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Factors Affecting Interest Rate Spread in the Banking Sector of Bangladesh

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ABSTRACT

Purpose: This paper examines the macroeconomic factors and bank-specific variables that affect the interest rate spread in the banking sector in Bangladesh using a two-step generalized method of moment estimation technique.

Methodology: Using panel data from 2013 to 2022, the study examines 30 scheduled banks, including four state-owned and 26 private commercial banks. A two-step Generalized Method of Moments (GMM) estimation technique is employed to analyze the impact of GDP growth rate, inflation, capital adequacy ratio, return on assets, bank size, and non-performing loan ratio on the interest rate spread.

Findings: The results reveal that bank size, return on assets, non-performing loan ratio, and GDP growth rate have a significant and positive effect on the interest rate spread. In contrast, capital adequacy ratio and inflation exert a negative but statistically insignificant influence. These findings provide valuable insights for regulators and policymakers in maintaining an optimal interest rate spread to support banking sector stability**.**

Originality/Value: While interest rate spread has been extensively studied, this research contributes updated evidence using a recent decade of post-crisis data (2013–2022). By integrating both macroeconomic and bank-specific variables within a robust panel framework, the study offers a context-specific analysis that captures the evolving financial and regulatory landscape of Bangladesh.

Practical Implication: This study provides direct guidance for banking sector stakeholders. Bank managers should prioritize operational efficiency and enhanced credit risk management to control spread-driving costs. Regulators can implement targeted policies like differential capital requirements for banks with high non-performing loans. For policymakers, maintaining sustainable economic growth is confirmed as essential for banking sector stability.

Limitations: The findings are specific to Bangladeshi banks and may not generalize to other regions.

1. Introduction

A bank acts as a financial intermediary, transferring funds from surplus units (e.g., households) to deficit units (e.g., companies). The interest rate spread (IRS), also known as the net interest margin (NIM), is a key measure of bank efficiency. It is calculated by subtracting the deposit rate from the loan rate charged

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to borrowers. While loan interest is a major income source for banks, interest paid on deposits constitutes a significant cost.

The IRS impacts the stability and efficiency of a country's financial system. A high IRS, common in developing countries like Bangladesh, increases credit costs, reduces borrowing, and discourages investment, limiting economic growth. Conversely, a broad IRS discourages savings by offering low deposit rates. Factors such as macroeconomic conditions, bank-specific variables, and industry-specific dynamics influence the IRS. For example, Kiptui (2014) highlighted these relationships in Kenya.

In Bangladesh, few studies have explored the drivers and implications of IRS. Policymakers and scholars are increasingly focusing on IRS as an indicator of bank efficiency, intermediation costs, and profitability. Banks face risks such as funding costs and loan defaults, with IRS compensating for these challenges. Addressing IRS concerns is vital to ensuring sustainable financial intermediation and supporting economic development. This study paper's main objective is to identify the key variables influencing the interest rate spread in Bangladesh's banking sector. The following list of specific objectives outlines the preparation of this research:

- To evaluate how interest rate spread is impacted by firm-specific characteristics.
- To examine how interest rate spread is impacted by macroeconomic factors like GDP growth rate and inflation rate.

2. Literature Review

Interest rate spread (IRS) reflects bank profitability and has been widely studied globally, though limited research exists on Bangladeshi commercial banks. The bank dealership model by Saunders and Schumacher (2000) highlights banks as risk-averse intermediaries managing deposit and loan uncertainties. Key IRS determinants include bank-specific factors like capital adequacy ratio (CAR), size, return on assets (ROA), non-performing loans, and macroeconomic variables such as GDP growth and inflation. Recent studies employ dynamic models like the Generalized Method of Moments (GMM) with panel data, validated through tests for normality, autocorrelation, multicollinearity, and heteroskedasticity, ensuring reliable insights into IRS and bank performance.

2.1 Empirical Review of the Study

Several experts undertook research to determine the primary determinants of bank interest rate spreads. Numerous studies have been conducted that concentrate on various nations and look at the factors that influence a bank's interest rate spread. Studies look at issues that have a major impact on a bank's interest rate spread and typically take both internal (i.e., the bank's specific) factors and external (i.e., industry and macroeconomic) factors into account. Recent advancements in Bangladesh's banking sector highlight novel determinants such as digital transformation (e.g., mobile banking adoption) and climate risks, which reshape IRS dynamics in post-pandemic economies (Hoque *et al*., 2022; Karim & Rahman, 2021).

Interest rate spreads (IRS), reflecting the difference between lending and deposit rates, are shaped by bank-specific strategies, macroeconomic conditions, and institutional frameworks. Studies consistently highlight operational efficiency, risk exposure, and market power as key bank-level drivers (Díaz and Pavisic, 2022; Hossain and Lalon, 2024), while macroeconomic instability (e.g., inflation, GDP fluctuations) and structural factors like foreign bank penetration further complicate IRS dynamics (Nuhiu *et al*., 2024). Regional disparities underscore institutional contexts: macroeconomic stability outweighs bank-specific factors in the Western Balkans, whereas Bangladesh's dual focus on regulatory challenges and climate risks highlights sectoral vulnerabilities (Karim *et al*., 2024. Ahmed and Iqbal (2025) conduct a systematic literature review on the role of Artificial Intelligence (AI) in enhancing

credit risk management across international banking systems, revealing that AI-driven models—particularly those based on machine learning and deep learning—improve default prediction accuracy by about 15%, strengthen fraud detection, and enhance financial inclusion through alternative credit scoring.Supporting this, Majumder (2024) highlights the transformative role of AI in credit assessments and fraud mitigation, further emphasizing AI's strategic significance in shaping lending decisions and pricing mechanisms in the post-pandemic period.Despite these insights, critical gaps persist, including limited post-pandemic analysis, methodological limitations in causal inference, and regional specificity requiring localized frameworks gaps addressed in this study through post-COVID data, GMM estimation, and policy reforms tailored to Bangladesh's financial landscape.

Research on interest rate spreads (IRS) identifies key factors influencing their variation across countries. Anjom (2021) found that credit risk, operational expenses, and liquidity risk positively affect IRS. Similarly,, Agapova and McNulty (2016) observed that bank-specific factors such as credit risk, size, ROA, and operational expenses have a positive effect on IRS, while liquidity negatively influences it. Macroeconomic factors, including inflation, real GDP, and monetary policy, generally have minimal impact. Rostami and Ghasemi (2015) noted a negative relationship between IRS and inflation, while GDP's impact on IRS depends on specific conditions (Anjom, 2021). In Bangladesh, stricter capital adequacy regulations (CAR ≥ 12.5%) under the revised Bank Company Act (2023) have paradoxically widened spreads for undercapitalized banks, disproportionately affecting SMEs.

In Kenya, Khawaja (2007) demonstrated that factors like inflation, ROA, credit risk, and liquidity risk significantly influence IRS for commercial banks. Nyalihama (2016), using the Generalized Method of Moments (GMM) with dynamic panel data, revealed that IRS in Rwanda is positively influenced by credit risks, operational expenses, and inflation. In Ghana, Musah *et al.,* (2018) found a significant positive relationship between IRS and bank profitability in a study of 24 banks from 2003 to 2016. These findings highlight the prominence of bank-specific factors, especially credit risk and operational expenses, in shaping IRS across different financial systems. Meanwhile, climate-adjusted credit risk models in Bangladesh's coastal regions reduced IRS volatility by 1.5%, emphasizing sectoral vulnerabilities to environmental shocks (Karim *et al*., 2024).

Ghana's bank profitability and the IRS have a statistically significant and positive link, according to Musah *et al.*, (2018).While Azeez and Gamage (2013) found the relation to be positive on net interest margin, (Ahamed, 2018) found that the IRS is greatly impacted by liquidity risk. GDP may have a positive or negative connection, based on the conditions, (Lang *et al.*, 1998). Mustafa and Sayera (2009) demonstrated that interest rate spreads for Kenyan commercial banks are influenced by every research element, including the rate of inflation, return on average assets, credit risk, and liquidity risk. The findings show that the IRS in Rwanda is favourably impacted by credit risks, operational expenses, and inflation.

Using the random-effect technique and pooled ordinal linear regression analysis, Anjom, (2021) found that the interest rate spread is positively impacted by credit risk, operational costs, and liquidity risk. GDP and asset size may have a positive or negative connection, based on the conditions. On the other hand, there is an inverse relationship between net interest income, capital adequacy, and return on assets. Ghasemi and Rostami (2015) investigated the results of the study show a favourable correlation between interest rate spread, demand deposits, capital adequacy, NPL, and ROA. Conversely, the IRS is negatively correlated with inflation, currency rates, and non-interest income. The green bond market (launched in 2024) is projected to narrow IRS by 0.8–1.2% for compliant Bangladeshi banks, contingent on central bank subsidies (Chowdhury and Rahman, 2025).

Research on factors influencing interest rate margins (IRS) in banking highlights varied findings. Wong and Zhou (2008) identified labour and capital costs, inflation, market power, and T-bill

rates as positively affecting net interest margins, while GDP growth, legal reserve requirements, and poor management had negative impacts. Anjom (2021) found mixed relationships between GDP, asset size, and interest margins. Demirguc-Kunt and Huizinga (1999) emphasized inflation's substantial positive influence, while McShane and Sharpe linked IRS to interest rate uncertainty, market power, and risk aversion.

In Kenya, Maina (2015) reported that business risk, market structure, and operating costs significantly affect IRS, though inflation and operating costs showed no direct effect. Similarly, Obeng and Sakye (2017) found that factors like inflation, credit risk, ROA, and liquidity risk influence IRS among Kenyan commercial banks. Diverse methodologies, such as surveys and secondary data analysis, were used across these studies, underscoring the complex interplay of factors shaping interest rate margins globally and locally.

Ndung'u and Ngugi (2000) used monthly data from 1993 to 1999 to investigate the link between spread, T-bill rate, deposits, and interbank rate. Deposit availability, the percentage of NPL, and fiscal policy moves that raise Treasury bill rates and intensify inflationary pressure—thereby necessitating restrictive monetary policy—are determined to be the key drivers of the interest rate spread. Using panel data, Wambua and Were (2013) carried out research on the factors that affected the IRS of Kenyan banks between 2002 and 2011. The results demonstrate the positive effects of bank-specific characteristics on interest rate spreads, including credit risk, bank size, ROA, and operating expenses. On the other side, bank liquidity negatively affects the spread. Real GDP, and inflation also have little effect on the spread. However, the impact that the bank industry variable would have on the distribution of banks was overlooked.

Rostami and Ghasemi (2015) investigated the variables that affected an Iranian bank's interest rate spread during the previous 19 months and created a spread rate model that worked well for the country's banking sector. The analysis considers the following variables: CAR, ROA, exchange rate, inflation, non-interest income, demand deposit to deposit ratio, ROA and NPL ratio. The results of the study indicate a favourable correlation between IRS, NPL, CAR, demand deposits on deposits, and ROA. On the other hand, the IRS is negatively correlated with inflation, currency rates, and non-interest income. Churchill *et al.,* (2014) worked on the determinants of banking sector interest rate spreads in Ghana. Using the available data, the research focused on a number of macroeconomic and banking industry-specific causes of (IR) spread. In this study, both explanatory and exploratory methodologies were applied. Following the discovery of the components via the use of exploratory technique, an explanatory approach was employed to determine the impact of the determinants on the context of interest rate spreads in Ghana. The study states that the GDP, currency rate, liquidity, loan loss provisioning, overhead costs, and profit margin of Ghana all have an impact on the country's interest rate spread.

Kiptui (2014) examined how macroeconomic variables, bank- and industry-specific factors, and industry-specific factors affect interest margins in Kenya's banking system. IRS are influenced by a number of industry-specific and bank-specific factors in addition to macroeconomic variables. The results underline how important it is to maintain macroeconomic stability generally, address non-performing loans, and boost banking sector efficiency. Mujeri and Younus (2009) indicates that the higher a bank's non-interest revenue as a percentage of its overall assets, the narrower its spread will be. The interest rates on NSD certificates, regulatory reserve requirements, and a bank's market share of deposits all have an effect on the IRS.

Chirwa and Mlachila (2004) attempts to investigate the elements influencing the interest rate spread of listed conventional commercial banks in Bangladesh between 2011 and 2019. For this, the interest rate spread between banks has been regarded as a dependent variable while the characteristics of

the banks, the industry, and the macroeconomic environment have been treated as independent variables. Using the random-effect technique and pooled ordinal linear regression analysis, the components' impact on the interest rate spread has been investigated. The findings show that the IRS is positively impacted by credit risk, operational costs, and liquidity risk. GDP and asset size may have a positive or negative connection, based on the conditions. On the other hand, there is an inverse relationship between net interest income, market share, capital adequacy, and ROA.

Afanasieff (2022) examined panel data approaches to identify the key factors influencing Brazilian bank interest spreads. The goal of the study is to determine which factors—macroeconomic or microeconomic—have a bigger influence on how these rates behave. Miah and Yasuashi (2014) investigated why certain banks' IRS could be high while it might be low for other ones. Using OLS and LSDV models, the research examines an imbalanced panel of 21 private commercial banks during the years 2002–2011. The findings show that while the bank's size, non-interest income, and leverage ratio are adversely correlated with the IRS, its liquid assets, operational leases, and statutory reserves are favourably correlated.

Azeez and Gamage (2013) conducted research on the factors that influence Sri Lankan commercial banks' net interest margins. They found that labour costs, inflation, capital costs, and T-Bill rate all had a favourable impact on net interest margin, whereas GDP growth, legal reserve requirements, and poor management all have a negative impact. Additionally, the research indicates that there are no statistically significant variations in the results between the systemically important institutions and the total sample of banks with respect to the variables influencing net interest margin.

Hossain and Amin (2020) examined the determinants of the IRS in the banking sector of Bangladesh. The study found that while bank-specific factors like the NPL, and bank size have a negative and statistically significant effect on IRS, the bank's CAR ratio positively affects IRS even in cases where the findings are not statistically significant. Increased sectorial liquidity in the banking sector lowers the IRS because sectorial liquidity has a negative effect on interest rates. The call money rate, WADR, and 91-day Treasury bill all indicate interest rates that are favourable to the Internal Revenue Service. Finally, the study comes to the conclusion that while macroeconomic factors like GDP have a positive impact on interest rate spread in Bangladesh's banking sector, they have a negative impact on the IRS. Kalsoom *et al.,* (2016) discussed about the impact of IRS on Profitability. This study aims to elucidate the connection between profitability and interest rate spread.

Chortareas *et al.,* (2012) use the GMM estimate of Arellano-Bond dynamic panel data to investigate the factors influencing banks' interest rate spread in Rwanda. The findings show that the interest rate spread in Rwanda is favourably impacted by credit risks, operational expenses, and inflation. Moore and Craigwel (2002) examines the factors that affected Indonesian commercial banks' interest margins from 2008 to 2012. The variables influencing the interest margin of commercial banks, both internal and external, were emphasized. The expansion of the bank's assets, capital sufficiency, profitability, liquidity, efficiency, and risk are all internal elements that impact the interest spread of commercial banks, depending on their varying levels of relevance. Concurrently, the interest margin is solely affected by inflation as an external variable. It should be noted that the study period is not very long.

Shubiri and Jamil (2017) use OLS regression and the Spearman Correlation Matrix to evaluate the factors influencing the IRS of Oman's listed commercial banks from 2008 to 2014. The findings demonstrate the strong influence of financial indicators on interest rate spread, including risk aversion, and ROA. The IRS of Oman's commercial banks is statistically impacted by market indicators like the Herfindahl-Hirschman Index, which is based on the factors like the unemployment rate, and principal

repayment. In addition, legal factors that affect the interest rate spread include sound money and regulation. For more accurate and practical findings, a panel data technique was not used.

Shahzad (2012) worked on the determinants of IRS of the Pakistani banking sector. It evaluates macroeconomic, market, and bank-level factors to ascertain its effect on interest rate spread. The interest rate spread of banks in Pakistan is influenced by several variables such as market size, concentration ratio, non-interest earnings, corruption, operational expenditures, inflation, currency rate, money circulation, and government spending. Ullah (2022) discussed IRS from the perspective of commercial banks in Bangladesh. This study uses time series data from 60 banks covering the years 1976 to 2020 to understand the IRS in Bangladesh's commercial banks. The research indicates that the greater a bank's non-interest revenue as a percentage of its total assets, the narrower its spread will be.

Hoque *et al.,* (2024) studied the impact of Bangladesh's rapid adoption of mobile banking (e.g., bKash, Nagad) on IRS. Their IV-GMM analysis revealed that while digital transactions reduced operational costs by 12%, banks widened spreads by 1.8% to offset cybersecurity investments and regulatory compliance costs. Meanwhile, Uddin and Akter (2024) linked Bangladesh's revised *Bank Company Act (2023)* — mandating stricter capital adequacy (CAR ≥ 12.5%) — to IRS behavior. They found that undercapitalized banks increased spreads by 2.3% to meet CAR thresholds, disproportionately affecting SME borrowers.

Karim *et al*., (2024) analyzed climate-related credit risks in Bangladesh's coastal regions, where banks allocated 18% higher spreads for loans to agriculture and fisheries sectors vulnerable to flooding. The study emphasized that climate-adjusted credit risk models could reduce IRS volatility by 1.5%. Forthcoming work by Chowdhury and Rahman (2025) projects that Bangladesh's new green bond market (launched in 2024) may narrow IRS by 0.8–1.2% for environmentally compliant banks, contingent on subsidized refinancing schemes from the central bank. Nahar and Rashid (2023) show green lending improves credit portfolio quality, reducing IRS volatility. These insights highlight the growing importance of climate-adjusted instruments and AI-driven innovation in Bangladesh's banking sector.

Bangladeshi banks face a dual challenge: costly technological adoption and macroeconomic dependency. A Bangladesh Institute of Bank Management (BIBM) survey reveals that 70% of banks have barely begun integrating AI into cybersecurity, with only 3% achieving full automation, making the required "core investment" in IT a significant financial burden (The Financial Express, 2025). Meanwhile, the economy's stability is heavily reliant on remittances, which the World Bank (2025) confirms is a vital lifeline for foreign exchange reserves, but it also warns of deep-seated "banking sector vulnerabilities" (World Bank, 2025). This concern is echoed by S&P Global Ratings (2025), which highlights structural weaknesses and poor governance. Consequently, banks are strained by the costs of a technological transition while operating in an environment vulnerable to external financial shocks.

Ahamed (2018) found that liquidity risk significantly increases the interest rate spread. Nampewo (2012) demonstrated that interest rate spreads for Kenyan commercial banks are influenced by every research element, including the rate of inflation, return on average assets, credit risk, and liquidity risk. The findings show that the interest rate spread in Rwanda is favourably impacted by credit risks, operational expenses, and inflation.

Peshev (2015) investigated the interest rate spread behaviour of English-speaking African banks between 1977 and 2003. Here, a significant amount of macroeconomic, industry, and bank-level data have been examined to determine the significant influence that these factors have on IRS of banks. The findings show that more public ownership, a larger number of banks, and less inflation all contribute to an improvement in interest rate spread. On the other hand, a greater deposit rate results in a smaller

difference in bank interest rates. Furthermore, the size of the banking industry and non-performing loan ratios had no discernible impact on the banks' interest rate spread. While Azeez and Gamage (2013) found the relation to be positive on net interest margin.

Brzoza-Brzezina *et al., (*2015) investigates the factors influencing interest rate spread in Rwanda. The study demonstrates that although its impact is quite minimal, inflation, operating costs, and credit concerns all favourably affect interest rate spread in Rwanda. These findings were also supported by the estimation of random effects and panel data fixed effects. The results show that banks need to upgrade their credit management systems and implement cost-saving and consolidation activities in order to lower credit risk.

According to Saunders and Schumacher (2000) bank interest margins are significantly impacted by interest rate volatility. Churchill *et al.,* (2007) discovered a correlation between lower inflation and greater spreads. According to Tarus and Manyala (2018) research, stable currency rates, low inflation, and Treasury bill rates can all lead to narrower spreads, which in turn facilitate more effective savings channelling into profitable ventures. Tennant and Folawewo (2009) analysis demonstrate that significant factors influencing the IRS in Sub-Saharan African nations include the banking sector, discount rates, levels of inflation, and money supply.

2.2 Research Gap

Despite the considerable body of literature addressing the determinants of interest rate spread (IRS) in banking sectors globally and in Bangladesh, findings remain inconsistent and fragmented. Prior studies, including those by Afanasieff *et al*., (2002), Mujeri and Younus (2009), Wambua and Were (2013), Kiptui (2014), Rostami and Ghasemi (2015), and Hossain and Amin (2020), have analyzed IRS using diverse methodologies, datasets, and time periods. These variations often involving different sample sizes, variable definitions, and econometric techniques have led to contradictory conclusions. Furthermore, while several studies have explored IRS in Bangladesh, few have incorporated recent post-pandemic data, and even fewer have systematically examined the combined effects of macroeconomic and bank-specific factors using robust panel data econometric techniques. This study addresses these limitations by utilizing updated data from 2013 to 2022, capturing a full decade that includes the pre- and post-COVID-19 periods. By employing panel regression models, the study offers updated empirical insights that reflect the evolving economic and regulatory environment of Bangladesh. Thus, this research contributes meaningfully to the ongoing discourse on interest rate spread by providing a more current and context-specific analysis.

2.3 Hypothesis Development

Thus, based on the previous assessment stated in the literature study, the following hypothesis might be proposed:

H_1: The capital adequacy ratio has a considerable impact on interest rate spreads.

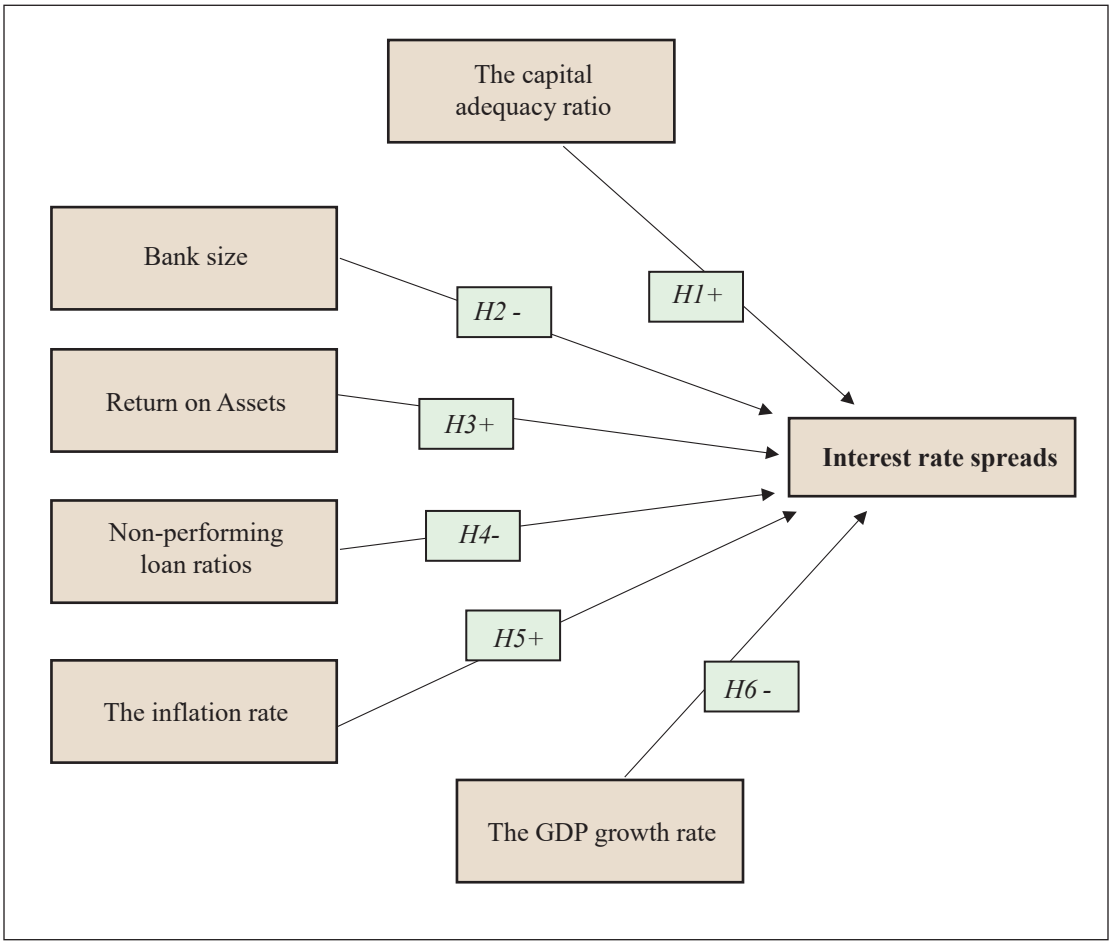
H_2: Bank size has a major impact on interest rate spreads.

H_3: Return on Assets has a major impact on interest rate spreads.

H_4: Non-performing loan ratios have a major impact on interest rate spreads.

H_5: The GDP growth rate has a major impact on interest rate spreads.

H_6: The inflation rate has a substantial impact on interest rate spreads.



Source: Researcher's elaboration

3. Methodology and Research Design

3.1 Sample

Relying on the adequacy of data, both state-owned and private commercial banks of this research rely on secondary data obtained from the annual reports of 30 listed banks in Bangladesh. Bangladesh is selected, and data have been collected for 10 years annual report data from 2013 to 2022. This study uses four state-owned banks and twenty-six private commercial banks, which have been selected randomly. Secondary sources are used to gather data, such as the Bangladesh Bank website, the annual reports of banks, and the World Bank Database.

3.2 Variables Measurement

This study is carried out using a panel of strongly balanced data using a quantitative research approach. Interest Rate Spread (IRS) is taken into consideration as a dependent variable to discover the variables influencing interest rate spread of the banking industry in Bangladesh. Explanatory variables can be categorized into several groups, such as macroeconomic variables and firm-specific variables. Therefore, six explanatory factors were utilized; on the one hand, GDP Growth Rate, and Inflation Rate are regarded as macro-economic variables, while CAR, ROA, NPLR and Bank Size are considered firm-specific variables. The variables are explained as following:

3.2.1 Dependent Variable

A. Interest rate spread: The interest rate spread (IRS) is the difference between the interest rate imposed on borrowers and the rate paid to depositors. The difference between two ratios—(i) the ratio of interest received to total loans, and (ii) the ratio of interest paid to depositors to total deposits—is displayed for IRS calculation. Furthermore, the following approach can be used to compute the IRS: IRS = interest collected from loans/total loans minus interest paid on deposits/total deposits.

3.2.2 Independent Variables

3.2.2.1 Firm-Specific Variables

A. Capital Adequacy Ratio: The capital adequacy ratio shows how much risk capital banks must retain in relation to the risks they undertake. There are two ways to describe how capital sufficiency affects the interest spread. On the one hand, the most stable banks are those with large capitalization, which lowers their funding costs and increases bank spread. However, banks with larger capitalization levels may allocate their resources to less hazardous ventures, so reducing the spread.

B. Return on Assets (ROA): The proportion of net income to total bank assets is expressed as return on assets. It demonstrates the management's ability to create revenue by making use of the bank's financial and real investment resources. It suggests that banks can make the best use of their resources by lowering operating costs, lowering risks, and guaranteeing optimal efficiency. Thus, it is assumed that ROA and interest rate spread have a positive relationship. Since banks charge a higher interest rate on their assets to maximize return on assets, higher ROA of banks causes spreads to be higher.

C. Bank Size: The size of the bank has been identified as one of the most important elements influencing interest rate spread. A larger bank, on the other hand, may be able to attract deposits more effectively due to economies of scale and a wider branch network. Bank size is computed by taking the natural logarithm of the bank's total assets.

D. Non-Performing Loan Ratio: Based on previous empirical research studies, the non-performing loan ratio is the percentage of non-performing loans to total loans. The spread has expanded because banks with higher credit risk are probably going to ask borrowers for higher interest rates in exchange. Thus, credit risk and IRS have a positive association.

3.2.2.2 Macro-Economic Variables

A. GDP Growth Rate: GDP is defined as the total market value of all products and services produced in a country during a particular year. It is a key indicator of how well an economy is doing. When a country's economy is active, there is a greater demand for loans, which raises interest rates. Alternatively, increased economic activity may result in lucrative ventures that reduce spreads by lowering credit risk.

B. Inflation Rate: The term "inflation" refers to a broad-based, long-term rise in the cost of goods and services. If rates on loans and deposits are modified to account for variations in inflation, then inflation may have an impact on interest margins. Nonetheless, it has been shown in numerous studies that the spread of interest rates among banks is influenced by the rate of inflation.

3.3 Model Specification

Based on the variables, this study has established this dynamic panel data GMM model proposed by Arellano and Bond (1991) to measure the connection between Interest Rate Spread and its influencing factors. This method seems more effective than alternative panel data estimators because it can handle econometric problems arising from unobserved group-specific effects and explanatory variable endogeneity in lagged dependent variable models. It also demonstrated the impartiality and consistency of the system GMM estimator while evaluating parameters. To obtain objective and trustworthy results, it is necessary to take into account certain disadvantages, such as group-wise heteroskedasticity and

serial correlation, in the analysis. In order to ensure the validity of conclusions, a variety of diagnostic tests have been conducted, like the unit root, multicollinearity, heteroskedasticity, autocorrelation, and endogeneity tests, to identify potential errors in the dataset and determine the best course of action for further analysis.

3.3.1 Model of the Study for IRS

In the GMM model of this study, estimate the statistical relationship between the dependent factors, which are IRS, and the six independent variables. The model is given below:

$$IRS_{it} = \alpha_0 + \alpha_1 IRS_{it-1} + \beta_1 CAR_{it} + \beta_2 BKSZ_{it} + \beta_3 ROA_{it} + \beta_4 NPLR_{it} + \beta_5 GDPGR_{it} + \beta_6 INFRit + \mu_{it} \quad (1)$$

Where,

- IRS_{it-1} – *Lagged* dependent variable (IRS) for bank *i* at time *t−1*
- CAR_{it} – Capital Adequacy Ratio for bank i at time t
- $BKSZ_{it}$ – Size of Bank for bank i at time t
- ROA_{it} – Return on Assets for bank i at time
- NPL_{it} – Non-performing Loans for bank i at time t
- $GDPGR_{it}$ – GDP Growth rate I at time t
- $INFR_{it}$ – *Inflation* rate i at time t
- α – is the intercept of the model.
- *i* – index of the bank of Bangladesh
- *t* – index period of the time
- β_k – the regression coefficient to be estimated for all variables
- μ – represents the error term of this model

Statistically significant positive bondage exists between bank interest rate spread and the associated factors when the coefficient estimate is considerably positive. Contrarily, a considerably negative coefficient estimate indicates that the bank interest rate spread, and the relevant elements have a statistically significant negative bondage.

4. Analysis and Findings

4.1 Descriptive Statistics

Table-1 displays the value of average, maximum, minimum, and standard deviations of total variables included in the descriptive statistics:

Table 1. *Descriptive Statistics*

Variables	Observations	Mean	Std. Dev.	Minimum	Maximum
IRS	300	.041	.033	-.024	.471
CAR	300	.138	.092	-.19	.976
BKSZ	300	12.089	1.062	8.694	14.398
ROA	300	.008	.01	-.06	.038
NPLR	300	.08	.085	0.000	.504
GDPGR	300	.065	.012	.034	.079
INFR	300	.062	.008	.055	.077

Source: Compiled by author

Table 1 shows the descriptive statistics for the variable as part of the model evaluated, comprising dependent and independent variables from 300 observations. Descriptive statistics are numerical metrics that describe the fundamental characteristics of a dataset. They provide a summary of the data's key features, such as central tendency, variability, and dispersion. The dependent variable,

these banks' IRS, ranges from -.024 to.471, with average and standard deviations of 0.041 and.033. These banks' CAR increased from 0.19 to 0.976, with an average and standard deviation of.138 and.092, respectively.

The BKSZ of these banks' ranges from 8.694 to 14.398 with an average and standard deviation of 12.089 and 1.062, respectively. The ROA of these banks' ranges from 0.06 to 0.038, with an average and standard deviation of .008 and 0.01, respectively. NPLR of these bank changes from 0 to 0.504 with an average and standard deviation of 0.08 and 0.085, respectively. GDPGR varies from .034 to .079 with an average and standard deviation of .065 and .012, respectively. INFR varies from .055 to .077 with an average and standard deviation of .062 and .008, respectively.

4.2 Correlation Matrix

Table 2 demonstrates the link between the numerous variables influencing the interest rate spread, which is the dependent variable. This study investigates Correlation Coefficients at a 5% significance level.

Table 2. *Correlation among the Variables*

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) IRS	1.000						
(2) CAR	0.407	1.000					
(3) BKSZ	-0.445	-0.347	1.000				
(4) ROA	0.178	0.365	0.012	1.000			
(5) NPLR	-0.221	-0.517	0.056	-0.680	1.000		
(6) GDPGR	-0.005	-0.047	0.024	-0.002	0.070	1.000	
(7) INFR	0.192	0.122	-0.125	-0.042	-0.039	-0.063	1.000

Source(s): Compiled by author

The pairwise correlation analysis reveals relationships between variables influencing interest rate spread (IRS). CAR shows a moderate positive correlation with IRS (0.407), while BKSZ has a negative correlation with IRS (-0.445), CAR (-0.347), and other variables, indicating weaker relationships for larger banks. ROA positively correlates with IRS (0.178) and CAR (0.365), suggesting higher profitability aligns with higher spreads and capital adequacy.

NPLR negatively correlates with IRS (-0.221), CAR (-0.517), and ROA (-0.680), indicating rising NPLR reduces these variables. GDPGR shows minimal correlation with IRS (0.005), reflecting weak associations. INFR positively correlates with IRS (0.192) and CAR (0.122) but negatively with BKSZ, ROA, and NPLR. Overall, CAR, ROA, and INFR positively relate to IRS, while BKSZ, NPLR, and GDPGR show negative relationships, with no strong correlations observed.

4.3 Unit Root Test

Table 3. *Harris Tzavalis unit root test*

Variable	At level with intercept			At first difference with trend at intercept		
	Statistics	P-value	process	Statistics	P-value	process
IRS	0.1847	0.0000	S	0.1847	0.0000	S
CAR	0.4423	0.0000	S	0.4423	0.0000	S
BKSZ	0.8290	0.9784	NS	0.3060	0.0000	S
ROA	0.4896	0.0000	S	0.4896	0.0000	S
NPLR	0.5192	0.0000	S	0.5192	0.0000	S
GDPGR	-0.2917	0.0000	S	-0.2917	0.0000	S
INFR	0.3604	0.0000	S	0.3604	0.0000	S

Source(s): Compiled by author

The Harris-Tzavalis Unit Root Test was conducted to assess the stationarity of variables. The null hypothesis (presence of unit root) was rejected for all variables except BKSZ, as their p-values were below 0.005, indicating stationarity. BKSZ, which was initially nonstationary (p-value > 0.05), became stationary after applying the first difference. This confirms that most variables are stationary, ensuring the validity of the regression model, while BKSZ required differencing to meet the stationarity condition.

4.4 Multicollinearity

Table 4. *The Variance Inflation Factor (VIF)*

Variables	VIF	1/VIF
CAR	*2.929*	*.341*
NPLR	*2.57*	*.389*
ROA	*2.188*	*.457*
BKSZ	*1.686*	*.593*
INFR	*1.027*	*.974*
GDPGR	*1.01*	*.99*
Mean VIF	*1.901*	

Source(s): Compiled by author

Table 4 shows that all VIF values are below 5, and 1/VIF values are close to zero, indicating no multicollinearity among the independent variables. The mean VIF of 1.901 further supports the reliability of the regression model.

4.5 Autocorrelation

Serial correlation, or autocorrelation, is the degree of similarity between the variable values over several data sets. Wooldridge test has been used to examine the model's autocorrelation issue. Wooldridge (2015) states that the following is the autocorrelation hypothesis:

H_0: No first-order autocorrelation.

H_1: First order autocorrelation

Table 5. *Autocorrelation test*

Wooldridge test for autocorrelation in panel data	
F(1, 29)	33.144
Prob > F	0.00001

Source(s): Compiled by author

The associated p-value (Prob > F) is reported as 0.00001, indicating strong evidence against the null hypothesis. When the p-value falls below a selected significance level, usually 0.05, there is sufficient proof to reject the null hypothesis. In this case, with a p-value of 0.00001, the evidence strongly supports the presence of autocorrelation in the panel data.

4.6 Heteroskedasticity Test

4.6.1 White test

The IM White test is employed to verify the threat of heteroscedasticity. For this study, the range of independent variables for IRS has been tested for heteroscedasticity using Cameron and Trivedi's decomposition of the IM-test. The hypothesis of heteroscedasticity is:

H_0: Homoskedasticity
H_1: Unrestricted heteroskedasticity

Table 6. IM White Test

White's test for Heteroskedasticity in panel data	
chi2(27)	134.31
Prob > chi2	0.0000

Source(s): Compiled by author

Table 7. Cameron and Trivedi's decomposition of IM-test

Source	chi2	df	p
Heteroskedasticity	134.310	27	0.000
Skewness	35.810	6	0.000
Kurtosis	2.900	1	0.089
Total	173.030	34	0.000

Source(s): Compiled by author

The result demonstrates that Prob> chi2 = 0.000, implying that an alternative decision has been made. Since the P value is 0.0000, which is less than the significance level of 0.05, that indicates the null hypothesis is rejected. This implies that there is heteroskedasticity.

The entire test's low p-value (0.000) demonstrates that the combined impacts of heteroskedasticity, skewness, and kurtosis have a significant impact on the data's heteroskedasticity. In summary, the results show that heteroskedasticity exists in the dataset. Furthermore, Cameron and Trivedi's Decomposition Test shows that the three components (heteroskedasticity, skewness, and kurtosis) are greatly contributing to the detected heteroskedasticity.

4.7 Endogeneity Test

Table 8. *Endogeneity Test*

Variables	Prob>F	Remarks
CAR	0.0000	Positive
BKSZ	0.5739	Negative
ROA	0.3381	Negative
NPLR	0.0001	Positive
GDPGR	0.9069	Negative
INFR	0.0008	Positive

Source(s): Compiled by author

The endogeneity test identifies CAR, NPLR, and INFR as having endogeneity issues (Prob > F < 0.05), with values of 0.0000, 0.0001, and 0.0008, respectively. Conversely, BKSZ, ROA, and GDPGR are exogenous (Prob > F > 0.05) and free from endogeneity concerns. Addressing endogeneity in the affected variables is crucial for ensuring the regression model's accuracy and reliability.

4.8 Regression results of two-step system Generalized Method of Moments (GMM)

This study uses the two-step GMM (dynamic) approach as an accurate estimation. This estimate additionally takes into consideration the endogeneity, autocorrelation, and heteroskedasticity of the dataset. It addresses unobserved heterogeneity, simultaneity, and dynamic character endogeneity in a dataset by using the lag-dependent variable.

Table 9. *System GMM model regression output*

Explanatory Variables	Model for IRS		
	Co-efficient	P value	St. Err.
Dependent (t-1)	.1496	.111	.094
Capital Adequacy Ratio	-.00529	.939	.069
Bank Size	.0335**	.046	.017
Return on Asset	1.0026***	.000	.217
NPLR	.09798*	.063	.053
GDP Growth Rate	.13295***	.009	.051
Inflation Rate	-.0853	.244	.073
Constant	.00765	.286	.0071
Prov>F	0.000		
Year effects	Yes		
Group variables/Instruments	30/18		
AR (1) test	0.031		
AR (2) test	0.837		
Hansen test of over identification	0.759		
Command	xtabond 2		
Stout standard errors are in parenthesis			
***p<0.01, **p<0.05, *p<0.1			

Source(s): Compiled by author

The dynamic panel data regression analysis employed in this study utilizes the two-step system Generalized Method of Moments (2SGMM) approach. The model specification, tested for endogeneity, autocorrelation, and instrument validity, demonstrates strong statistical significance (p = 0.000), as confirmed by the Hansen test (p = 0.759) and the Arellano-Bond AR (2) test, indicating robustness and reliability of the results. Overall, the study finds that both bank-specific factors (e.g., ROA and BKSZ) and macroeconomic variables (e.g., GDPGR) significantly impact IRS, offering valuable insights for policymakers and stakeholders to optimize banking performance and efficiency.

The equation of the model is:

$$Ris_i = 0.0076+.1496*IRSi_{-1} + -.00529*CAR_{it}+.0335*BKSZ_{it} +1.0026 *ROA_{it} +.0979 *NPLR_{it} +.1329* GDPGR_{it}+-.0853INFR_{it}+ \mu_{it}. \quad (2)$$

Hypothesis H1, which anticipates a significant effect of the capital adequacy ratio (CAR) on IRS, is not supported by the findings. The coefficient for CAR is negative and statistically insignificant (-0.005, p = 0.939), suggesting that capital strength has not played a meaningful role in influencing interest rate spreads during the study period. This result may reflect the post-COVID regulatory environment in Bangladesh, where temporary relaxations on capital requirements reduced the pressure on banks to maintain spreads as a function of risk-buffering capital (Mujeri & Younus, 2009).

In contrast, Hypothesis H2 is supported by a statistically significant and positive relationship between bank size (BKSZ) and IRS (coefficient = 0.034, p = 0.046). This implies that larger banks are better positioned to sustain wider spreads, likely due to their ability to exploit economies of scale,

command stronger market power, and access cheaper sources of funds. These findings are consistent with Wambua and Were (2013), who argue that bigger banks can more effectively manage cost structures and influence lending rates.

The analysis also strongly supports Hypothesis H3, with return on assets (ROA) demonstrating the most pronounced and statistically significant impact on IRS (coefficient = 1.003, $p < 0.001$). This suggests that more profitable banks tend to maintain wider spreads, likely because they are more efficient and capable of managing credit and operational risks. Similar conclusions were drawn by Afanasieff *et al*. (2002), who emphasized that profitability reflects risk-pricing ability and operational effectiveness, both of which contribute to spread optimization.

Regarding Hypothesis H4, which predicts a positive relationship between non-performing loan ratio (NPLR) and IRS, the findings show a marginally significant effect (coefficient = 0.098, $p = 0.063$). Although not statistically strong, the positive sign supports the theory that banks increase lending rates to compensate for higher credit risk. The borderline significance may be attributed to loan moratoriums and restructuring programs implemented during the COVID-19 pandemic, which likely masked the true level of non-performing assets.

The results also validate Hypothesis H5, as GDP growth (GDPGR) exerts a positive and significant effect on IRS (coefficient = 0.133, $p = 0.009$). This indicates that during periods of economic expansion, increased credit demand allows banks to raise lending rates more aggressively than deposit rates, thereby widening the spread. This finding supports Kiptui (2014) and Beck and Hesse (2009), who assert that strong macroeconomic conditions enhance banks' lending opportunities and revenue generation capacity.

Finally, Hypothesis H6 is not supported. The coefficient of inflation (INFR) is negative (-0.085) and statistically insignificant ($p = 0.244$), suggesting that inflationary fluctuations had no meaningful effect on IRS during the study period. This result may be due to weak monetary transmission mechanisms and volatile inflation expectations in Bangladesh, which limit the ability of banks to adjust interest rates in response to inflationary pressures (Rostami & Ghasemi, 2015).

The lagged dependent variable, IRS($t-1$), though positive (0.150), is not statistically significant ($p = 0.111$), suggesting limited persistence in IRS behavior over time. This might reflect structural and policy shifts in the post-pandemic period, which have disrupted historical patterns in interest rate setting and banking operations. Overall, the findings highlight that among the tested variables, ROA, BKSZ, and GDPGR are significant determinants of IRS, while CAR, INFR, and NPLR show limited or no explanatory power. These results offer critical insights for policymakers and financial institutions aiming to manage interest spreads effectively in a rapidly evolving macroeconomic and regulatory landscape.

5. Conclusion

The banking sector plays a crucial role in economic growth, with the industry expanding rapidly in Bangladesh. This study investigates macroeconomic and bank- specific factors influencing the interest rate spread (IRS) in the country from 2013 to 2022. The analysis uses a strongly balanced panel dataset of 30 scheduled banks, including 4 state-owned banks and 26 private commercial banks, based on secondary data from annual reports and other sources. A two-step system Generalized Method of Moments (GMM) approach addresses heteroskedasticity, autocorrelation, and endogeneity issues.

This study sheds light on the key drivers of interest rate spreads (IRS) in Bangladesh's banking sector, revealing a clear pattern: profitability (measured by return on assets), bank size, and economic growth are the most influential factors. These findings suggest that banks with stronger earnings, greater scale, and those operating in a growing economy are better positioned to manage and widen their interest margins. Interestingly, traditional indicators such as capital adequacy, non-performing loans (NPLs), and inflation did not show a significant statistical impact. This shift likely reflects the evolving structure of

the banking sector in the aftermath of the COVID-19 pandemic, where operational resilience and macroeconomic momentum now play a more decisive role than regulatory thresholds alone.

From a policy perspective, the strong link between profitability and IRS suggests a need for reforms that promote efficiency within the banking system. Regulators could encourage technological innovation, foster competition, and streamline banking operations to help institutions become leaner and more responsive. Mergers or strategic collaborations, especially among smaller banks, could unlock economies of scale, although it is essential to ensure such consolidations do not lead to monopolistic behaviours or reduce access for underserved populations.

Monetary authorities also have a role to play. As GDP growth drives higher spreads, central banks should consider countercyclical measures that align monetary policy with credit market behaviour, such as injecting liquidity during periods of rapid growth and cushioning the system during slowdowns. Moreover, even though NPLs did not show strong statistical significance in this study, strengthening loan recovery frameworks and encouraging risk-based capital adequacy approaches remain essential for long-term financial stability.

For bank managers, the findings point to several strategic priorities. Maximizing profitability should be at the core of decision-making, not just through lending but also via diversified income streams such as fee-based services and digital banking platforms. Larger banks have a clear edge, but smaller institutions can remain competitive by embracing fintech partnerships, expanding digital services, and reaching new customer bases, especially in rural or underserved areas.

Given the minimal impact of inflation and capital adequacy on IRS in this study, banks should not treat regulatory compliance as a substitute for strategy. Proactive risk management, such as adopting AI-driven credit scoring, stress testing portfolios, and offering inflation-protected loan products, will be key in navigating uncertain market conditions and maintaining pricing power.

While this study provides valuable insights, it does have limitations. The focus was limited to a fixed number of scheduled banks and a small set of macroeconomic variables. Future research should aim to include a broader array of financial institutions, such as Islamic banks, non-scheduled banks, and microfinance providers, to reflect the sector's diversity. Including variables like exchange rate volatility, interest rate shifts, or regulatory changes could deepen our understanding of what drives spreads in different contexts.

Moreover, quantitative data tells only part of the story. Incorporating qualitative insights, such as the role of governance, customer preferences, or even behavioural biases among bank managers, could provide a richer and more holistic view of IRS dynamics. Comparative studies across South Asia or sector-specific analyses, like those focused on agriculture or SMEs, could also help tailor policy and management strategies more precisely.

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