: Bank FE	Model 2: Bank + Year FE
CSR_1000	0.088** (0.039) p = 0.026	0.092*** (0.031) p = 0.003
ROA	12.645*** (4.336) p = 0.005	12.647*** (3.723) p = 0.001
Bank_Size_lnTA	0.119 (0.090) p = 0.187	0.184 (0.117) p = 0.116
NPL_Ratio	0.341** (0.168) p = 0.043	0.294* (0.153) p = 0.054
Liquidity_Ratio	-0.511** (0.237) p = 0.031	-0.530** (0.206) p = 0.010
Capital_Strength	0.804 (2.227) p = 0.718	0.420 (1.884) p = 0.823
Efficiency_Ratio	0.476*** (0.107) p < 0.001	0.498*** (0.096) p < 0.001
Loan_Intensity	-1.864*** (0.311) p < 0.001	-1.595*** (0.328) p < 0.001
Bank fixed effects	Yes	Yes
Year fixed effects	No	Yes
Observations	100	100
Banks	20	20
Adjusted R^2	0.907	0.908

Notes: Standard errors are reported in parentheses. The three asterisks represent significance at 1%, 5%, and 10%, respectively. The value of CSR_1000 is the product of CSR_Ratio_IV times 1000. Model 2 is preferred because it incorporates both bank and year fixed effects.

The regression results support H1. The coefficient on CSR expenditure in both fixed-effect models is positive and statistically significant. In the bank fixed-effect model, the coefficient of CSR_1000 is 0.088 and significant at the 5% level. The coefficient rises slightly to 0.092 and remains significant at the 1% level in the two-way fixed-effects model. This suggests that, with other bank characteristics and fixed effects being controlled for, the banks with higher

ratios of CSR expenditure to asset size have higher ratios of non-interest income.

The results are also consistent with H2. ROA is statistically significant and positive in both models. The model is the preferred two-way fixed-effects model, in which the coefficient on ROA is 12.647 and significant at the 1% level. This discovery indicates that more profitable banks are more likely to be able to generate their own non-interest income, which could be more easily possible because of the resources that banks have due to their profitability, including the ability to expand their services, invest in digital, offer fee-based products, acquire customers, and modernize their operations.

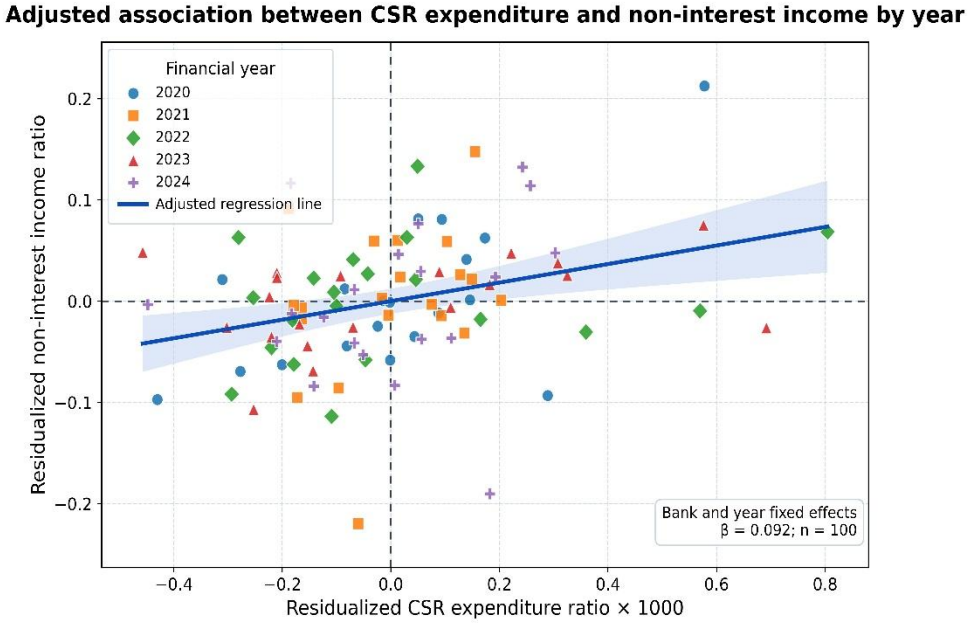


Figure 4. Added-variable plot showing the adjusted relationship between CSR expenditure and non-interest income after controls and fixed effects.

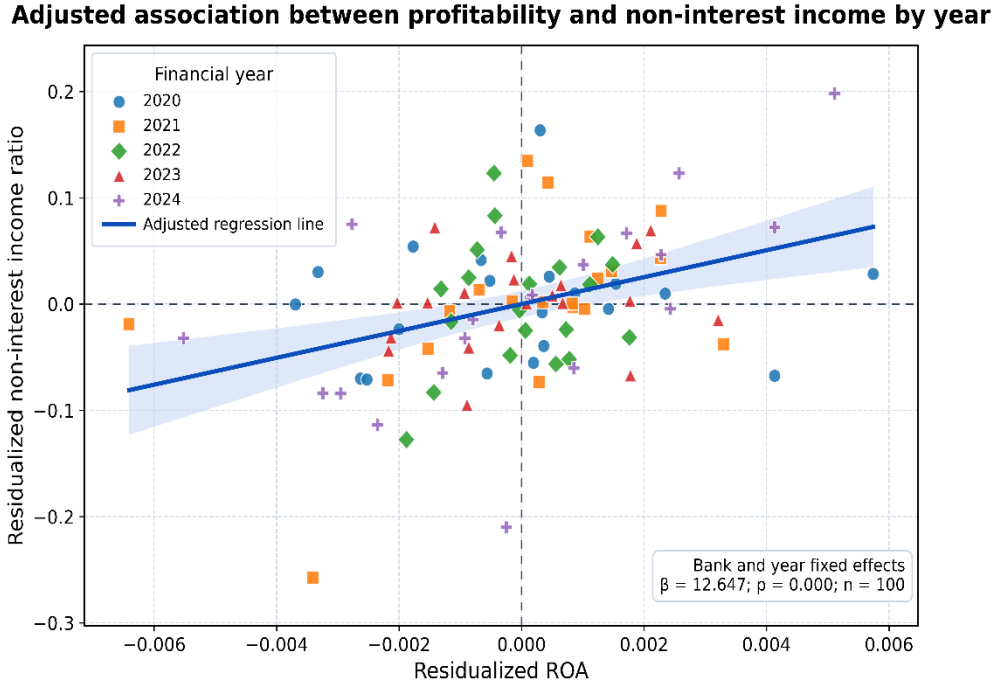


Figure 5. Added-variable plot showing the adjusted relationship between profitability and non-interest income after controls and fixed effects.

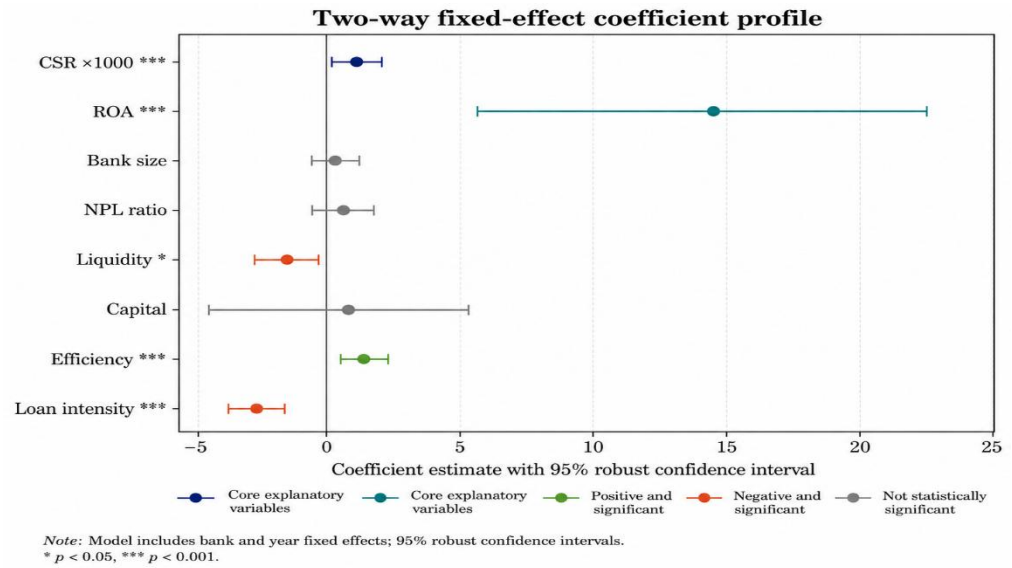


Figure 6. Coefficient plot from the two-way fixed-effect model. Intervals are 95% robust confidence intervals.

4.4 Hypothesis decision

Table 7. Hypothesis testing summary

Hypothesis	Empirical evidence	Decision
H1: CSR expenditure has a positive significant effect on non-interest income.	CSR_1000 is positive and significant in Model 1 and Model 2.	Supported
H2: Profitability has a positive significant effect on non-interest income.	ROA is positive and significant in Model 1 and Model 2.	Supported

5. Discussion

The results reveal that CSR expenditure is linked to an increase in non-interest income for banks in Bangladesh. Just because it is called CSR doesn't mean it automatically generates income. Instead, it would seem that CSR can be leveraged to build reputation, customer trust, stakeholder legitimacy, and broader customer engagement. These mechanisms are highly applicable in banking, as customers purchase financial products from institutions they trust to be reliable and legitimate. CSR activities can thus contribute to building the relational foundation for income generation through fees and services.

The positive ROA result is also theoretically consistent. More successful banks are better equipped in terms of capital and management to invest in technology, service platforms, branches and e-channels, trade finance, remittance services, cards, and other commission-based products. Profitability, then, can be a means of a capability condition for the production of non-interest income. This further reinforces the notion that income diversification is a strategic option and a capacity-based result.

It is important to note that bank size was not considered an important factor in the preferred model. Size is not necessarily a distinguishing factor in non-interest income performance, as larger banks might be more asset-rich and extensive, but not necessarily more profitable in the other areas of bank performance. Instead, operational capability, the quality of customer relationships, the legitimacy of CSR, and profitability may be more important than asset size. The negative liquidity coefficient also implies that an increase in liquid asset holdings may reduce the deployment of income-generating assets and/or indicate a conservative asset allocation. This reading, however, should be taken with a grain of salt.

The study findings corroborate earlier research on the CSR-financial performance link, in that CSR may relate to income structure as well as direct profitability. It is significant for banking research, as it reflects income from customer services and the results of income diversification. The results thus take CSR banking research one step further, specifically to a more detailed performance channel.

6. Theoretical and Practical Implications

6.1 Theoretical implications

As far as theory is concerned, the study contributes to perspectives on stakeholders and legitimacy by demonstrating that CSR expenditure can be associated with one revenue outcome, namely non-interest income. The finding suggests that CSR can be considered an intangible investment that supports the customer's reputation and service income. This casts the literature in a new light, shifting from a CSR-versus-profit debate to an income-diversification framework for CSR.

6.2 Managerial implications

The findings of this study indicate that CSR spending should be viewed not just as a compliance or philanthropic cost for bank managers. If CSR is believable and transparent, and it resonates with stakeholders' needs, it can help build customer trust and drive service adaptation. To enhance this effect, banks can further integrate CSR communication with financial inclusion, digital access, SME support, education, health, and community development programs.

6.3 Policy implications

Regulators and policymakers have shown that the quality and comparability of CSR disclosures are important. When reporting on CSR expenditures, it would be beneficial to have consistent measurement to validate research and hold the market accountable. More disclosure will also help separate real CSR spending from general donation or promotional spending, thereby enhancing the credibility of responsible banking practices.

7. Limitations and Future research.

There are several limitations to this study. The sample has 100 observations over 5 years. The panel is balanced but would benefit from a longer time span to increase statistical power and enable dynamic modelling. Second, CSR expenditure is measured through reported CSR or donation-related lines (if necessary). Further investigation should be conducted, and CSR categories should be broken down into education, health, environment, disaster relief,

financial inclusion, and community development. Third, non-interest income is expressed as a percentage of OI. Other dependent variables can be used in future research, such as non-interest income, total assets, or all fee and commission income.

Another limitation is the possibility of disclosure-related bias in CSR measurement. Banks may differ in how they report CSR, donations, social contributions, or promotional social activities in annual reports. Therefore, the findings should be interpreted as evidence based on reported CSR expenditure rather than direct evidence of the actual social effectiveness or quality of CSR activities.

In addition, future research should explore lagged CSR effects, endogeneity, and causal pathways. If more power comes from the data, it is possible to use more powerful identification strategies such as dynamic-panel GMM, instrumental-variables approaches, or difference-in-differences designs. A comparative evaluation of the CSR-income diversification nexus across different banking sectors in South Asia would also help identify whether the nexus can be extrapolated to other emerging banking markets.

Future studies may adopt a mixed-method approach by combining panel-data analysis with interviews or surveys of bank managers, customers, and CSR officers. Such qualitative evidence could explain how CSR activities build reputation, customer trust, stakeholder legitimacy, and customer engagement, which may later support fee-based and service-based income.

8. Conclusion

This study aimed to examine the impact of CSR spending and profitability on the NII of Bangladesh's banking sector. Based on the results of the study, CSR spending has a positive and statistically significant influence on the non-interest income ratio, as shown using a balanced panel of 20 banks from 2020-2024 and a fixed-effects panel regression. Profitability (ROA) also has a positive and significant effect on this relationship. These findings are robust to estimating a preferred two-way fixed-effect model, which shows that these relationships persist even when accounting for bank-specific differences and year-specific shocks. The results suggest that CSR spending can help banks implement income diversification through reputation and stakeholder linkages, and that profitability enhances banks' ability to expand their service-based income channels. The study thus demonstrates that responsible banking expenditure is associated not only with a bank's social image or accounting profitability but also with its income structure, thereby adding to the banking and CSR literature.

Declarations

Data availability statement

The empirical dataset used for this manuscript is based on the supplied workbook titled Analysis_Data. The workbook contains the Regression Data sheet, the source log, the variable codebook, and the model setup information. The high-resolution figures and analysis tables are supplied as separate supporting files.

Conflict of interest statement
The authors declare no conflict of interest.

Funding statement
No specific funding was reported for this study.

Ethics statement
This study uses secondary bank-level financial statement data and does not involve human participants or animal subjects.

Author contributions
Md. Ashraful Alam: conceptualization, data preparation, methodology, analysis, writing, and revision. Sunil Kumar Vohra: supervision, conceptual guidance, review, and editing. The authors should finalize author contribution details before submission.

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