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**Risk-based Supervision in the Banking Sector:
Its Impact on Bank Stability and Profitability**

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Risk-based Supervision in the Banking Sector: Its Impact on Bank Stability and Profitability

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ABSTRACT

Risk-based supervision (RBS) is a regulatory approach that prioritizes allocating oversight resources based on each institution's risk profile, applying a structured, process-driven methodology to identify and quantify not only the risks faced by a bank but also the quality of its risk management and internal controls. Bangladesh Bank, the country's central bank, has recently introduced RBS in the banking sector. This study examines the opportunities to enhance bank stability and profitability following the implementation of the RBS in Bangladesh. The panel data analysis of historical and projected data for Bangladesh's commercial banks reveals evidence of enhanced bank stability as an impact of RBS. Effective supervision will ensure proactive measures to maintain asset quality, prevent capital erosion, reduce non-performing loans, and ultimately ensure bank stability. However, at the initial stage, RBS may adversely affect bank profitability due to costs associated with developing IT infrastructure, implementing enhanced management control systems, and hiring skilled, well-trained employees. We assume that RBS's adverse impact on profitability is immediate rather than long-lasting. When all the banks can cope with the proactive supervisory measures, there is a possibility of enhanced profitability. Moreover, as observed, if RBS is implemented prudently, the reduction of non-performing loans (NPLs) will be a significant advantage for the banking industry. This study contributes to the literature as the first empirical study at a country level to examine the impact of RBS on bank stability and profitability.

Keywords: Risk-based supervision, Rule-based supervision, Banking regulation, Bank stability, Profitability.

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1. Introduction

Risk-based supervision (RBS) is a regulatory approach that prioritizes the monitoring and management of financial institutions based on their risk profiles (Dohotaru et al., 2025). Unlike traditional supervision methods that apply uniform oversight, RBS focuses on identifying, assessing, and mitigating risks specific to each institution (Newbury & Izaguirre, 2019). The RBS approach allows regulators to prioritize the areas of utmost concern in bank supervision and risk management, and to apply targeted interventions to ensure financial stability. RBS has the potential to mitigate systemic risks and foster a more resilient financial system in an economy by improving financial stability, regulatory efficiency, and investor confidence (Curry, 2015).

RBS was first introduced in the United States in the late 1980s, following the increasing complexity of financial institutions, which became a significant concern (Newbury & Izaguirre, 2019). Later, the global financial crisis (2007-2009) served as a wake-up call, exposing the limitations of traditional one-size-fits-all approaches to supervision. The vulnerabilities in the system, such as a lack of effective risk assessment, inadequate capital requirements, and limited supervisory oversight, were revealed by the crisis. In that situation, the key role was played by a) Basel Committee on Banking Supervision (BCBS): Basel Accords III, adopted in 2010, significantly strengthened capital requirements and introduced new liquidity rules for banks, explicitly reflecting their risk profiles; b) International Monetary Fund (IMF) and Financial Stability Board (FSB): promoted best practices and standards for RBS implementation; c) Regulators' focus on systemic risk: regulators shifted their focus from individual institutions to the broader financial system, identifying and addressing interconnected risks (Dordevic et al., 2021; King & Tarbert, 2011; Board, 2010).

Although RBS is considered an effective supervisory technique for addressing systemic risk worldwide, there is very limited research on it. Existing research on RBS is primarily descriptive. Quantitative research on RBS can accurately examine its impact on bank stability and profitability, helping policymakers make strategic decisions. Our work aims to fill the gap in existing literature.

To ensure a forward-looking, risk-sensitive, and efficient supervisory system aligned with international best practices, Bangladesh Bank, the country's central bank, has implemented RBS as a supervisory approach for the banking sector in January 2026. This paper examines the

opportunities to enhance bank stability and profitability following the implementation of the RBS in Bangladesh.

The panel data analysis of 78 quarters (19.5 years) of commercial bank data in Bangladesh reveals evidence of enhanced bank stability and deteriorating bank profitability as a consequence of RBS. This paper contributes to the banking literature by quantifying the impact of risk-based over rule-based bank supervision.

2. Risk-based Supervision in Bangladesh

After the global financial crisis in 2008, many countries adopted RBS for the financial sector. Bangladesh Bank also recognized the need to align with international standards to strengthen governance and resilience in the banking sector (Bangladesh Bank, 2024). Bangladesh's banking industry has been plagued by a higher level of non-performing loans as a percentage of total loans, weak private-sector credit growth due to stressed political and economic conditions, and a weak governance structure across regulatory oversight and bank internal management (Khatun, 2025). To ensure qualitative transformation in the banking industry, the Bangladesh Bank has developed a comprehensive RBS strategy. Bangladesh Bank sought technical assistance requirements for RBS implementation from the International Monetary Fund (IMF) in 2017, and the IMF identified multi-year technical assistance. In December 2021, a dedicated 'Risk-Based Supervision Implementation Cell' was established in the Bangladesh Bank. In 2023, two separate Memoranda of Understanding (MOUs) were signed between the IMF and the Bangladesh Bank, and between the International Finance Corporation (IFC) and the Bangladesh Bank, respectively, to implement RBS (Bangladesh Bank, 2024). After three phases of survey and assessment, Bangladesh Bank officially adopted RBS in the banking sector on January 4, 2026.

In confirmation with the regulatory approach of the RBS, that prioritizes the allocation of oversight resources according to each institution's risk profile, applying a structured, process-driven methodology to identify and quantify not only the risks faced by a bank but also the quality of its risk management and internal controls, the purposes of RBS in Bangladesh are: i) shifting from rule-based to risk-based, ii) single point supervision, iii) dynamic and forward-looking, and iv) avoiding 'one size fits for all'.

Under the RBS framework, Bangladesh Bank supervises all commercial banks across 12 clusters to monitor financial risks in real time via a unified data platform. Each of the clusters monitors (off-site analysis and risk-focused on-site inspection) 4-7 banks (depending on size and overall profile of banks) under the name of Bank Supervision Departments, which introduce an annual supervisory plan, an inspection calendar, and a scope memorandum based on the relevant bank's risk profile, systemic importance, and emerging vulnerabilities. As a result, Bangladesh Bank has established 14 new departments, reforming the old supervision-related departments to ensure the smooth functioning of RBS processes, with a new data analytics model, updated Information Technology (IT) infrastructure, and contemporary supervisory practices to enable real-time surveillance.

In the Bangladesh Bank risk matrix model, several risks have been considered, based on RBS practices at central banks in developed and emerging markets, such as Bank Negara Malaysia, the Monetary Authority of Singapore, and the Bank of Thailand. In the Bangladesh Bank Risk model, there are five inherent risks: credit risk, market risk, operational risk, legal and regulatory risk, and strategic risk. The model also considers three composite risks: earnings, capital, and liquidity. Moreover, there are three risks in institutional assessment: cultural, technological, and money laundering & terrorist financing (ML/TF). These risks are being assessed by six quality risk management approach, such as operation management (organizational structure, precise allocation of power among treasury, separate function of trading and risk management in treasury, policy, procedure, resource, staffing, training, monitoring, controlling, and reporting), risk management control functions, board oversight, senior management oversight, compliance, and internal audit.

The objective criteria of identifying the inherent credit risk factors include the composition of the credit portfolio, portfolio growth, quality of exposure, single-name concentration, sector concentration, asset quality, loss-absorption capacity, foreign-currency lending risk, and the investment portfolio. Furthermore, the subjective criteria for the same include the quality of borrowers, the top 20 borrowers, the quality of credit growth, the number of willful defaulter cases, the trend in off-balance sheet exposure, and violations of the single borrower exposure limit, among others.

The objective criteria of identifying the market risk are the assessment of trading book exposure, interest rate risk in the banking book, foreign exchange risk, and equity price risk, whereas the subjective criteria are historical profitability & volatility of market activities of the bank's trading book, degree of market concentration, extent of gain/loss from speculative foreign exchange dealing, breach of net open position (NOP) limit, scenario-based evaluation, extent of incidences of overdue export bills, bills of entry, accepted bills payable and receivable, adequacy and accuracy of information.

Again, the objective criteria of identifying the operational risk are people risk - theft, fraud, and vigilance; process risk - customer service and complaint redressal mechanism; technology risk - effectiveness of IT and payment systems; and operational loss. The subjective assessment criteria are people, unreconciled items, fraud trends, information quality, vendor management, outsourced activities, and stress testing.

The liquidity level and quality indicators are short-term liquidity, funding structure, funding/liquidity concentration, reliance on wholesale funding, structural reliance on Bangladesh Bank funding, and foreign exchange liquidity. The liquidity risk management practices emphasize board and senior management oversight, as well as the measurement and management of liquidity risk.

The indicators of earning strength are the cost of income ratio, net interest income (NII) to average assets, non-interest income (fee and commission income), average assets, non-interest income to personal expenses, return on assets, interest stress test, and significant cash outflows.

The indicators of capital adequacy assessment include the level of capital adequacy and quality of capital; capital-generating capabilities; access to markets and shareholder strength; capital management practices and processes; identification of gaps between observed practices and the regulatory risk control framework; and determination of the overall rating for capital adequacy. The considered factors are capital to risk weighted assets ratio (CRAR), leverage ratio, stressed capital ratio, stressed leverage ratio, common equity tier 1 (CET-1) ratio without any regulatory forbearance, tier-1 Ratio without any regulatory forbearance, CRAR without any regulatory forbearance, return on equity (ROE), cost to income ratio, capital growth, and CET-1 growth.

At last, the composite risk rating (CRR) is the final assessment of the bank's risk profile, after considering its earnings and capital relative to the overall net risk (ONR) and its liquidity. The CRR is a bank's assessment of its safety and soundness with respect to its depositors and policyholders. The assessment is over a time horizon that is appropriate to the bank, given changes occurring internally and in its external environment. CRR is rated as 'low', 'moderate', 'above average', and 'high'. Accordingly, the ONR is the weighted aggregate of the net risk of all inherent risks of an institution. The higher the ONR, the greater the safety net needed for continued viability. The rating levels of ONR are 'low', 'moderate', 'above average', and 'high'. The direction of ONR is determined by the five inherent risks, especially net credit risk.

The RBS model depends on 16 guidelines for supervisory intervention. The supervisory intervention stage (SIG) is the direction of CRR and the timeframe. According to the supervisory intervention guidance: SIG 0 (routine supervisory), SIG 1 (enhanced monitoring), SIG 2 (early intervention), SIG 3 (advanced intervention), SIG 4 (restructuring), and SIG 5 (resolution). The overall assessment is based on qualitative judgement and the supervisor's credibility.

Bangladesh Bank initiated RBS piloting in 3 (three) phases. In the first phase (based on 31 December 2022), three banks (Al Arafah Islami Bank PLC, National Credit & Commerce Bank PLC, Bank Asia PLC) were assessed. The RBS team prepared a risk assessment report using a standard template, based on off-site information and data collected from banks. The second phase (based on 31 December 2023) covered pilot surveys and assessments at 20 banks (Sonali Bank PLC, Citizen Bank PLC, Brac Bank PLC, One Bank PLC, Dutch-Bangla Bank PLC, AB Bank PLC, Shahjalal Islami Bank PLC, Basic Bank PLC, Mutual Trust Bank PLC, National Bank PLC, Eastern Bank PLC, NRB Bank PLC, United Commercial Bank PLC, Al Arafah Islami Bank PLC, City Bank PLC, National Credit & Commerce Bank PLC, Islami Bank Bangladesh PLC, Standard Chartered Bank, and Commercial Bank of Ceylon). The assessment was conducted based on an on-site inspection and an off-site report. Lastly, the third phase (based on 31 December 2024) covered all commercial banks in Bangladesh.

3. Literature Review

RBS is a supervisory framework that endorses a judgment-driven, assessment-based approach rather than a checklist-based one. RBS originated mainly from the Basel Core

Principles, which emphasized its importance in assuring financial stability in the context of a fast-paced, dynamic economic and banking operations landscape. The Basel Committee on Banking Supervision (2023) developed a consultative document for sound bank supervision and regulation in a global standard, which includes several thematic topics, such as financial risks, operational resilience, systemic risk, macroprudential supervision, climate-related financial risk and digitalization of finance, non-bank financial intermediation, and risk management practices. In total, 29 core principles are categorized into two groups: i) power, responsibilities, and functions of supervisors (principles no. 1-13), ii) prudential regulations and requirements for banks (principles no. 14-29).

“A bank’s risk management framework should take an integrated bank-wide perspective of its risk exposure, encompassing individual business lines and business units” (Basel Committee on Banking Supervision, 2024, p.15). In conducting supervision, “supervisors consider the risk profile and systemic importance of individual banks” (Basel Committee on Banking Supervision, 2024, p.22).

World Bank Group (2022) developed a guidance note for RBS to protect financial consumer protection, which includes ten key elements - six context factors (current data position, legal and regulatory foundation, market characteristics, overarching supervisory approach, organizational setting, staff considerations, and current data position) and four core components (data collection and analysis, risk indicators, risk assessment framework, and risk-based monitoring & supervision activities). Both will be considered in parallel for further development in practical situations. However, the paper acknowledges that there is no single standard or definition of RBS concepts and methodologies across international financial sector authorities.

Worldwide, RBS reflects the principles of effective financial risk management, requiring supervisors to examine internal risk controls in a cumulative manner. In developed countries like the United States (U.S.), RBS is now an essential part of banking regulations, replacing indiscriminate oversight with targeted measures based on banks' scale, complexity, and susceptibility to fundamental risks: credit, market, operational, and liquidity risks (Abubakar, 2025). Empirical evidence from the U.S. shows that supervision has a dynamic role in effective bank regulation, particularly by reducing non-performing loans and volatility in adverse banking

scenarios. In examining the impact of supervision on bank risk-taking and performance, Hirtle et al. (2020) found that the banks that receive more supervisory attention have less risky loan portfolios, are less volatile, and less sensitive to industry downturns. These banks also maintain overall growth and profitability.

Studies have repeatedly shown that RBS, being more efficient, is associated with improved banking efficiency and performance, serving as proxies for financial stability, under the assumption that stable institutions are better able to withstand disturbances. A sample of 22 European countries' banking systems between 2000 and 2008 suggests that increased supervisory powers, along with improved capital management, lead to greater efficiency within institutions (Chortareas et al., 2012).

In investigating the role of banking supervision in controlling bank risk, Delis & Staikouras (2011) found that effective supervision and market discipline requirements are important and complementary mechanisms in reducing bank fragility. They found an inverted U-shaped relationship between on-site audits and bank risk. However, they also found a negative, linear relationship between sanctions and risk.

Moreover, during the turbulent period of the Greek financial crisis (2009-2018), supervision proved instrumental in many ways, including crisis management, liquidity management, preventing further deterioration of non-performing loans, and achieving sustainability (Dedeloudis et al., 2025). Analyzing Greece's four systemic banks from 2015 to 2024, they found that enhanced supervision contributed to improved resilience and regulatory compliance.

In existing literature, there are many studies on bank supervision, but very few, especially with RBS. These are mostly either descriptive or survey-based. Although the RBS regime has proven effective for banking supervision, quantitative research on RBS that can precisely examine its impact on bank stability or profitability is very sparse in the literature. This study aims to fill a gap in the literature by quantifying the effectiveness of RBS in facilitating strategic decision-making to get maximum output from RBS implementation.

4. Theoretical Framework and Hypothesis Development

4.1 *Bank stability and Risk-based Supervision*

The theoretical foundation of the beneficial role of RBS on bank stability can be explained in three ways: agency theory, asymmetric information theory, and systemic risk externalities.

i) **Agency Theory and Incentive Alignment:** Banks face a principal-agent problem, whereby the shareholders (principals) assign decision-making powers to the bank managers (agents). When the interests of the two parties are misaligned, the agents may take on risks to maximize their gains. In the RBS framework, bank supervisors proactively and regularly monitor the bank's behavior and ensure that it behaves correctly. Greater supervisor attention decreases risk-taking, as measured by lower earnings volatility and higher capital adequacy ratios for supervised institutions (Hirtle et al., 2020).

ii) **Asymmetric Information Theory:** Information asymmetry among banks, supervisors, and markets makes it difficult to supervise and results in a gradual build-up of opaque risks (Agarwal & Goel, 2024). RBS has further tackled this problem through risk profiling and stress tests to increase efficiency and transparency in the banking system. Lower information asymmetry stabilizes the banking industry, enabling regulators to anticipate looming crises and take action to prevent bank runs.

iii) **Systemic Risk & Externalities:** Individual risk often spreads through the system, such as contagion effects through interbank lending. RBS prevents this systemic contagion effect by focusing on systemically important banks (SIBs) and providing intensive supervision through tools, such as the Probability Risk and Impact System (PRISM). This method is based on the theory that systemic risks can be mitigated through effective regulatory mechanisms and high-quality supervisory standards, as outlined by RBS. RBS strengthens the banking and financial system by enhancing supervisory and management practices.

Based on a consolidation of the theories, the RBS becomes a mechanism that works in a synergistic manner to align regulatory and supervisory activities. Dynamic supervision considers risk factors, allowing the model to function more effectively than a static compliance model. The RBS fosters a culture in which risks are mitigated proactively. The model provides banks with a

buffer against shocks while giving regulatory authorities time to focus on the high-risk areas. On the basis of these theoretical underpinnings, it is expected that the significance attached to RBS's customized, forward-looking supervision approach will improve banking stability. This leads us to our hypothesis:

Hypothesis 1: Risk-based Supervision has a positive impact on Bank stability.

4.2 Bank profitability and Risk-based Supervision

Although RBS ensures bank stability through risk identification, risk mitigation, and stronger internal risk governance, it also incurred costs in many areas, such as the adoption of advanced data management systems, software upgrades, hiring and retaining skilled personnel, and increased compliance costs. Sometimes the transition to RBS requires reevaluating existing portfolios to address emerging market and credit risks, which increase banks' capital requirements and supervisory costs. Smaller banks usually have lower economies of scale, and adopting RBS increases their operational costs and reduces their profitability in the short term (Barth et al., 2013).

RBS entails higher administrative and upfront implementation costs (Kandrac & Schlusche, 2021). Due to the adoption of RBS, banks' profitability is reduced to accommodate different types of costs.

All these phenomena reflect one of the most fundamental prudential trade-offs: risk-based supervision internalizes the benefits of systemic stability while externalizing the implementation costs for banks. This leads to our second hypothesis:

Hypothesis 2: Risk-Based Supervision adversely affects bank profitability.

5. Methods, Data, and Empirical Framework

This study adopts both qualitative and quantitative approaches. As Bangladesh has introduced RBS very recently, qualitative data from expert interviews, focus group discussions, and stakeholder interviews are essential for projecting financial indicators for individual banks, prioritizing their historical trends, and considering RBS intervention. Following the interview guidelines (Table A1 of Appendix 1), we have conducted three focus group discussions and semi-structured interviews with selected employees (120 persons) from all scheduled

commercial banks in Bangladesh, as well as 20 expert interviews from the policy-making and supervisory departments of Bangladesh Bank. The interview data have been processed through Nvivo 14. The information obtained from the interviews and focus group discussions primarily serves as input for our financial projection and theoretical arguments. Later, we used both the historical and projected data in the quantitative analysis.

5.1 Variables and data

Primarily, we have considered all commercial banks for the study. However, we have to exclude a few banks because they started operations only a few years ago and have insufficient quarters of data to forecast. Secondary data for 39 quarters (2015 Q4 - 2025 Q2) on different bank-specific variables have been collected from the respective 53 commercial banks. Based on historical data of 39 quarters, another 39 quarters (2025 Q3 – 2035 Q1) have been predicted, taking into account the historical trend and the possible intervention of RBS.

Bank Stability

This study uses the Z-score (Laeven & Levine, 2009) to measure bank stability.

$Z - Score_{i,t} = \frac{ROA_{i,t} + EQT_{i,t}}{\delta(ROA)_{c,t}}$, where, $ROA_{i,t}$ = the return on assets of the bank i in year t ; $EQT_{i,t}$ = the equity to assets ratio of the bank i in year t ; and $\delta(ROA)_{c,t}$ = the standard deviation of return on assets of all banks in the country in the period t .

Bank Profitability

Both Return on Assets (ROA) and return on equity (ROE) are used to measure bank profitability.

$$ROA_{i,t} = \frac{Net\ Income_{i,t}}{Total\ Assets_{i,t}} \text{ and } ROE_{i,t} = \frac{Net\ Income_{i,t}}{Total\ Equity_{i,t}}$$

All the study variables are defined in Table 1.

Table 1: Variable description

Variable	Definition	Expected Sign
<i>Dependent Variable</i>		
Bank Stability	Z-score (described in the methodology section)	
ROA	Net income to total assets	
ROE	Net income to total equity	

Variable	Definition	Expected Sign
Main Effects Regressor		
Primary Independent Variable		
RBS	Dummy variable ('0' before RBS implementation and '1' after RBS implementation)	+
Controls		
CAR	Capital Adequacy Ratio [(Tier 1 capital + Tier 2 capital)/Risk-weighted Assets]	+
DepAsset	The ratio of total deposits to total assets	–
EquityAsset	The ratio of total equity to total assets	–
Advdep	The ratio of total advance to total deposit	–
RWA	Risk-weighted Assets (Credit, market, and operational risks)	–
NPL	The ratio of non-performing loans to total loans	–

Source: Authors.

The descriptive statistics and pairwise correlations are shown in Tables 2 and 3, respectively.

Table 2: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
BankStability	4134	4.237	17.308	-159.3	44.2
ROA	4134	.001	.014	-.543	.186
ROE	4134	-.007	.473	-7.845	21.456
CAR	4134	.176	.589	-2.83	5.749
DepAsset	4134	.709	.144	.129	1.239
EquityAsset	4134	.064	.215	-1.493	.503
AdvDep	4134	.934	.346	.184	3.496
RWA	4134	9.838	1.367	5.466	13.843
NPL	4134	.135	.179	0	.998
RBS	4134	.5	.5	0	1

Source: Authors with Stata 19.5.

Table 3: Matrix of correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) BankStability	1.000									
(2) ROA	0.333	1.000								
(3) ROE	0.021	0.108	1.000							
(4) CAR	0.704	0.398	0.074	1.000						
(5) DepAsset	-0.417	-0.227	-0.024	-0.553	1.000					
(6) EquityAsset	0.879	0.367	0.012	0.720	-0.476	1.000				
(7) AdvDep	-0.068	-0.122	-0.076	-0.153	-0.416	-0.082	1.000			
(8) RWA	0.113	0.017	-0.048	-0.133	0.198	0.063	0.315	1.000		
(9) NPL	-0.345	-0.380	-0.102	-0.361	0.031	-0.437	0.091	-0.228	1.000	
(10) RBS	0.062	-0.011	-0.067	0.090	0.028	-0.032	0.058	0.234	-0.020	1.000

Source: Authors with Stata 19.5.

5.2 Empirical Framework

Our empirical model is persuaded by the literature, estimating the determinants of bank stability (Podder, 2026; Alam, 2024; Jahan et al., 2019; Ozili, 2019) and profitability (Podder & Ghosh, 2025; Al-Homaidi et al., 2018; Rahman et al., 2015; Podder, 2012).

We extend the conventional bank-stability model by incorporating the RBS variable.

Model 1.0: Base Model

$$\text{Bank stability}_{i,t} = \alpha + \beta_1 \text{Control variables}_{i,t} + \varepsilon_{i,t}$$

Model 1.1: Including Primary Independent Variable (RBS)

$$\text{Bank Stability}_{i,t} = \alpha + \beta_1 \text{RBS}_{i,t} + \beta_2 \text{Control variables}_{i,t} + \varepsilon_{i,t}$$

Similarly, we extend the conventional bank profitability model by incorporating the RBS variable.

Model 2.0: Base Model

$$\text{Bank profitability}_{i,t} = \alpha + \beta_1 \text{Control variables}_{i,t} + \varepsilon_{i,t}$$

Model 2.1: Including Primary Independent Variable (RBS)

$$\text{Bank profitability}_{i,t} = \alpha + \beta_1 \text{RBS}_{i,t} + \beta_2 \text{Control variables}_{i,t} + \varepsilon_{i,t}$$

The detailed identification of the models is shown in Table 4.

Table 4: Identification of the Models

Model	Dependent Variable	Model Description
1.0	Bank Stability	Base Model with controls: (1) CAR, 2) DepAsset, 3) EquityAsset, 4) AdvDep.
1.1	Bank Stability	Include the primary independent variable RBS with Model 1.0
2.1.0	ROA	Base Model with controls: 1) DepAsset, 2) EquityAsset, 3) AdvDep, 4) RWA, 5) NPL
2.1.1	ROA	Include the primary independent variable RBS with Model 2.1.0
2.2.0	ROE	Base Model with controls: 1) DepAsset, 2) EquityAsset, 3) AdvDep, 4) RWA, 5) NPL
2.2.1	ROE	Include the primary independent variable RBS with Model 2.2.0

Source: Authors.

5.3 Research Method

The collected time-series data were processed and analyzed using Stata 19.5. In Stata, the data set has been declared as a time series. Skewness and kurtosis tests were run to assess normality for each variable included in the models, and all were found to be normally distributed.

All variables are checked for trends. It is also checked whether the trend is linear, quadratic, or cubic. Based on the found trend pattern, all variables are made detrended (Wu et al., 2007). Later, all detrended variables are checked for seasonality. If any seasonality is found, these variables are made de-seasonalized (Box et al., 1978). Besides, the variables used in a regression model must be stationary to avoid spurious regression. A unit root test was conducted to determine whether the data set was stationary at the level or in first differences. To check whether the data set is stationary at which level, the Augmented Dickey-Fuller test (Dickey & Fuller, 1979) has been run, and the result has been cross-checked with the Phillips-Perron test (Phillips & Perron, 1988).

In our study, we use panel data analysis, an appropriate statistical procedure for examining data from multiple relevant entities over time (Hsiao, 2007; Baltagi, 2008). It captures both within-unit variations and between-unit variations. This approach provides valuable insights into individual behaviors and the dynamics of change. For our study, it enables us to examine the differences between individual banks and the changes within the same bank over time.

We employ two types of regression (fixed and random) to our panel data and select the most suitable one in every case. We test for significant differences among the coefficients using the Durbin-Wu-Hausman (DWH) test (Hausman, 1978). A significant DWH test indicates that the fixed-effect model is appropriate (Dougherty, 2011). If it is not significant, we performed the Breusch-Pagan test (Breusch & Pagan, 1980) to examine the presence of random effects. This test result confirms that the random effects model is the most appropriate if it is significant.

For this study, we use standardized regression coefficients. These coefficients express the values in a standard set of statistically reasonable units, enabling comparison (Siegel & Wagner, 2022).

Several diagnostic tests have been conducted to find out the validity of each of the models, such as, with the variance inflation factor (VIF), it has been checked whether there is any multicollinearity in the models; with the Durbin Watson test (Durbin & Watson, 1971) and the Breusch-Godfrey test (Breusch, 1978; Godfrey, 1978), it has been checked whether there is autocorrelation; with White's test (White, 1980), it has been checked whether there are any heteroscedastic errors in the models.

6. Results

6.1 Effects of RBS on bank stability

The results (Table 5) show that RBS positively influences bank stability. Hypothesis 1 corresponds to model 1.1, which asserts a positive association between RBS and bank stability.

Table 5: Panel Data Analysis Results (Dependent Variable: Bank Stability)

Model	1.0		1.1	
Variables	Fixed Effect	Random Effect	Fixed Effect	Random Effect
CAR	0.305*** (0.02)	0.247*** (0.01)	0.305*** (0.02)	0.247*** (0.01)
DepAsset	0.011 (0.02)	0.079*** (0.02)	0.012 (0.02)	0.079*** (0.02)
EquityAsset	0.919*** (0.03)	0.776*** (0.01)	0.918*** (0.03)	0.775*** (0.01)
AdvDep	0.040** (0.02)	0.062*** (0.01)	0.041** (0.02)	0.063*** (0.01)
RBS			0.014** (0.01)	0.015** (0.01)
Constant	0.000 (0.01)	0.000 (0.01)	0.000 (0.01)	0.000 (0.01)
Number of Banks	53	53	53	53
Observations	4,134	4,134	4,134	4,134
R-squared within	0.3487	0.3451	0.3494	0.3457
R-squared between	0.9663	0.9730	0.9663	0.9730
Overall R-squared	0.7836	0.7884	0.7839	0.7886
F-statistics/Wald χ^2	545.77***	6330.14***	437.77***	6338.05***
F-test	9.71***		9.70	
Hausman's Test	232.19***		230.89***	

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1; Best models are shown in bold.

Source: Authors' computations using STATA 19.5.

The hypothesis was supported with high significance ($\beta_1 = 0.014$, $p < 0.05$).

6.2 Effects of RBS on bank profitability

Hypothesis 2 corresponds to models 2.1 and 2.2, which posit a negative association between RBS and bank profitability, as measured by ROA and ROE. It was supported with high significance in both cases ($\beta_1 = -0.404$, $p < 0.01$) for ROA (Table 6a) and ($\beta_1 = -0.240$, $p < 0.01$) for ROE (Table 6b).

Table 6a: Panel Data Analysis Results (Dependent Variable: ROA)

Model	2.1.0		2.1.1	
Variables	Fixed Effect	Random Effect	Fixed Effect	Random Effect
DepAsset	-0.343*** (0.03)	-0.436*** (0.03)	-0.278*** (0.03)	-0.275*** (0.03)
EquityAsset	0.107*** (0.04)	-0.039 (0.03)	0.254*** (0.04)	0.128*** (0.03)
AdvDep	-0.452*** (0.03)	-0.481*** (0.02)	-0.293*** (0.02)	-0.267*** (0.02)
RWA	1.331*** (0.02)	1.030*** (0.02)	0.655*** (0.03)	0.427*** (0.03)
NPL	-0.350*** (0.02)	-0.259*** (0.02)	-0.285*** (0.02)	-0.231*** (0.02)
RBS			-0.404*** (0.02)	-0.480*** (0.01)
Constant	0.000 (0.01)	0.000 (0.04)	0.000 (0.01)	0.000 (0.04)
Number of Banks	53	53	53	53
Observations	4,134	4,134	4,134	4,134
R-squared within	0.4507	0.4410	0.5349	0.5267
R-squared between	0.1555	0.1947	0.3435	0.4266
Overall R-squared	0.1713	0.1943	0.3702	0.4548
F-statistics/Wald χ^2	668.89***	2308.42***	781.06***	4409.16***
F-test	49.16***		18.28***	
Hausman's Test	1570.70***		187.10***	

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1; Best models are shown in bold.

Source: Authors' computations using STATA 19.5.

Table 6b: Panel Data Analysis Results (Dependent Variable: ROE)

Model	2.2.0		2.2.1	
Variables	Fixed Effect	Random Effect	Fixed Effect	Random Effect
NPL	-0.233*** (0.03)	-0.173*** (0.02)	-0.194*** (0.03)	-0.161*** (0.02)
DepAsset	-0.191*** (0.04)	-0.299*** (0.03)	-0.153*** (0.04)	-0.190*** (0.03)
EquityAsset	-0.432*** (0.05)	-0.318*** (0.04)	-0.345*** (0.05)	-0.224*** (0.04)
AdvDep	-0.299*** (0.03)	-0.328*** (0.03)	-0.205*** (0.03)	-0.193*** (0.03)
RWA	0.782*** (0.03)	0.546*** (0.03)	0.381*** (0.05)	0.187*** (0.03)
RBS			-0.240*** (0.02)	-0.306*** (0.02)

Model	2.2.0		2.2.1	
Variables	Fixed Effect	Random Effect	Fixed Effect	Random Effect
Constant	0.00 (0.01)	0.00 (0.04)	0.00 (0.01)	0.00 (0.04)
Number of Banks	53	53	53	53
Observations	4,134	4,134	4,134	4,134
R-squared within	0.1468	0.1396	0.1740	0.1693
R-squared between	0.0008	0.0039	0.0005	0.0410
Overall R-squared	0.0282	0.0418	0.0899	0.1429
F-statistics/Wald χ^2	140.25***	478.17***	143.11***	815.47***
F-test	15.83***		8.21	
Hausman's Test		237.78***		44.42***

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1; Best models are shown in bold.

Source: Authors' computations using STATA 19.5.

7. Discussion

The operationalization of RBS in contemporary banking supervisory procedures has been an instrumental paradigm shift in the oversight of banking operations worldwide. This supervisory intervention has been termed the transformation of traditional supervisory mechanisms into cutting-edge supervisory dynamics, equipped with advanced, practical, and actionable supervisory tools that focus on each bank's idiosyncratic risk profile for risk identification. Given the fact that the traditional supervisory process often overlooks the intricacies of the banks' diverse set of risk exposures, RBS has become an ultimate option for banking supervision, especially after the turbulent years of the global financial crisis, as well as the emergence of the newer threats to the banking industry due to changes in banking operations.

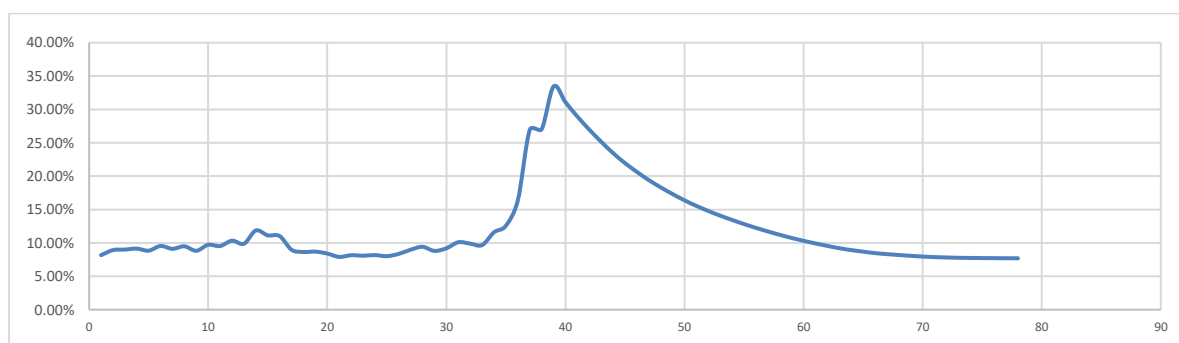
Our results indicate that RBS has a significantly positive influence on bank stability. As RBS can proactively address specific risks for a particular bank, it helps prevent vulnerabilities and enhance stability. However, it is also evident that RBS adversely affects bank profitability. Bangladesh has just implemented RBS in the banking sector. So, at the initial stage, it may adversely affect profitability due to costs associated with developing IT infrastructure, implementing enhanced management control systems, and hiring skilled, well-trained employees. However, we assume that the adverse impact of RBS on profitability is immediate, stemming from the initial cost adjustment in some areas of banking supervision. When all the

banks can cope with the proactive supervisory measures, there is a possibility of enhanced profitability.

Moreover, we have considered a realistic scenario in our projection of future financial indicators for commercial banks in Bangladesh, enabling us to take adequate measures to address upcoming challenges. If we were to consider optimistic scenarios in projecting bank-specific financial indicators, there is a possibility of enhanced profitability. We do not want to be complacent about over-optimistic projections that could deter us from adequate preparation for the upcoming period.

Nevertheless, our projections show an optimistic scenario for the NPL ratio. It shows that the NPL ratio will reach a single digit within the next four years and remain there in the future (Figure 1). If RBS can be implemented prudently, the reduction of NPL will be a significant advantage for the banking industry.

Figure 1: Non-performing loan ratio (Historical data for 39Q and projections for 39Q)



Source: Authors' computations using Bangladesh Bank's data and projections.

The success of RBS depends on how higher-risk banks are supervised and on ensuring flexible supervision for lower-risk banks. RBS also requires an effective risk control mechanism that enhances resilience and leverages technology for smooth surveillance of the digital interface, among others. However, obstacles are there that hinder the effectiveness of RBS. Human judgment in risk management decisions often leads to inconsistency (Abubakar, 2025; Barth et al., 2013). Inadequate resource mobilization poses a challenge to the implementation of the RBS. Sometimes, RBS's more stringent supervisory operations inhibit efficiency. A high-quality institutional framework and coordination among different stakeholders are other issues to consider for RBS. Bangladesh's banking sector could become more stable and dynamic if it adopts RBS during the current economic hardship.

8. Conclusion, Recommendation, Limitation, And Future Directions

It is evident from our analysis that RBS increases bank stability. Effective supervision will ensure proactive measures to maintain asset quality, prevent capital erosion, reduce non-performing loans, and ultimately ensure bank stability.

As Bangladesh has recently introduced RBS, some banks may face challenges adapting to the new systems, which may initially reduce their profitability. When all commercial banks are fully ready for the new system, we can expect both stability and profitability to be enhanced. In the current scenario, the risk profile, non-performing loan ratio, capital adequacy, etc., are not uniform across all banks. Moreover, all commercial banks in Bangladesh are not equally equipped technologically. Some banks are more digitally advanced, with innovative software and a tech-savvy workforce, than others. Moreover, supervisors in Bangladesh have only recently begun risk-based supervision. They need to be well-capable in handling the transition from rule-based to risk-based supervision. In this situation, continuous training for supervisors, stress testing, risk assessment techniques, data analytics, and close scrutiny of high-risk banks are indispensable for the success of RBS. In addition, the effectiveness of RBS in regional and similar economy-level contexts needs to be explored to better understand the situation and take measures to ensure banking stability.

The effectiveness of RBS in a developing country like Bangladesh is a major concern. Hence, Bangladesh should regularly compare its RBS framework with global as well as regional standards to identify gaps and adopt best practices, and Bangladesh Bank should disclose periodic supervisory risk assessments and sector-based test results to promote market discipline. Furthermore, the integration of advanced data analytics, artificial intelligence, and machine learning will play a significant role in reshaping RBS's future outlook.

A balanced approach that unites technological innovation, strong governance, data-driven oversight, transparent communication, and sound supervisory proficiency is essential to strengthening banking stability and sustaining public trust in the financial sector.

Although our study has several important findings, it has a few limitations. To examine the impact of RBS on bank stability and profitability, we need to project the bank-specific variables. The projections are primarily based on historical trends and assumptions, informed by

insights from expert interviews and focus group discussions, considering the RBS intervention. These assumptions may differ from reality in the future. In that case, the impact may vary. Actual data can provide a more accurate assessment of impact than any projections. Moreover, in the near future, digital transformation (DT) in the banking sector may introduce a new dimension that could affect overall financial dynamics. We have not considered the impact of DT in our projection.

This quantitative study on the impact of RBS on bank stability and profitability at the country level opens the door to further research. The study recommends that the impact of RBS on banks at the cluster (state-owned banks, private commercial banks, Islamic banks, and foreign commercial banks) and generation (based on year of establishment) levels be studied for future planning. Research in a regional context should reveal country-specific factors that may yield many interesting findings. Comparing two or more similar economies in the context of RBS and bank stability is another promising area of research.

Appendix 1

Table A1: Interview Guidelines

Locating the interviewees in the conversation

a. Conversation around

- business type, role and responsibilities, nature, and idea regarding RBS

b. Elaborate on research objectives and familiarize with the informed consent form

Discussions on Rule-based and Risk-based Supervision

- Insight regarding rule-based and risk-based Supervision in the context of your bank/organization.

- What do you expect regarding the financial indicators of your bank after RBS implementation?

- Which entity-specific financial indicators may improve after RBS implementation? Would you please share your opinion on the magnitude of the improvement and the reasons for your assumption?

- Which entity-specific financial indicators may degrade after RBS implementation? Would you please share your opinion on the magnitude of the degradation and the reasons for your assumption?

Involvement in the RBS process

- Your role in the organization related to the RBS process.

Comments on RBS

- Describe the conveniences or difficulties with RBS from your organizational perspective.
- Preparedness of your bank for RBS.
- Do you think all banks will be capable of responding to RBS in a similar way?

Other issues related to RBS

- Describe any other issues that you think should be considered in this process.

Source: Authors.

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