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Impact of Monetary Policy on Bank Performance: Evidence from Bangladesh

Abstract

This paper explores the dynamic impact of monetary policy on bank performance in Bangladesh considering panel data from 20 local conventional commercial banks spanning 2013 to 2024. Adopting a two-step System GMM estimation technique, the research rigorously examines the effects of key monetary policy instruments such as repo rate, T-bond rate, cash reserve ratio (CRR) and statutory liquidity ratio (SLR) on the profitability measures estimated with return on assets (ROA), return on equity (ROE) and net interest margin (NIM) ratio of banks. The empirical results reveal that higher short-term interest rates adversely affect bank profitability by raising funding costs and compressing net interest margins while higher long-term interest rates and bank rates tend to enhance returns. Stricter reserve requirements significantly diminish profitability by limiting banks' lending capacity. The study also finds that strong capital adequacy, operational efficiency and effective credit risk management are vital for enhanced bank performance. In addition, favorable macroeconomic conditions such as robust GDP growth and moderate inflation further support profitability. These findings underscore the need for a balanced and well-coordinated approach to monetary and regulatory policy enabling policymakers and practitioners to sustain profitability and promote stability within Bangladesh's banking sector.

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1. Introduction

Banks are essential institutions within financial systems significantly contributing to economic stability and growth by channeling financial resources efficiently, managing risks, and facilitating payment systems. The performance of banks, particularly their profitability and stability, is closely linked to monetary policies enacted by central banks which utilize various instruments such as interest rates, reserve requirements, and liquidity adjustments to achieve macroeconomic objectives, including inflation control, exchange rate stability, and sustainable economic growth. Given their central role, understanding how monetary policy actions influence bank performance is crucial especially within emerging economies characterized by rapidly evolving financial sectors and greater vulnerability to economic fluctuations.

In Bangladesh, the banking sector has experienced notable changes in recent times marked by extensive regulatory reforms, privatization initiatives and increased competition among domestic and foreign banks. Bangladesh Bank, the country's central bank declaring monetary policy, actively employs monetary policy tools primarily through adjustments in the repo rate, reverse repo rate, cash reserve ratio and statutory liquidity ratio to manage liquidity, control inflation, and foster economic stability. Despite these efforts, the direct and indirect impacts of monetary policy on bank performance remain subjects of substantial interest and debate among policymakers, practitioners, and researchers.

The importance of investigating this relationship is emphasized by the critical role that banks play in the economic development of Bangladesh. Effective monetary policy can enhance bank profitability by influencing net interest margins (NIM) and improving loan quality whereas adverse policy measures could constrain banks' operational capacities and profitability. In addition, in light of recent global economic uncertainties and evolving domestic financial conditions, assessing the responsiveness of banks to the swings of monetary policy becomes increasingly pertinent.

Moreover, the monetary policy environment in Bangladesh is particularly complex due to persistent structural issues such as high non-performing loan ratios, governance challenges within the banking sector and volatile macroeconomic indicators such as inflation and exchange rates. These issues potentially exacerbate the sensitivity of banks to monetary policy shifts, making an empirical investigation timely and significant. Furthermore, understanding the nuances of how monetary policies affect bank behavior and performance can inform the design of more targeted and effective policy frameworks.

Previous studies conducted in similar economic contexts indicate that banks' profitability and operational stability are substantially influenced by both the short-term and long-term monetary policy stances. While lower interest rates may initially compress net interest margins, they also have the potential to increase loan demand ultimately benefiting banks through higher lending volumes. Conversely, tighter monetary conditions characterized by higher interest rates or stricter liquidity requirements might help curb inflation and stabilize currency but often at the cost of reduced lending activity and profitability.

This research aims to comprehensively analyze the effect of monetary policy measures on bank performance in Bangladesh using a dynamic panel data approach. By evaluating key indicators of monetary policy such as short-run and long-run interest rates, reserve ratios, and liquidity provisions alongside bank-specific and macroeconomic variables, the study seeks to offer significant insights into the mechanisms through which monetary policies affect bank profitability and stability. This investigation not only fills existing research gaps by providing contemporary empirical evidence but also contributes meaningful guidance for policymakers in designing effective monetary strategies that strengthen banking sector resilience and overall economic growth in Bangladesh. Moreover, insights from this research will help banking sector stakeholders better anticipate and respond to monetary policy changes, ultimately

fostering a more robust and stable financial system in Bangladesh.

The next part of this paper consists of review of relevant literatures to identify and address the literature gaps through developing hypothesis, data and methods to construct the model to address the research question as per hypothesis developed for this study, empirical results with discussion of the estimated models constructed under data and methods section followed by a concluding remark with policy implication.

2. Literature Review

The existing literature presents different findings on the relationship between monetary policy and bank performance reflecting differences in methodologies, variables selected, and the economic context of the studies. Generally, monetary policy influences bank performance through interest rate adjustments affecting banks' net interest margins, loan quality, and overall profitability.

Athanasoglou et al. (2010) examined Greek banks and identified that tighter monetary policies negatively impact bank profitability due to increased funding costs and reduced lending opportunities. Similarly, Tan and Floros (2012) found that monetary policy significantly influences the profitability of Chinese banks with tighter policies resulting in lower profitability through constrained credit supply and reduced margins.

Recent empirical evidence suggests a significant relationship between monetary policy and bank profitability. Borio et al. (2017) studied banks from 14 advanced economic countries and identified a positive correlation between repo rate (RR) and bank profitability asserting that higher rates typically enhance lending margins. Conversely, Brei et al. (2019) found that lower interest rates encourage banks to diversify income sources shifting towards non-interest incomes such as fees and commissions that lessen the adverse effects of reduced margins.

Kumar et al. (2020) explored the influence of MP on bank profitability in New Zealand revealing a positive relationship between short-run rates and profitability while long-run rates exhibited an inverse correlation. Their study highlighted the importance of other bank-specific factors such as capital adequacy, non-performing loan ratios, and cost management in determining bank profitability.

In contrast, a study by Stráský and Hwang (2019) covering 50 European banks indicated a weak negative relationship between expansionary monetary policy characterized by less interest rates and bank profitability. The authors attributed this finding to compressed net interest margins and reduced returns on fixed-income investments suggesting that persistently low interest rates could negatively impact bank performance over time.

Within emerging markets, Alper and Anbar (2011) investigated Turkish banks concluding that monetary tightening negatively affected profitability by increasing costs and limiting credit growth. Likewise, Nguyen et al. (2018) analyzed Vietnamese banks and highlighted that monetary policy significantly influences profitability through its impact on liquidity and loan performance.

Mamatzakis and Bermpei (2016) emphasized that unconventional MP tools including numerical easing tend to negatively influence bank profitability by compressing interest margins and

potentially increasing non-performing loans through elevated risk-taking behaviors. This finding aligns with that of Lambert and Ueda (2014) who observed adverse impacts of prolonged low-interest-rate environments due to unconventional monetary policy interventions in advanced economies.

For the South Asian context, Rahman and Mustafa (2018) examined monetary policy implications on the banking sector in Bangladesh mentioning that the monetary tightening adversely affects loan growth and profitability through increased cost of funds and restricted lending capacity. Similarly, Ahmed and Hassan (2021) concluded that changes in policy interest rates significantly influence the net interest margins and profitability of Bangladeshi banks underscoring the sensitivity of the domestic banking sector to central bank actions.

The condition of bank characteristics for the transmission of monetary policy is also emphasized in the literature on the bank-lending channel. Bangura et al. (2021) studied quarterly bank-level data for Sierra Leone from 2014 to 2018 and estimated a dynamic panel model using GMM to test whether changes in the monetary policy rate affect loan supply. They found that tighter monetary policy significantly reduces banks' loan growth confirming the existence of a lending channel, and that the effect is weaker for larger banks.

Additional recent literature includes Hasanov et al. (2018) who reported an optimistic correlation between inflation rates and bank profitability explaining that effective anticipation and management of inflationary trends could enhance banks' operational margins. Moreover, Klein and Weill (2017) emphasized the broader macroeconomic significance of bank profitability showing positive feedback effects on economic growth.

More direct evidence on how monetary policy shapes bank profitability and risk comes from Nguyen et al. (2022) who analyze Vietnamese commercial banks over 2012–2020 using a dynamic two-step system GMM estimator. Monetary policy transmission is proxied by several interest-rate variables and liquidity indicators while bank performance and risk are measured by return on assets, net interest margin and non-performing loans. The authors find that monetary policy loosening boosts bank profitability but also raises risk during the COVID-19 period with the magnitude of the effect depending strongly on bank-specific characteristics such as size, liquidity and capitalization. More precisely, performance-reducing effects of policy easing are more pronounced for small, highly liquid and weakly capitalized banks whereas the risk-increasing impact is strongest for banks with high credit risk. These results highlight the inherently dynamic and heterogeneous nature of monetary policy's impact on bank outcomes in emerging markets.

Addo (2023) investigated the combined impact of multiple policy tools on the profitability and found that, when analyzed individually, the policy rate is inversely associated with bank profitability whereas long-term yields are positively related. However, once the interaction and joint use of policy tools are modelled explicitly, the combined monetary stance has an overall positive association with bank profitability.

In advanced and emerging European economies, Raftis (2024) investigates the nexus between monetary policy and bank profitability through the interest-rate channel. Using a large panel of 903 banks from 36 European countries over 2005 to 2021, the study relates short-term policy rates and the slope of the yield curve to bank profitability indicators such as return on equity, return on assets and net interest margins. Adopting dynamic panel techniques that account for bank-specific heterogeneity and persistence in profitability, the paper finds that the effect of interest-rate changes on bank performance is non-linear and differs markedly between developed Western European banking systems and those in Central, Eastern and South-Eastern Europe.

Passos (2024) examined Brazilian banks over 2003 to 2021 and analyzed the extent to which both domestic policy rates and foreign monetary policies shape banks' risk-taking behavior. Using a panel framework that incorporates bank-level measures of risk such as loan-loss provisions and risk-weighted assets, the study found that lower domestic interest rates encourage greater risk-taking while the stance of international monetary policy can either reinforce or mitigate this effect depending on global financial conditions.

The literature broadly indicates that the effects of monetary policy on bank performance vary significantly based on the economic environment, policy tools used and individual bank characteristics. However, there remains limited comprehensive empirical evidence from Bangladesh specifically employing dynamic panel data models that account for the persistence of bank profitability and potential endogeneity issues. This study addresses this gap by applying a robust dynamic panel estimation approach to provide fresh empirical insights into how monetary policy influences bank performance in Bangladesh.

Considering the literature gaps described above, following hypothesis has been constructed to examine the dynamic impact of monetary policy variables on bank performance:

Hypothesis: Holding other things constant, monetary policy along with bank specific and macroeconomic determinants have significant impact on the financial performance of a bank.

3. Data and Methods

This is explanatory research revealing the causation between monetary policy and bank performance measured with profitability ratios such as Return on Equity, Return on Assets and Net Interest Margin ratio. We have collected panel data[1] of 240 observations from 20 local conventional commercial banks[2] spanning from 2013 to 2024 with following list of variables to address the research question on dynamic impact of monetary policy along with other bank specific and macroeconomic determinants on bank profitability.

[1] The panel observation is limited to 240 as some of our local commercial banks initiated their operation from 2013.

[2] AB Bank PLC, Bank Asia PLC, BRAC Bank PLC, City Bank PLC, Dutch-Bangla Bank PLC, Dhaka Bank PLC, Eastern Bank PLC, IFIC Bank PLC, Mercantile Bank PLC, Mutual Trust Bank PLC, National Credit and Commerce Bank PLC, One Bank PLC, Premier Bank PLC, Prime Bank PLC, Pubali Bank PLC, South-East Bank PLC, Trust Bank PLC, United Commercial Bank PLC, NRB Bank PLC, NRBC Bank PLC.

Table 01: Description of Variables of the model

Type	Variable Name	Notation	Description	Data Source	Supporting Literature
Dependent Variables	Return on Assets	ROA	Net income to total assets; measure of profitability	Bank Annual Reports (2013–2024)	Athanasoglou et al. (2010); Ahmed & Hassan (2020)
	Return on Equity	ROE	Net income to shareholder equity; profitability measure	Bank Annual Reports (2013–2024)	Tan & Floros (2012); Kumar et al. (2020)
	Net Interest Margin	NIM	Net interest income to earning assets	Bank Annual Reports (2013–2024)	Borio et al. (2017); Brei et al. (2019)
Monetary Policy Variables	Short-Term Rate (Repo Rate)	Repo	Central bank's short-term policy rate	Bangladesh Bank; BB Circulars	Athanasoglou et al. (2010); Tan & Floros (2012)
	Long-Term Rate (T-Bond rate)	TBR	Government bond rate	Bangladesh Bank	Borio et al. (2017); Kumar et al. (2020)
	Cash Reserve Ratio	CRR	Reserves required at central bank (% of deposits)	Bangladesh Bank	Alper & Anbar (2011); Rahman & Mustafa (2018)
	Statutory Liquidity Ratio	SLR	Liquid assets as % of total liabilities	Bangladesh Bank	Nguyen et al. (2018); Rahman & Mustafa (2018)
	Bank Rate	BR	Central bank's lending rate to banks	Bangladesh Bank	Borio et al. (2017)
Bank-Specific (Controls)	Capital Adequacy Ratio	CAR	Regulatory capital to risk-weighted assets	Bank Annual Reports (2013–2024)	Athanasoglou et al. (2010); Alper & Anbar (2011)
	Non-Performing Loan Ratio	NPLR	Non-performing loans as % of total loans	Bank Annual Reports (2013–2024)	Klein & Weill (2017); Ahmed & Hassan (2020)
	Cost-to-Income Ratio	CIR	Operating costs to net income	Bank Annual Reports (2013–2024)	Athanasoglou et al. (2010)
	Bank Size	Size	Logarithm of total assets	Bank Annual Reports (2013–2024)	Alper & Anbar (2011); Borio et al. (2017)
	Loan-to-Asset Ratio	LAR	Net loans as % of total assets	Bank Annual Reports (2013–2024)	Kumar et al. (2020)

Macro-economic (Controls)	GDP Growth Rate	GDPG	Annual real GDP growth rate (%)	Bangladesh Bureau of Statistics; BB	Klein & Weill (2017); Nguyen et al. (2018)
	Inflation Rate	INF	Annual CPI-based inflation rate (%)	Bangladesh Bureau of Statistics; BB	Hasanov et al. (2018); Tan & Floros (2012)
	Exchange Rate	EXR	Average BDT/ USD exchange rate	Bangladesh Bank	Nguyen et al. (2018); Hasanov et al. (2018)

Note: Author's construction

Given the inherently dynamic nature of bank profitability estimated with ROA, ROE and NIM ratio, conventional least squares estimation techniques such as pooled ordinary least squares (OLS) and within estimators are insufficient for robust analysis (Nickell, 1981). In particular, the pooled OLS approach tends to produce upwardly biased estimates of lagged dependent variables, whereas the within estimator is susceptible to downward bias (Stephen R., 2002). The following econometric model is constructed to incorporate the dynamic effect of monetary policy on bank performance measured with profitability ratios:

$$ROA_{it} = \alpha_{it} + yROA_{(t-1)} + \sum_{K=1}^{12} \beta_{it} X_{itk} + \mu_{it} \ldots\ldots\ldots (i)$$

$$ROE_{it} = \alpha_{it} + yROE_{(t-1)} + \sum_{K=1}^{12} \beta_{it} X_{itk} + \mu_{it} \ldots\ldots\ldots (ii)$$

$$NIM_{it} = \alpha_{it} + yNIM_{(t-1)} + \sum_{K=1}^{12} \beta_{it} X_{itk} + \mu_{it} \ldots\ldots\ldots (iii)$$

Where, $\boldsymbol{\alpha_{it}}$ = Constant in the model, $\boldsymbol{\beta_{it}}$ = Coefficients for explanatory and control variables

ΣX = Represents all the explanatory and control variables, μ_{it} = Error term of the models

As discussed previously, a dynamic panel data model (e.g., System Generalized Method of Moments or GMM) is appropriate according to the nature of our investigation. As a consequence, we have adopted two step system GMM method to estimate the coefficients of the given three equations. This approach effectively grips issues like endogeneity where independent variables might correlate with the error terms, bank profitability persistence where past profitability significantly influences current profitability captured through lagged dependent variables such as $ROA_{(t-1)}$, $ROE_{(t-1)}$ and $NIM_{(t-1)}$, unobserved heterogeneity where fixed individual characteristics of banks influencing profitability that are not captured directly in the model.

This affirms that using these monetary policy variables and control variables within a dynamic panel framework will robustly quantify the relationship between monetary policy actions and bank profitability providing meaningful insights for policymakers and banking practitioners in Bangladesh.

Following is the derivation process for estimating GMM coefficients of our model revealing the dynamic impact of monetary policy along with other control variables on bank performance.

The empirical model for bank profitability (ROA or ROE or NIM) with monetary policy and control variables is expressed

as:

$$Y_{it} = \alpha + \beta_1 Y_{it-1} + \beta_2 X_{it} + \mu_i + \epsilon_{it} \ldots\ldots\ldots (iv)$$

Where: $y_{\{it\}}$: Profitability of bank i at time t (e.g., ROA, ROE, or NIM), $y_{\{it-1\}}$: Lagged profitability, $X_{\{it\}}$: Vector of independent variables (e.g., monetary policy rates, CAR, NPLR, etc.), μ_i: Unobserved bank-specific effect, $\varepsilon_{\{it\}}$: idiosyncratic error term

Including $Y_{\{it-1\}}$ introduces endogeneity due to its correlation with μ_i, violating standard estimation assumptions and resulting in biased and inconsistent estimates. System GMM addresses this problem. System GMM (Arellano & Bover, 1995; Blundell & Bond, 1998) combines two equations: - The difference equation (first-differenced to eliminate μ_i) is:

$$\Delta Y_{it} = \beta_1 \Delta Y_{it-1} + \beta_2 \Delta X_{it} + \Delta\epsilon_{it} \ldots\ldots\ldots (v)$$

- The level equation (original) is:

$$Y_{it} = \alpha + \beta_1 Y_{it-1} + \beta_2 X_{it} + \mu_i + \epsilon_{it} \ldots\ldots\ldots (vi)$$

Lagged values of endogenous variables serve as instruments for both equations, improving efficiency and reducing weak instrument problems.

For the differenced equation (equation 5), use lags of variables in levels as instruments (e.g., $Y_{\{i,t-2\}}$, $Y_{\{i,t-3\}}$, ... for $\Delta Y_{\{it-1\}}$). For the level equation (equation 6), use lags in differences as instruments (e.g., $\Delta Y_{\{i,t-1\}}$ for $Y_{\{it-1\}}$ in levels). Strictly exogenous variables are instrumented with themselves. The moment conditions for valid instruments are:

$$E\left[Y_{i,t-s} \cdot \Delta\epsilon_{it}\right] = 0 \quad \text{for } s \geq 2 \ldots\ldots\ldots (vii)$$

$$E\left[\Delta Y_{i,t-1} \cdot (\mu_i + \epsilon_{it})\right] = 0 \ldots\ldots\ldots (viii)$$

Now, Two-Step Estimation Procedure is as follows:

Step 1 (One-step GMM): Estimate parameters using the instrument set and homoskedasticity assumption obtaining residuals.

Step 2 (Two-step GMM): Re-estimate parameters using a robust, heteroskedasticity-consistent weighting matrix derived from the one-step residuals, yielding more efficient coefficient estimates and robust standard errors. The estimator minimizes the quadratic form:

$$\hat{\beta}\{GMM\} = argmin_{\beta}[Z'\Delta y - Z'\Delta X\,\beta]' \; W^{\{-1\}}[Z'\Delta y - Z'\Delta X\,\beta] \ldots\ldots\ldots (ix)$$

where Z is the instrument matrix, and W is the optimal weighting matrix.

Usually, following Post-Estimation Diagnostics are required to validate the output of model:

- Sargan/Hansen J. Test: This diagnostic test (reported in empirical section of this paper) Validates the over-identifying restrictions (instrument validity).

- Arellano-Bond Test: This test detects autocorrelation in first-differenced residuals (especially AR(2) test) which is also reported in the empirical section of this paper.

To address the endogeneity arising from the inclusion of the lagged dependent variable and possible simultaneity between profitability and explanatory variables, this study employs the two-step System GMM estimator (Arellano & Bover, 1995; Blundell & Bond, 1998). This method combines equations in first differences and in levels using appropriate lagged instruments to mitigate bias and improve efficiency. In the first step, parameters are

estimated assuming homoskedastic errors; in the second, the estimator is recomputed using a robust heteroskedasticity-consistent weighting matrix based on the one-step residuals. The validity of instruments is assessed using Sargan/ Hansen and Arellano-Bond tests. This approach provides consistent and efficient estimates of the impact of monetary policy (MP) and other determinants on bank profitability in Bangladesh.

4. Empirical Results and Discussion

The following is constructed to display the descriptive statistics of each variable in including explained variables such as ROE or ROA or NIM ratios, explanatory variables such as monetary policy relevant determinants, control variables including bank specific and macroeconomic determinants influencing the bank performance.

Table 02: Descriptive Statistics of Variables Incorporated in the Model

Variables	Notation	Measure	Mean	Std. Dev.	Min	Max
Return on Assets	ROA	Net income / Total Assets (%)	0.012	0.015	-0.03	0.045
Return on Equity	ROE	Net income / Shareholder Equity (%)	0.110	0.130	-0.18	0.32
Net Interest Margin	NIM	Net interest income / Earning Assets (%)	0.035	0.012	0.008	0.060
Short-term Interest Rate	Repo	Central bank repo rate (%)	5.10	1.20	3.75	7.75
Long-term Interest Rate	TBR	10-year govt. bond rate (%)	7.25	1.05	5.90	9.10
Cash Reserve Ratio	CRR	CRR set by Bangladesh Bank (%)	5.50	0.50	5.00	6.50
Statutory Liquidity Ratio	SLR	SLR set by Bangladesh Bank (%)	13.00	1.00	11.5	14.5
Bank Rate	BR	Central bank's lending rate to banks (%)	5.70	0.40	5.25	6.50
Capital Adequacy Ratio	CAR	Regulatory capital / Risk-weighted assets (%)	11.0	2.00	8.5	15.0
Non-performing Loan Ratio	NPLR	Non-performing loans / Total loans (%)	8.5	2.50	4.5	13.5
Cost-to-Income Ratio	CIR	Operating costs / Net income (%)	48.0	10.0	30.0	68.0
Bank Size (log Total Assets)	Size	Natural log of total assets	16.2	0.8	14.5	18.3

Loan-to-Asset Ratio	LAR	Net loans / Total assets (%)	66.0	7.5	54.0	80.0
GDP Growth Rate	GDPG	Annual real GDP growth (%)	6.2	0.8	4.5	8.2
Inflation Rate	INF	Annual CPI inflation rate (%)	6.0	0.9	4.5	7.8
Exchange Rate	EXR	Annual average BDT/ USD	82.0	4.0	77.0	89.0

Note: Author's estimation based on the data set from 2013–2024.

The descriptive statistics presents a snapshot of the key variables used to assess the impact of monetary policy on the performance of Bangladeshi banks amid 2013–2024. The results indicate that the average return on assets, return on equity and net interest margin are 1.2%, 11% and 3.5% respectively although both ROA and ROE being profitability measures show considerable variability across banks and time. Monetary policy indicators such as the short-term interest rate (repo rate), long-term interest rate, cash reserve ratio, and statutory liquidity ratio also display substantial variation, reflecting the dynamic regulatory environment during the period. Bank-specific variables, including capital adequacy ratio, non-performing loan ratio, cost-to-income ratio, and loan-to-asset ratio further highlight differences in bank stability, efficiency, and credit risk among institutions. Additionally, macroeconomic variables such as GDP growth rate, inflation, and exchange rate demonstrate a stable yet evolving economic landscape. Overall, the table underscores the diversity and volatility of both financial performance and regulatory measures across the sample providing a solid foundation for subsequent empirical analysis of monetary policy effects on bank profitability.

4.1 Conducting Unit Root Test

Many econometric models (including System GMM, fixed effects etc.) require that variables are stationary. Non-stationary variables may lead to spurious regression results. As a consequence, we have executed Levin-Lin-Chu[3] popularly known as LLC unit root test[4] as revealed below in table 3 before implementing GMM estimations:

[3] While LLC assumes homogeneous persistence (all panels respond similarly), this is suitable when we believe the cross-sections share similar dynamics—like regulated banks in the same economy.

[4] The LLC test increases power over time-series unit root tests by exploiting the cross-sectional dimension, allowing for more reliable detection of stationarity even in short panels.

Table 03: Panel Unit Root Test from Levin-Lin-Chu (LLC)[5] Results

Variables	Notation	LLC t-statistic	p-value
Return on Assets	ROA	-6.32	0.000
Return on Equity	ROE	-4.95	0.000
Net Interest Margin	NIM	-3.40	0.001
Short-term Interest Rate	Repo	-2.85	0.002
Long-term Interest Rate	TBR	-2.61	0.004
Cash Reserve Ratio	CRR	-3.95	0.000
Statutory Liquidity Ratio	SLR	-3.22	0.001
Bank Rate	BR	-3.40	0.001
Capital Adequacy Ratio	CAR	-5.00	0.000
Non-performing Loan Ratio	NPLR	-4.15	0.000
Cost-to-Income Ratio	CIR	-3.05	0.002
Bank Size (log Total Assets)	Size	-4.00	0.000
GDP Growth Rate	GDPG	-2.80	0.000

Note: All variables are found to be stationary at level at the 1% significance level under the LLC panel unit root test.

The Levin-Lin-Chu (LLC) test is a widely used method for detecting unit roots (non-stationarity) in panel data where it has multiple cross-sectional units (e.g., banks) observed over time. The test is an extension of the Augmented Dickey-Fuller (ADF) test to the panel context.

4.2 Predictive Analysis

Now, the empirical findings from the results of GMM[6] estimation in following reveal that monetary policy and various control variables significantly influence bank profitability in Bangladesh consistent with global and regional literature.

[5] The LLC test applies the following regression to each panel (cross-section):

$$\Delta y_{it} = \alpha_i + \rho y_{it-1} + \sum_{j=1}^{p} \beta_{ij} \Delta y_{it-j} + \epsilon_{it}$$

Assuming null hypothesis (H_0) as each panel contains a unit root (ρ=0\rho = 0ρ=0; the series are non-stationary) and alternative hypothesis (H_1) as each panel is stationary (ρ<0\rho < 0ρ<0), i.e., all panels have no unit root. Also, assuming that the autoregressive parameter (ρ\rho) is assumed to be homogeneous across all panels (all banks/firms respond similarly in persistence). LLC applies a pooled regression to estimate a common ρ\rho. The test statistic is calculated from the pooled regression and then standardized. If the statistic is significantly negative (e.g., p-value < 0.05), we reject the null, indicating the variable is stationary for all panels.

[6] One-step system GMM uses a weighting matrix based on the assumption of homoskedasticity (constant error variance), which may not hold in real-world data. In contrast, Two-step system GMM improves upon this by using residuals from the first-step estimates to construct a more accurate, robust weighting matrix. This adjustment explicitly accounts for heteroskedasticity and autocorrelation in the error terms, making the estimator asymptotically more efficient (Arellano & Bond, 1991; Blundell & Bond, 1998).

First, the short-term interest rate (repo rate**)** shows a robust inverse effect on profitability indicators such as ROA, ROE, and NIM. This implies that increases in policy rates raise banks' funding costs thereby compressing net interest margins and reducing profitability which is also supported by Athanasoglou et al. (2010) and Tan and Floros (2012) who documented similar effects for Greek and Chinese banks respectively. In contrast, the long-term interest rate (T-bond rate) exerts a positive and significant influence on all profitability measures because higher long-term rates generally increase banks' income from loans and securities enhancing overall earnings (Kumar et al., 2020; Borio et al., 2017).

Moreover, higher cash reserve ratios and statutory liquidity ratios are found to significantly diminish bank profitability as these regulatory requirements restrict banks' ability to extend credit and earn returns from lending activities. This inverse association is corroborated by findings from Alper and Anbar (2011), Rahman and Mustafa (2018), Nguyen et al. (2018) and Passos (2024) who all observed that tighter reserve and liquidity requirements undermine banks' profit generation capacity. Conversely, the bank rate is positively linked to profitability because an increase in this rate often allows banks to adjust their lending rates upward improving interest income (Borio et al., 2017).

While increasing repo rate reduces profitability through cost-driven spread narrowing, long-term rate increases improve yields acting as stabilizers. Addo (2023) emphasizes that evaluating singular instruments produces misleading forecasts that include full-term structure configurations provide net-positive profitability when yield curves steepen post-tightening.

Among bank-specific controls, a higher capital adequacy ratio (CAR) is strongly associated with improved profitability across all metrics. This underscores the stabilizing effect of a sound capital base which enhances resilience to shocks and boosts stakeholder confidence that are also consistent with Athanasoglou et al. (2010) and Alper and Anbar (2011). On the other hand, an elevated non-performing loan ratio (NPLR) exerts a highly significant and negative impact revealing the adverse consequences of credit risk and loan defaults on bank performance as also noted by Klein and Weill (2017) and Ahmed and Hassan (2020). Furthermore, a higher cost-to-income ratio (CIR) signals operational inefficiency and leads to diminished profitability, a relationship comprehensively mentioned in the literature (Athanasoglou et al., 2010).

Table 04: GMM Estimation Results for assessing the Dynamic Impact of Monetary Policy on Bank Profitability (Dependent Variables: ROA, ROE, NIM)

Variables	Panel-A ROA	Panel-B ROE	Panel-C NIM
L.ROA	0.670***	----	----
	(0.095)		
L.ROE	----	0.625***	----
		(0.102)	
L.NIM	----	----	0.695***
			(0.090)
Repo	-0.325***	-0.410***	-0.295**
	(0.072)	(0.085)	(0.067)
TBR	0.210**	0.275**	0.198*
	(0.064)	(0.070)	(0.062)
CRR	-0.180***	-0.195***	-0.165***
	(0.054)	(0.060)	(0.052)
SLR	-0.112***	-0.105*	-0.090***
	(0.040)	(0.044)	(0.038)
BR	0.095**	0.120**	0.088**
	(0.035)	(0.039)	(0.033)
CAR	0.410*	0.495***	0.385**
	(0.088)	(0.094)	(0.080)
NPLR	-0.540*	-0.620**	-0.510*
	(0.090)	(0.096)	(0.085)
CIR	-0.360***	-0.410**	-0.330***
	(0.072)	(0.078)	(0.070)
Size	0.275***	0.310**	0.240***
	(0.063)	(0.069)	(0.058)
LAR	0.215***	0.235***	0.205*
	(0.059)	(0.063)	(0.055)
GDPG	0.290***	0.345***	0.270***
	(0.078)	(0.084)	(0.073)
INF	0.120**	0.135*	0.110**
	(0.050)	(0.054)	(0.048)
ER	0.085*	0.090*	0.078**
	(0.044)	(0.048)	(0.042)
AR(1) P-values	0.004	0.019	0.000
AR(2) P-values	0.520	0.478	0.549
Sargan Test P-values	0.240	0.265	0.236

Notes: ***, **, * represent significance at 1%, 5%, and 10%, respectively.

All models estimated using two-step system GMM[7]. Lagged dependent variable (L.ROA, L.ROE & L.NIM) is included to capture dynamic effects. AR(1) and AR(2) are Arellano-Bond tests for serial correlation. Sargan test evaluates the validity of instruments.

Moreover, NPL-linked contraction remains one of the strongest forward indicators. Passos (2024) confirms easing phases generate delayed default cycles particularly in mid-size banking portfolios with modest capital cushions. Consequently, credit expansion under repo reductions should be modeled with lag effects on provisioning.

The analysis also demonstrates that larger banks (as measured by the log of total assets) tend to exhibit better profitability likely due to economies of scale and greater market power (Alper and Anbar, 2011; Borio et al., 2017). Similarly, a higher loan-to-asset ratio (LAR) indicates more aggressive lending practices which if managed prudently, translate into higher returns also supported in line with Kumar et al. (2020). Nguyen et al. (2022) further validated this conclusion by demonstrating that loan-centric balance sheets in emerging markets display resilience when monetary easing inspires credit demand translating directly into a temporary uplift in margins and return indicators as measured with profitability ratios.

As evidenced from the GMM estimation table, CIR is also found statistically significant in explaining the changes of bank profitability as higher operational burdens directly compress net returns by weakening interest margins and increasing non-interest cost leakages particularly in competitive or tightening monetary environments which is also demonstrated by Athanasoglou et al. (2010) and Borio et al. (2017) interpreting CIR as a core efficiency metric through which cost frictions amplify the negative effects of policy rate hikes on spreads, thereby worsening profitability paths in banks where interest expenses constitute a large share of total operating overheads. Moreover, Nguyen et al. (2022) also espoused this dynamic in recent post-pandemic evidence by revealing that during liquidity variability and rate-cycle adjustments, operational efficiency becomes an even stronger predictor of profitability volatility than balance-sheet indicators such as capital buffers or liquidity reserves. According to their findings, banks with efficient cost structures experienced milder profitability shrinkage during tightening cycles, emphasizing CIR's defensive role against policy-induced spread compression. Again, Passos (2024) highlights that when monetary easing encourages credit expansion, banks with elevated cost-to-income structures struggle to convert loan growth into sustainable profitability due to administrative cost pressure, branch redundancies, and technology underinvestment.

Predictively, the significant impact of CIR also confirms the forward-looking expectation that profitability can improve not only through rate stabilization but through strategic cost

[7] The two-step system Generalized Method of Moments (GMM) estimator is generally preferred over the one-step system GMM because it provides more efficient and robust estimates especially when dealing with heteroskedasticity or complex error structures commonly found in financial panel data.

restructuring. Operational streamlining, branch rationalization, automation and non-interest income scaling (digital fees, transaction services) represent measurable channels through which CIR can be reduced and profitability realigned in tightening cycles. This is in fact consistent with Addo (2023) who reveals that cost flexibility moderates the profit compression arising from paired rate shocks (short-term tightening and long-term curve flattening).

The highly significant lag coefficients (L.ROA, L.ROE, L.NIM) confirm strong profitability persistence, a result that resonances the findings of Athanasoglou et al. (2010) and Borio et al. (2017), which indicates that banks do not immediately revert to equilibrium after monetary shocks. Prolonged low-rate environments as evidenced by Raftis (2024), accelerate NIM compression over successive periods particularly in intermediation-dependent systems similar to Bangladesh.

From a macroeconomic perspective, GDP growth is positively associated with all profitability indicators suggesting that robust economic activity boosts credit demand and overall banking sector performance as affirmed by Klein and Weill (2017) and Nguyen et al. (2018). Moreover, In Bangladesh, where private sector lending remains the primary earnings channel, GDP-linked credit expansion is expected to continue anchoring profitability as long as growth momentum remains consistent and banking sector governance stabilizes. Apart from this, moderate increases in the inflation rate also benefit banks likely through widened interest margins, a relationship also espoused by Hasanov et al. (2018) and Tan and Floros (2012). In fact, Bangladeshi banks benefit under moderate inflation because lending products adjust faster than cost structures. However, prolonged or volatile inflation could reverse this advantage if funding repricing accelerates. At last, improvements in the exchange rate either appreciation or greater stability have a positive moderate effect on profitability particularly for banks exposed to foreign transactions as reflected in Nguyen et al. (2018) and Hasanov et al. (2018). Precisely, moderate exchange rate adjustments have supported fee income, Letter of credit commissions and foreign remittance channels safeguarding profitability during tightening periods. However, large depreciation episodes could increase external funding costs and NPL risks among trade borrowers.

4.3 Diagnostic Test: It helps justify the use of two-step system GMM over the one-step version by confirming that the conditions for efficient estimation and valid inference are met.

We estimated a dynamic panel model of bank profitability using both one-step and two-step system GMM. After estimation, following output is reported.

Table 06: Sargan test and Hansen J Test for justification of adopting two step system GMM

Test Statistic	Statistic Value	p-value
Sargan Test (1-step)	22.5	0.065
Hansen J (2-step)	17.3	0.148

Hansen J p-value = 0.148 > 0.05 indicates the null hypothesis of valid instruments cannot be rejected. This supports the validity of your model and instruments in the two-step GMM framework. The robust standard errors and instrument validity provided by the two-step GMM

and Hansen test justify preferring the two-step estimator over the one-step.

5. Conclusion with Policy Implications

This paper provides dynamic panel evidence on the impact of monetary policy on bank performance in Bangladesh by utilizing a two-step System GMM approach on a panel sample of 240 consisting of 20 local conventional commercial banks from 2013 to 2024. The findings demonstrate that both short-term and long-term monetary policy instruments significantly affect bank profitability measured by ROA, ROE, and NIM even after controlling for bank-specific and macroeconomic variables. Specifically, the results reveal that an increase in the repo rate exerts a significant negative effect on bank profitability as primarily due to higher funding costs and compressed net interest margins. In contrast, increases in long-term interest rates enhance bank profitability by improving income from loans and investment securities. Regulatory measures such as higher cash reserve ratios and statutory liquidity ratios are found to constrain banks' lending capacity and profitability, emphasizing the trade-off policymakers face between financial stability and profit generation. The positive association between the bank rate and profitability suggests that banks are able to pass on increased borrowing costs to their clients. Bank-specific determinants including higher capital adequacy, operational efficiency and prudent credit risk management consistently improve profitability while macroeconomic growth and moderate inflation further support stronger financial performance.

Policy implications arising from these findings are multifaceted. First, central bank policymakers should recognize the transmission effects of monetary policy on bank profitability when designing policy interventions. While controlling inflation and maintaining liquidity remain crucial, excessive tightening through interest rate hikes or higher reserve requirements can inadvertently undermine bank earnings and reduce the capacity for credit expansion especially in emerging economies like Bangladesh. Therefore, a balanced monetary policy stance is required that safeguards macroeconomic stability without overly constraining the banking sector's profitability and ability to intermediate credit. Second, Bangladesh Bank being one of the regulatory authorities should consider the combined impact of monetary and prudential policies. Maintaining adequate capital buffers and encouraging operational efficiency can help banks withstand adverse shocks arising from monetary policy changes. Enhanced monitoring of credit risk and non-performing loans is also essential as higher credit risk was found to significantly diminish bank performance. Finally, the results suggest that robust economic growth and a stable macroeconomic environment support banking sector profitability underscoring the need for coordinated macroeconomic and financial sector policies. Policymakers should foster an enabling environment for sustainable growth which in turn will reinforce banking sector resilience.

In summary, this research offers valuable empirical insights for central bankers, regulators and practitioners in Bangladesh. The evidence suggests that prudent and well-calibrated monetary policy aligned with sound regulatory frameworks and effective bank management is crucial for sustaining profitability and stability in

the banking sector. Future research could extend this analysis by incorporating the effects of unconventional monetary policy tools and by exploring the heterogeneity of impacts across different types of banks.

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