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Determinants of Profitability: Empirical Evidence from the Bangladeshi Banking Sector

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Abstract
This paper, unique in its focus on the Bangladeshi banking sector, examines the relationship between profitability and both bank-specific and macroeconomic variables by analyzing archival data from 2012 to 2021. The Fixed Effect Model is employed for regression estimation. We have used ROA, ROE, and NIM to assess bank profitability. The study finds that non-interest income (NIITA), capital adequacy (CRAR), interest rate spread (SPREAD), and the advance-to-deposit ratio (ADR) positively influence profitability. In contrast, the non-performing loan ratio (NPLTL) and the loan loss provision ratio (LLPTL) negatively impact profitability. Additionally, net non-interest income (NNIITA) and bank size (SIZE) have significant effects on profitability. Various stakeholders in the banking sector—including regulators, policymakers, investors, bank managers, and other interested parties—can benefit substantially from the findings of this study to enhance the performance of the banking sector in emerging economies.

Keywords: Profitability, Banks, Fixed Effect Model, Bangladesh.

1. Introduction

In this study, we aim to model bank profitability as a function of several relevant factors related to both bank-specific and macroeconomic variables. In examining profitability within the Bangladeshi banking sector, we focus on variables associated with ROA, ROE, and NIM. Our primary interest lies in assessing the impact of earnings, capitalization, liquidity, asset quality, industry efficiency, management efficiency, asset structure, industry dynamics, inflation, economic growth, and exchange rate—while controlling for other relevant factors that may also contribute to bank profitability.

Following the 1971 War of Independence, Bangladesh adopted a liberalization policy in the 1980s. Since then, the country has experienced consistent growth in its banking industry. Domestic private banks began to expand, and foreign commercial banks increased their presence in the country. Export, import, and total investment are correlated with GDP growth in Bangladesh (Alam et al., 2021). Therefore, these banks placed a strong emphasis on financial inclusion, introducing a diverse range of products and services. An efficient financial system is often reflected in increased profitability, greater fund mobilization, and improved service quality (Sufian & Habibullah, 2009). The expansion of the banking sector began to significantly influence profitability.

The banking industry in Bangladesh plays a critical role in the national economy. The country's economic stability and development are closely tied to the performance of its banks. Banking assets constitute more than 60 percent of the total financial system, and banking assets as a share of GDP stand at approximately 71 percent (Matin, 2017). In Bangladesh, banks serve as the primary source of lending and play a leading role in financial intermediation. For borrowers, banks function as a bridge by securing the financial channel between parties, enabling uninterrupted financial intermediation and fostering economic growth. Thus, banks serve as intermediaries that support societal advancement by providing funds at relatively lower costs. An efficient financial system can enhance profitability and act as a catalyst for delivering high-quality banking services.

Although the COVID-19 crisis disrupted the growth of the banking industry, Bangladesh Bank implemented several policies through various circulars to stabilize the financial system and restore public confidence in the banking sector.

To conduct a detailed investigation, this article empirically examines the impact of bank-specific and macroeconomic variables on the profitability of DSE-listed Bangladeshi banks. As the profits of some banks have fluctuated over time, this raises interest in identifying the key factors influencing profitability in Bangladesh's banking sector. To the best of our knowledge, this study represents a pioneering effort to analyze bank performance in an emerging economy like Bangladesh. We expect the findings of this research to be valuable for regulatory authorities, policymakers, bank management, investors, and other stakeholders.

The remainder of this paper is organized as follows. Section 2 reviews the existing literature on the determinants of bank profitability. Section 3 presents the materials and methods, including data, variables, and the econometric model. Section 4 discusses the results and key findings. Finally, Section 5 provides conclusions and outlines managerial implications.

2. Literature Review

We have organized the literature into distinct sections to provide a clearer understanding of the various components that influence bank profitability. Some research studies focus exclusively on bank-specific variables, while others examine external factors, including industry-specific and macroeconomic variables. Among these, both single-country and multi-country data are commonly used. Typically, researchers review the literature by considering factors such as economic context, geographic location, study period, and more. In this study, we categorize the existing literature based on geography, approaching it from three distinct perspectives as outlined below:

Single-Country Studies

Bank-specific and macroeconomic determinants are widely examined in single-country studies. Prior research conducted by Bhatia et al. (2012) and Sufian and Noor (2012) in India; Liu and Wilson (2010) in Japan; Shoaib et al. (2015) in Pakistan; Sufian and Chong (2008) in the Philippines; Macit (2012), Alper and Anbar (2011), and Alp et al. (2010) in Turkey; Kosmidou et al. (2005) and Sufian (2011) in Korea; and Saeed (2014) in the United Kingdom has found significant effects of bank-specific variables on bank performance.

For example, a study based on 251 Korean banks covering the period from 1992 to 2003 found that liquidity had a negative relationship with profitability, while non-interest income had a positive impact (Sufian, 2011). Similarly, Goddard et al. (2004) observed that banks with higher liquidity tend to have lower profitability. Loans and advances outstanding to total assets, the non-interest or operating expenditures ratio, and the deposit-to-asset ratio have been identified as significant determinants of bank performance (Al-Jarrah et al., 2010).

Empirical results based on all scheduled Pakistani banks from 2006 to 2013, using the Pooled Ordinary Least Squares (POLS) method, indicate that bank performance is negatively affected by liquidity, non-performing loans, and administrative expenses, while capital adequacy has a positive effect (Shoaib et al., 2015). Similarly, Alp et al. (2010) found that an increase in operating expenses reduces the profitability of Turkish banks. However, they also reported no statistically significant relationship between the ratio of total loans and receivables to total assets and bank profitability.

Macit (2012), in a study on Turkish banks covering the period 2005–2010, concluded that the equity-to-total-assets ratio positively influences profitability, while the ratio of non-performing loans to total outstanding loans, as well as advances, shows a negative relationship.

Gul et al. (2011), using POLS for the top 15 Pakistani commercial banks from 2005 to 2009, asserted that assets, loans and advances, equity, and deposits all have a positive influence on three key profitability indicators—ROA, ROE, and NIM.

A study by Growe et al. (2014), conducted on U.S. banks from 1994 to 2011 using the Generalized Method of Moments (GMM), concluded that the level of non-performing assets is negatively associated with all measures of profitability. Furthermore, they found that the volume of deposits has an insignificant effect on profitability, while a higher level of non-performing loans substantially reduces profitability. In contrast, the capital adequacy ratio was found to have a significant and positive effect on profitability (Acaravci & Calim, 2013). Hassan and Bashir (2003) also noted that increasing capital positively impacts bank profitability.

A study based on U.K.-owned commercial banks from 1995 to 2002 found that capital strength and efficiency in managing expenses have a positive effect on performance (Kosmidou et al., 2005). However, other studies by Kosmidou (2006) and Pasiouras et al. (2006) demonstrated that liquidity has a negative effect on bank performance.

Saeed (2014) claimed that the capital ratio, loan outstanding, volume of deposits, liquidity, and interest rate positively affect both ROA and ROE. In the Philippines, Sufian and Chong (2008), analyzing the period from 1990 to 2005, concluded that operating expenses are negatively related to ROA and ROE, while capital and non-interest income positively influence bank performance.

Using the Backward Stepwise Regression model, Bhatia et al. (2012) studied 23 private Indian banks from 2006–07 to 2009–10 and found that the advance-to-deposit ratio (ADR), capital adequacy ratio (CRAR), and non-interest income directly influence ROA. In another study of the

Indian banking sector from 2000 to 2008, Sufian and Noor (2012) found that liquidity and operating expenses significantly impact profitability.

Ali and Puah (2018), employing panel regression on 24 Pakistani commercial banks from 2007 to 2015, concluded that bank size significantly influences profitability. However, they also documented a statistically insignificant impact of liquidity risk on profitability measures.

Kawshala and Panditharathna (2017) conducted a study on 12 Sri Lankan commercial banks using panel data, which revealed that the capital ratio, deposit ratio, and similar indicators have a significant and positive relationship with bank profitability, whereas liquidity negatively affects bank performance. Using panel data for Vietnamese banks, Batten and Xuan (2019) found that variables such as bank size, risk, expenses, and the capital adequacy ratio have a substantial impact on profitability. However, industry-related factors and macroeconomic variables negatively influence a bank's profitability measures.

Rani and Zergaw (2017) observed a negative effect of internal and industry-related variables on profitability in Ethiopian banks. In contrast, macroeconomic variables showed a positive, though statistically insignificant, association with the net profit margin, using multiple regression models. Similarly, a study conducted in Nigeria using the system GMM approach found that cost-efficiency is a strong determinant of profitability in developing countries (Bolarinwa et al., 2019).

Hasanov et al. (2018), in a study on Azerbaijani banks using GMM, concluded that both internal and external variables—such as bank size, assets, liabilities, oil prices, and inflation—positively influence profitability. Conversely, factors such as exchange rate deflation, deposit levels, and liquidity-related risks negatively impact bank performance.

A study on Turkish banks, using panel data from 2005 to 2015, found that bank-specific determinants such as net interest margin and commissions significantly and positively affect ROA and ROE. On the other hand, non-performing loans (NPL), operating expenses, and the capital adequacy ratio have a negative impact on profitability measures (Topak & Talu, 2017). Another study on 23 Turkish banks using the panel regression method demonstrated that bank size, capital, inflation rate, and exchange rate significantly affect bank profitability. However, the degree of influence varies between listed and non-listed banks (Belke & Unal, 2017).

Based on Indonesian banks, Hasan et al. (2020), using the panel data model, concluded that net interest margin, capital adequacy ratio, and the advance-to-deposit ratio have a significant impact on ROE (Hasan et al., 2020).

Multi-Country Studies

A study conducted by Sahyouni and Wang (2018), based on data from 11 developed and emerging nations between 2011 and 2015 using the fixed effect model, found that the capital adequacy ratio and bank size have a positive association with bank profitability. In contrast, banks with higher liquidity tend to experience lower profitability.

Another study, examining empirical evidence from 78 commercial banks across Argentina, Brazil, Chile, Colombia, Mexico, Paraguay, Peru, and Venezuela from 1995 to 2010, also found a positive relationship between the capital adequacy ratio and bank profitability (Mauricio et al., 2014).

Similarly, a panel data study conducted by Demirguc-Kunt and Huizinga (1999) concluded that banks maintaining higher levels of capital tend to perform better. Furthermore, the study noted that in European banks, higher capital preservation can be a key factor contributing to superior

performance (Goaied, 2008; Pasiouras & Kosmidou, 2006; Dietrich & Wanzenried, 2011; Obamuyi, 2013; Garcia-Herrero et al., 2009; Menicucci & Paolucci, 2016). According to Boateng (2018), capital adequacy ratio and bank size had a statistically significant impact on the ROA of 10 Indian and 10 Ghanaian banks.

Bangladesh Studies

An empirical study on 47 Bangladeshi commercial banks from 2010 to 2015, using the Feasible Generalized Least Squares (FGLS) model, indicated that non-performing loans (NPL), loan loss provisions, and bank size had a negative impact on ROA. In contrast, non-interest income had a positive effect on both ROA and NIM. However, loan loss provisions negatively influenced ROE as well (Matin, 2017).

Using data from 10 Bangladeshi private commercial banks and all state-owned commercial banks between 2008 and 2014, Yesmine and Bhuiyah (2015) found that asset utilization and operating efficiency had a significant positive effect on profitability, while credit risk had a significant negative impact. However, bank size and liquidity showed an insignificant relationship with performance.

Based on an analysis of 15 Bangladeshi private banks, Islam and Rana (2017) reported a strong negative impact of operating expenses and NPL on profitability using a panel data approach. Similarly, Mahmud et al. (2016) found that bank size, operating expenses, and gearing ratio were negatively associated with profitability indicators.

Rahman et al. (2015), using panel data from 2006 to 2013 and applying the Generalized Method of Moments (GMM), asserted that capital and loan intensity positively influenced bank performance, whereas cost efficiency and off-balance sheet activities had a negative impact.

Hossain and Ahamed (2015) stated that bank earnings, capital strength, and size significantly influenced profitability. In another study using data from 1997 to 2004 and applying both the Least Squares and Fixed Effect models, Sufian and Habibullah (2009) found that bank size and inflation were negatively correlated with profitability.

Abdullah et al. (2014), in their empirical study of 26 DSE-listed banks from 2008 to 2011, reported a negative relationship between credit risk and ROA, while the relationship with NIM was positive. Inflation was found to be statistically significant in relation to NIM, but not with ROA.

A study on five selected private commercial banks listed on both the DSE and CSE from 2008 to 2012 concluded that operational efficiency, credit risk, asset quality, and bank size had statistically significant effects on profitability (Al Karim & Alam, 2013).

Finally, Hossain and Ahamed (2021), using the POLS method for 23 Bangladeshi banks from 2005 to 2009, found that non-interest income, capital ratio, GDP growth, market share, bank size, and real exchange rates had significant relationships with profitability measures.

3. Materials and Method

Data

In this study, we examine the relationship between profitability and both bank-specific and macroeconomic variables using empirical data from Dhaka Stock Exchange (DSE)-listed banks in Bangladesh. Currently, Bangladesh has 61 banking institutions, of which 36 are listed on the DSE. Our analysis spans a ten-year period from 2012 to 2021. Among the listed banks, six were established after 2012 and therefore do not have a complete dataset for the entire study period.

Additionally, one bank exhibited data inconsistency and heterogeneity compared to the rest of the sample. As a result, these seven banks were excluded from our analysis.

Ultimately, our study includes 29 DSE-listed banks that have consistent and complete data from 2012 to 2021. The names of these selected banks are presented in **Table 1**.

The bank-specific data were collected from publicly available annual reports, which are considered the most comprehensive and reliable sources of financial information in the Bangladeshi banking sector. Data on macroeconomic variables were obtained from official statistical publications of the Bangladesh Bureau of Statistics (BBS), Bangladesh Bank (BB), and the Ministry of Finance.

Table 1: List of Sample Banks

Serial No.	Banks
1	AB Bank PLC
2	Al-Arafah Islami Bank PLC
3	Bank Asia PLC
4	BRAC Bank PLC
5	City Bank PLC
6	Dhaka Bank PLC
7	Dutch Bangla Bank PLC
8	Eastern Bank PLC
9	EXIM Bank Ltd.
10	First Security Islami Bank PLC
11	IFIC Bank PLC
12	Islami Bank Bangladesh PLC
13	Jamuna Bank PLC
14	Mercantile Bank PLC
15	Mutual Trust Bank PLC
16	National Bank Ltd.
17	NCC Bank PLC
18	One Bank PLC
19	Premier Bank PLC
20	Prime Bank PLC
21	Pubali Bank PLC
22	Rupali Bank PLC
23	Shahjalal Islami Bank PLC
24	Social Islami Bank PLC
25	Southeast Bank PLC
26	Standard Bank PLC
27	Trust Bank PLC
28	United Commercial Bank PLC
29	Uttara Bank PLC

Source(s): Authors

Econometric Model

To test the hypotheses in our study, we developed five models to analyze the balanced panel data using the Fixed Effects model for regression output. We used three profitability measures—ROA, ROE, and NIM—as the dependent variables in the regression analysis. To

examine the correlation between bank profitability and both bank-specific and macroeconomic factors, we constructed the following linear regression model:

$$Y_{ij} = \alpha + \beta_1 NIITA + \beta_2 NNIITA + \beta_3 OPEX + \beta_4 CRAR + \beta_5 NPLTL + \beta_6 LLPTL + \beta_7 SPREAD + \beta_8 ADR + \beta_9 SIZE + \beta_{10} INF + \beta_{11} GDP + \beta_{12} EXR + \beta_{13} Year + \mathcal{E}$$

Where Y_{ij} represents the profitability of the i_{th} bank in year j. For the banks, Y is the profitability indicator. The coefficients β_1,…,β_{13} represent the regression coefficients, and ϵ is the disturbance term.

We used R programming to generate summary statistics, the Pearson correlation matrix, and the Fixed Effects model for regression output. A list of all constructed variables, along with their hypothesized relationships, is provided in **Table 2**.

Table 2: Construction of Variables

Variables	Acronym	Measurement	Proxy	Hypothesized Relationship
Dependent Variables				
ROA	ROA	Net Profit/Total Asset		N/A
ROE	ROE	Net Profit/Total Equity	Profitability	N/A
NIM	NIM	Net Interest Margin/Total Asset		N/A
Independent Variables				
Bank-specific Variables				
NII Ratio	NIITA	Non-interest Income/Total Asset	Earning	+
NNII Ratio	NNIITA	Net Non-interest Income/Total Asset	Earning	+
OPEX Ratio	OPEX	Operating Expense/Total Asset	Management Efficiency	+/-
CRAR Ratio	CRAR	Capital/Risk Weighted Asset	Capitalization	+/-
NPL Ratio	NPLTL	Non-performing Loan/Total Loans	Asset Quality	+/-
Loan Loss Provision Ratio	LLPTL	Loan Loss Provision/Total Loans	Capital Risk	+/-
Interest Rate Spread	SPREAD	Average Lending Rate - Average Rate of Deposit	Industry Efficiency	+
Advance to Deposit Ratio	ADR	Total Loans and Advances/Total Deposit	Liquidity	+
Bank Size	SIZE	Natural Logarithm of Total Asset	Industry Impact	+/-
Macroeconomic Variables				
Inflation Rate	INF	Inflation Rate	Inflation	+/-
GDP Growth Rate	GDP	GDP Growth Rate	Economic Growth	+/-
Exchange Rate	EXR	Exchange Rate	Real Exchange Rate	+/-

Source(s): Authors

Dependent Variables

Prior research has expressed ROA, ROE, and NIM as functions of the determinants of profitability for banking institutions.

ROA measures the profit relative to assets, indicating how effectively a bank uses its assets to generate profit. It is commonly used to assess a bank's operational effectiveness, competence, managerial skill, and efficiency.

ROE represents income relative to equity, showing how efficiently management uses shareholders' equity to generate profit. ROE emphasizes the optimal use of invested funds to achieve growth. It tends to be higher for banks due to their high leverage, as financial leverage is often not considered in the calculation.

NIM is the ratio of a bank's net interest income to its total assets. It measures profitability in relation to both depositors' and shareholders' funds. Net interest income is calculated by subtracting total interest expenditures from total interest revenue.

Independent Variables

This study examines two distinct types of independent variables that independently influence bank profitability: bank-specific and macroeconomic variables. Bank-specific indicators are influenced by the managerial decisions of the bank itself, while macroeconomic indicators are shaped by government policies, regulatory bodies, and other external factors that significantly impact the entire sector.

Bank-Specific Variables

Non-interest income (NIITA) ratio and net non-interest income (NNIITA) ratio serve as proxy variables for earnings. Sources of non-interest income include investment income, bank guarantee income, foreign exchange profits, service charges, brokerage commissions, and capital gains. NNIITA is calculated by deducting non-interest expenses from non-interest income and dividing the result by the average earning assets.

The operating expense (OPEX) ratio is a proxy for management efficiency, reflecting how effectively a bank's management operates its activities. A lower operating expense is desirable, as it directly impacts profitability. Capital serves as a buffer, essential for maintaining the soundness of a bank's operations. The Capital to Risk-Weighted Assets (CRAR) ratio represents capitalization. This is why Bangladesh Bank (BB) adopted and revised Basel III standards, setting the minimum capital requirement for banks at 12.5 percent of risk-weighted assets (including a 2.5 percent conservatism buffer), or BDT 5,000 million, whichever is greater. Previously, the minimum was 10 percent of risk-weighted assets or BDT 4,000 million, whichever was greater.

The advance to deposit (ADR) ratio measures liquidity. Since financial institutions primarily earn income through loans and advances, which are less liquid than other assets, a higher ADR indicates lower liquidity. Longer-term loans and advances result in reduced liquidity. The non-performing loan (NPLTL) ratio reflects the quality of assets by indicating the amount of unpaid loans, which result in losses for banks. To maintain stability, banks must set aside provisions from their earnings against non-performing loans.

The interest rate spread (SPREAD) is a proxy for industry efficiency. A large interest rate spread suggests inefficiency, lack of competition, and underdevelopment in a nation's financial system. Banks generally fund their operations through deposits, which are closely tied to their financial performance. Bank size (SIZE), measured by total assets, represents industry impact, which is crucial for financial performance. Larger banks benefit from economies of scale, enabling more profitable activities such as investments, lending, and financing projects at lower

costs. They can also diversify their loan portfolios, reducing credit risk.

Macroeconomic Variables

Inflation (INF) refers to the rise in the cost of goods and services over a specific period, which can impact the elements involved in the production process. As inflation drives up business costs, it negatively affects profitability. The GDP growth rate measures how quickly an economy is expanding over a certain period. Positive changes in the growth rate indicate economic development and efficiency. The exchange rate (EXR) represents the weighted average value of a nation's currency relative to a basket of other major currencies. The real effective exchange rate accounts for inflation, providing a more accurate measure of currency value in the global market.

Table 3: Summary Statistics

Variable	Observation	Mean	SD	Min	Max	Range	SE
ROA	290	0.88	0.43	-0.1	2.75	2.85	0.03
ROE	290	11.13	4.41	-2.58	23.4	25.98	0.26
NIM	290	2.29	0.99	-0.62	5.02	5.64	0.06
NIITA	290	2.14	0.92	-0.58	4.56	5.14	0.05
NNIITA	290	0.05	0.8	-1.8	2.22	4.02	0.05
OPEX	290	2.14	0.77	0.15	5.09	4.94	0.04
CRAR	290	12.65	1.82	5.56	17.93	12.37	0.11
NPLTL	290	5.69	3.72	1.63	33.07	31.44	0.22
LLPTL	290	3.74	1.71	1.22	15.33	14.11	0.1
SPREAD	290	4.68	1.38	0.05	9.75	9.7	0.08
ADR	290	82.15	7.18	56.15	97.49	41.34	0.42
SIZE	290	11.4	0.22	10.91	12.21	1.3	0.01
INF	290	6.04	0.66	5.5	7.5	2	0.04
GDP	290	6.64	1.25	3.5	8.2	4.7	0.07
EXR	290	81.47	3.08	77.75	85.8	8.05	0.18

Source(s): Authors

4. Results and Discussion

Table 3 presents the summary statistics for all dependent and independent variables, including control variables. The mean values for the three profitability indicators—Return on Assets (ROA), Return on Equity (ROE), and Net Interest Margin (NIM)—are 0.88%, 11.13%, and 2.29%, respectively. The standard deviation (SD) of ROE is 4.41, which is higher than the SD of ROA (0.43) and NIM (0.99). This indicates that ROA and NIM show minor variation across banks, whereas ROE varies significantly from bank to bank. Among the bank-specific variables, the mean Capital to Risk-Weighted Assets Ratio (CRAR) is 12.65%, which exceeds the minimum threshold of 12.5% mandated in Bangladesh under the Basel requirement. The maximum CRAR is 17.93%, while the minimum is 5.56%. The average Non-Performing Loan Ratio (NPLTL) is 5.69%, with a range of 31.44%. The mean Advance to Deposit Ratio (ADR) is 82.15%, with a standard deviation of 7.18. The ADR ranges from a minimum of 56.15% to a maximum of 95.49%. Regarding

macroeconomic variables, Table 3 shows that inflation (INF) and the exchange rate (EXR) fluctuate slightly less than the Gross Domestic Product (GDP).

Table 4 displays the correlation matrix, which indicates the strength of association among variables. According to Kennedy (2008), multicollinearity becomes problematic when correlations exceed 0.80. We did not find any severe multicollinearity issues in our data. The matrix shows that NIITA, NNIITA, OPEX, CRAR, SPREAD, ADR, INF, and GDP are positively associated with ROA, whereas NPLTL, LLPTL, SIZE, and EXR are negatively correlated with ROA. ROE shows positive correlations with NIITA, OPEX, CRAR, SPREAD, ADR, INF, and GDP, but is negatively associated with NNIITA, NPLTL, LLPTL, SIZE, and EXR. Finally, NIM is positively correlated with NIITA, OPEX, CRAR, SPREAD, ADR, INF, and GDP. On the other hand, NIM is negatively affected by NNIITA, NPLTL, LLPTL, SIZE, and EXR. In summary, the correlation matrix indicates that non-interest income (NIITA), management efficiency (OPEX), capital strength (CRAR), industry efficiency (SPREAD), and liquidity (ADR) positively influence bank profitability. However, asset quality (NPLTL), capital risk (LLPTL), bank size (SIZE), and the real exchange rate (EXR) negatively affect bank profitability.

Table 4: Correlations of the Variables

	OA	OE	IM	IITA	NIITA	PEX	RAR	PLTL	LPTL	PREAD	DR	IZE	NF	DP	XR
OA															
OE	.795														
IM	.550	.573													
IITA	.542	.568	.997												
NIITA	.001	0.162	0.673	0.680											
PEX	.261	.265	.476	.488	0.376										
RAR	.164	.236	.223	.243	0.136	.083									
PLTL	0.381	0.514	0.391	0.388	.142	0.086	0.390								
LPTL	0.378	0.427	0.395	0.388	.208	0.026	0.167	.575							
PREAD	.405	.363	.479	.472	0.100	.636	0.072	0.138	0.168						
DR	.109	.127	.279	.281	0.200	0.346	.185	0.281	0.318	0.273					
IZE	0.374	0.264	0.154	0.140	0.176	0.169	.252	.099	.296	0.474	.139				
NF	.238	.120	.084	.079	.192	.115	0.284	0.085	0.172	.424	0.246	0.522			
DP	.010	.044	.166	.168	0.104	0.023	0.035	.120	0.017	.081	.187	.052	0.311		
XR	0.345	0.183	0.162	0.148	0.188	0.150	.419	.080	.255	0.539	.163	.629	0.723	.124	

Source(s): Authors

The importance of bank profitability and the strategies for growth are expected to gain greater relevance as we move into a new era of deregulation and re-regulation (Cyree et al., 1999). In this study, three endogenous variables—ROA, ROE, and NIM—have been constructed as proxy indicators to measure bank profitability. These three variables serve as performance metrics for evaluating the financial health of banking institutions. A substantial portion of the variability in both bank-specific and macroeconomic factors is explained by the models, as reflected in the values of R-squared and adjusted R-squared.

Table 5 presents the regression output of the fixed effect model, with Return on Assets (ROA) as the dependent variable. The study estimates all five models using this regression framework, maintaining ROA as the consistent dependent variable across all models. The estimation of parameters follows a well-established statistical procedure. Based on this method, the study derives coefficients for each independent variable across the five models. In **Model 1**,

the results show a positive and significant coefficient for NIITA (β = 0.293, $p < 0.01$), indicating that NIITA has a significantly positive impact on bank profitability. Conversely, the model reveals a negative and significant coefficient for NPLTL (β = -0.024, $p < 0.01$), suggesting that poor asset quality adversely affects bank growth in Bangladesh. In **Model 2**, the results indicate a significantly positive coefficient for NNIITA (β = 0.132, $p < 0.05$). Additionally, SPREAD (β = 0.085, $p < 0.05$) and ADR (β = 0.010, $p < 0.05$) also show positive and significant relationships with ROA. **Model 3** finds a positive and significant coefficient for NIITA (β = 0.245, $p < 0.01$), along with negative and significant coefficients for NPLTL (β = -0.018, $p < 0.05$) and LLPTL (β = -0.056, $p < 0.01$), indicating adverse effects from non-performing loans and loan loss provisions. In **Model 4**, both bank-specific variables—NIITA (β = 0.485, $p < 0.01$) and NNIITA (β = 0.405, $p < 0.01$)—show positive and significant coefficients. However, the model also reports a negative and significant coefficient for SIZE (β = -0.779, $p < 0.1$), indicating that larger banks may experience diminished profitability. Finally, **Model 5**, a random effect model, finds positive and significant coefficients for NNIITA (β = 0.152, $p < 0.01$), SPREAD (β = 0.073, $p < 0.05$), and ADR (β = 0.010, $p < 0.05$). On the other hand, it identifies negative and significant coefficients for the bank-specific variable LLPTL (β = -0.073, $p < 0.05$) and the control variable SIZE (β = -1.042, $p < 0.1$).

Table 5: Fixed Effect Model in R (DV: ROA)

	Dependent Variable = ROA				
	Model-1	**Model-2**	**Model-3**	**Model-4**	**Model-5**
NIITA	0.239***		0.245***	0.485***	
	(0.042)		(0.041)	(0.044)	
NNIITA		0.132**		0.405***	0.152***
		(0.055)		(0.052)	(0.045)
OPEX		-0.024		-0.031	
		(0.064)		(0.052)	
CRAR	0.025				0.023
	(0.017)				(0.018)
NPLTL	-0.024***		-0.018**		
	(0.008)		(0.008)		
LLPTL			-0.056***		-0.073***
			(0.019)		(0.020)
SPREAD	0.007	0.085**	0.021	0.009	0.073**
	(0.033)	(0.035)	(0.032)	(0.030)	(0.034)
ADR	-0.001	0.010**	-0.002	-0.006	0.010**
	(0.005)	(0.005)	(0.005)	(0.004)	(0.005)
SIZE	0.363	-0.725	0.114	-0.779*	-1.042*
	(0.478)	(0.535)	(0.472)	(0.439)	(0.534)
Year	Yes	Yes	Yes	Yes	Yes
Observations	290	290	290	290	290
R^2	0.372	0.266	0.388	0.508	0.316
$Adjusted\ R^2$	0.263	0.141	0.281	0.422	0.196
F Statistic	9.725***	6.383***	10.394***	16.933***	7.573***
df	(15; 246)	(14; 247)	(15; 246)	(15; 246)	(15; 246)

Note: *p<0.1; **p<0.05; ***p<0.01
Source(s): Authors

Table 6 presents the regression results of the fixed effect model with Return on Equity (ROE) as the dependent variable. The study estimates all five models using this approach, with ROE consistently used as the dependent variable across all models. Using the fixed effect estimation method, the study obtains the coefficients for each independent variable within the five models. In **Model 1**, the results show a significantly positive coefficient for NIITA ($\beta = 2.632$, $p < 0.01$), suggesting that generating non-interest income is a valuable and effective means for banks to enhance profitability. Additionally, the bank-specific variable SIZE ($\beta = 16.288$, $p < 0.01$) is positively and significantly associated with ROE, indicating that larger banks tend to be more profitable. In contrast, the control variable NPLTL ($\beta = -0.260$, $p < 0.01$) exhibits a significantly negative relationship, implying that poor asset quality adversely affects profitability. In **Model 2**, the regression results indicate significantly positive coefficients for NNIITA ($\beta = 1.519$, $p < 0.01$), SPREAD ($\beta = 1.282$, $p < 0.01$), and ADR ($\beta = 0.130$, $p < 0.01$), highlighting the positive influence of these factors on equity returns. **Model 3** finds significantly positive relationships with NIITA ($\beta = 2.675$, $p < 0.01$), SPREAD ($\beta = 0.668$, $p < 0.01$), and SIZE ($\beta = 14.380$, $p < 0.01$). However, it also shows significantly negative coefficients for NPLTL ($\beta = -0.213$, $p < 0.05$) and LLPTL ($\beta = -0.446$, $p < 0.05$), further underscoring the detrimental impact of asset quality and capital risk on profitability. In **Model 4**, both bank-specific variables—NIITA ($\beta = 5.097$, $p < 0.01$) and NNIITA ($\beta = 4.395$, $p < 0.01$)—demonstrate positive and statistically significant associations with ROE. Finally, **Model 5**, which applies a random effect model, finds significantly positive coefficients for NNIITA ($\beta = 1.371$, $p < 0.01$), SPREAD ($\beta = 1.261$, $p < 0.01$), and ADR ($\beta = 0.118$, $p < 0.05$). Conversely, LLPTL ($\beta = -0.643$, $p < 0.01$) shows a significantly negative effect, emphasizing the adverse role of capital risk in determining equity returns.

Table 6: Fixed Effect Model in R (DV: ROE)

	Dependent Variable = ROE				
	Model-1	**Model-2**	**Model-3**	**Model-4**	**Model-5**
NIITA	2.632***		2.675***	5.097***	
	(0.432)		(0.429)	(0.459)	
NNIITA		1.519***		4.395***	1.371***
		(0.580)		(0.541)	(0.476)
OPEX		0.467		0.388	
		(0.668)		(0.546)	
CRAR	0.176				0.197
	(0.175)				(0.187)
NPLTL	-0.260***		-0.213**		
	(0.080)		(0.082)		
LLPTL			-0.446**		-0.643***
			(0.201)		(0.208)
SPREAD	0.564	1.282***	0.668**	0.487	1.261***
	(0.345)	(0.368)	(0.337)	(0.309)	(0.360)
ADR	0.002	0.130***	-0.005	-0.033	0.118**
	(0.047)	(0.050)	(0.047)	(0.043)	(0.048)
SIZE	16.288***	5.693	14.380***	5.125	3.005
	(4.938)	(5.596)	(4.905)	(4.578)	(5.647)
Year	Yes	Yes	Yes	Yes	Yes
Observations	290	290	290	290	290
R^2	0.302	0.165	0.313	0.443	0.204
$Adjusted\ R^2$	0.180	0.023	0.193	0.346	0.065
F Statistic	7.108***	3.480***	7.480***	13.059***	4.196***
df	(15; 246)	(14; 247)	(15; 246)	(15; 246)	(15; 246)

Note: *p<0.1; **p<0.05; ***p<0.01
Source(s): Authors

Table 7 presents the regression results of the fixed effect model with Net Interest Margin (NIM) as the dependent variable. The study estimates all five models using this approach, consistently using NIM as the dependent variable across all models. The regression estimation of parameters follows an established statistical procedure, and coefficients for each independent variable are derived accordingly. In **Model 1**, the results reveal a positive and significant coefficient for the decision variable NIITA ($\beta = 1.073$, $p < 0.01$) and for the control variable SIZE ($\beta = 0.179$, $p < 0.10$), suggesting that both non-interest income and bank size contribute positively to NIM. However, the model also identifies a negative and significant coefficient for NPLTL ($\beta = -0.003$, $p < 0.10$), indicating that poor asset quality slightly reduces the bank's net interest margin. In **Model 2**, the regression output shows a negative and significant coefficient for NIITA ($\beta = -0.616$, $p < 0.01$), implying an adverse effect of non-interest income on NIM in this specification. On the other hand, positive and significant coefficients are observed for SPREAD ($\beta = 0.164$, $p < 0.10$) and ADR ($\beta = 0.033$, $p < 0.10$), indicating that a wider interest rate spread and higher advance-to-deposit ratio enhance the NIM. **Model 3** again finds positive and significant relationships for NIITA ($\beta = 1.073$, $p < 0.01$) and SIZE ($\beta = 0.181$, $p < 0.10$), reinforcing their beneficial impact on NIM. However, similar to Model 1, this model also identifies a negative and significant coefficient for NPLTL ($\beta = -0.003$, $p < 0.10$), reaffirming that deteriorating asset quality

weakens the bank's interest margin. In **Model 4**, both bank-specific variables—NIITA and NNIITA—are considered; however, only NIITA shows a positive and significant coefficient (β = 1.076, $p < 0.10$). Additionally, the model finds a significantly positive coefficient for the control variable SIZE (β = 0.214, $p < 0.10$). Finally, in **Model 5**, the random effect model reveals positive and significant coefficients for CRAR (β = 0.044, $p < 0.10$), SPREAD (β = 0.144, $p < 0.01$), and ADR (β = 0.033, $p < 0.01$). In contrast, a negative and significant coefficient is found for the decision variable NNIITA (β = -0.626, $p < 0.01$).

Table 7: Fixed Effect Model in R (DV: NIM)

	Dependent Variable = NIM				
	Model-1	**Model-2**	**Model-3**	**Model-4**	**Model-5**
NIITA	1.073***		1.073***	1.076***	
	(0.009)		(0.009)	(0.011)	
NNIITA		-0.616***		-0.008	-0.626***
		(0.072)		(0.013)	(0.060)
OPEX		-0.006		-0.022	
		(0.083)		(0.013)	
CRAR	-0.001				0.044*
	(0.004)				(0.023)
NPLTL	-0.003*		-0.003*		
	(0.002)		(0.002)		
LLPTL			-0.0001		0.022
			(0.004)		(0.026)
SPREAD	-0.008	0.164***	-0.008	-0.004	0.144***
	(0.008)	(0.045)	(0.007)	(0.008)	(0.045)
ADR	-0.001	0.033***	-0.001	-0.002	0.033***
	(0.001)	(0.006)	(0.001)	(0.001)	(0.006)
SIZE	0.179*	0.334	0.181*	0.214*	0.600
	(0.108)	(0.692)	(0.108)	(0.112)	(0.709)
Year	Yes	Yes	Yes	Yes	Yes
Observations	290	290	290	290	290
R^2	0.989	0.600	0.989	0.989	0.606
$Adjusted\ R^2$	0.988	0.532	0.988	0.988	0.537
F Statistic	1,544.953***	26.459***	1,544.634***	1,541.578***	25.223***
df	(15; 246)	(14; 247)	(15; 246)	(15; 246)	(15; 246)

Note: *p<0.1; **p<0.05; ***p<0.01
Source(s): Authors

For banks, non-interest income represents an additional revenue stream, which can be enhanced through efficient resource allocation to improve profitability. Operating expenses—such as branch or sub-branch expansion, recruitment, installation of ATM or CRM machines, and marketing or promotional activities—can increase costs but may also lead to income growth (Hossain & Ahamed, 2021). The OPEX ratio reflects managerial efficiency in generating higher profits at lower costs. Higher capital levels provide security to depositors and serve as a buffer against financial crises. However, excessive lending can reduce fund availability and heighten liquidity risk, thereby affecting both fund management and profitability. Diversifying the asset structure and investments helps mitigate risk, enhances resilience in adverse financial conditions,

and fosters growth opportunities. Additionally, a rise in loans and advances increases the likelihood of higher non-performing loans (NPLs) and loan-loss provisions. In essence, three critical factors that influence profitability are total outstanding loans, net present value, and loan-loss provisions. Large banks with greater market share often lead the market due to better access to liquidity, investment, and financing options. Although they face more complex regulations and constraints, which can hinder growth, these institutions generally manage to secure long-term deposits at lower rates and invest in well-diversified, lower-risk portfolios. This, in turn, helps reduce NPLs and capital requirements. Macroeconomic factors—such as inflation (INF), gross domestic product (GDP), and exchange rates (EXR)—can influence both supply and demand dynamics, thereby affecting bank performance. To ensure sustainable profitability, banks must adopt long-term strategies and policies that support enduring growth.

5. Conclusion and Managerial Implications

This paper investigates the relationship between bank-specific and macroeconomic variables and bank profitability using data from 29 DSE-listed banks in Bangladesh over the period 2012 to 2021. The fixed effect model was employed for the regression estimation, using ROA, ROE, and NIM as proxies for bank profitability in line with prior studies. The results indicate that non-interest income (NIITA), capital adequacy (CRAR), interest rate spread (SPREAD), and advance-to-deposit ratio (ADR) positively affect bank profitability. In contrast, profitability is negatively influenced by the non-performing loan ratio (NPLTL) and loan loss provision ratio (LLPTL). Additionally, net non-interest income (NNIITA) and bank size (SIZE) are found to have statistically significant impacts on financial performance.

In emerging economies like Bangladesh, competing on price is not a sustainable strategy for gaining a competitive advantage in the banking sector. Based on these empirical findings, policymakers and senior bank management should prioritize efficient fund allocation to diversify income sources—particularly by enhancing non-interest income—as this can substantially improve earnings and long-term profitability. Banks with more diversified revenue streams are likely to be more resilient and better regarded by depositors, investors, analysts, and regulators. Besides, profitable banks enjoy more autonomy and flexibility to be involved in diversified CSR activities with shareholders (Alam & Fourkan, 2025).

Larger banks tend to experience lower liquidity risk due to greater diversification in investment and financing options. However, new regulatory measures and policy constraints, while aimed at enhancing governance, may adversely impact financial performance. This underscores the importance of regulatory compliance strategies in sustaining profitability. Moreover, macroeconomic variables such as exchange rates, inflation, and GDP growth significantly influence supply and demand conditions, thereby affecting bank performance. The Bangladesh Bank (BB), as the central monetary authority, must implement effective macroeconomic policies—especially in managing real exchange rates—to control financial costs and promote sustainable bank growth.

Operational expenses—including branch expansion, staffing, ATM/CRM deployment, and marketing—can increase short-term costs while contributing to long-term revenue growth (Hossain & Ahamed, 2021). Thus, effective deposit management is essential for controlling operating expenses. Adequate capital reserves serve as a safety net for depositors and protect against financial instability. Conversely, excessive lending may strain available funds and heighten liquidity risks. Asset and investment diversification is key to mitigating risk and ensuring institutional resilience during adverse financial conditions, thereby enhancing growth

opportunities. Additionally, the volume of outstanding loans, the quality of assets (NPL), and the level of loan-loss provisions are critical indicators of bank profitability.

While this study offers a strong empirical foundation for understanding profitability drivers in the Bangladeshi banking sector, it is not without limitations. First, the research excludes non-listed banks, foreign commercial banks operating in Bangladesh, and banks established after 2012. Second, it focuses solely on quantitative factors, omitting qualitative dimensions that are essential for a holistic understanding of financial performance. Broader economic, political, and international dynamics, which also influence profitability, were not considered. Future research could expand the sample to include foreign and non-listed banks, as well as banks launched post-2012. Comparative studies between Islamic Shariah-based and conventional banks may also yield valuable insights. Moreover, inter- and intra-bank comparisons across different time periods could deepen our understanding. Finally, banks must address external threats such as non-performing assets, unsecured loans, and willful defaulters, which warrant further investigation in future studies.

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