

Impact of Monetary Policy Instruments on Profitability: A Case of Nepalese Commercial Banks

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ABSTRACT

This study examines the impact of monetary policy instruments on the profitability of Nepalese commercial banks from 2013 to 2022. It analyzes the relationship between bank profitability and monetary policy tools such as money supply, treasury bill investments, interest rates, cash reserve ratio (CRR), statutory liquidity ratio (SLR), and bank rate. The study uses a descriptive and correlational research design based on secondary data from twenty Nepalese commercial banks. Data were collected from Nepal Rastra Bank reports and annual bank reports. Descriptive statistics, correlation analysis, and linear regression were employed to assess relationships between monetary policy variables and bank performance measured by return on assets (ROA) and return on equity (ROE). The results show that changes in monetary policy parameters significantly affect bank profitability. The cash reserve ratio had a negative impact on ROE, while the bank rate negatively influenced ROE as well. The money supply exhibited a negative correlation with both ROA and ROE. Effective management of monetary policy instruments can enhance commercial banks' profitability in Nepal. Recommendations include managing CRR levels, maintaining low bank rates, encouraging treasury bill investments, and minimizing SLR to improve financial performance.

Keywords: monetary policy, profitability, commercial banks, cash reserve ratio, bank rate

Introduction

Monetary policy is a strategic framework designed and implemented by a country's central bank to manage the money supply in order to achieve key macroeconomic objectives such as economic stability, inflation control, optimal employment, and sustained economic growth. It serves as a regulatory tool through which the central bank influences economic activity by controlling the money supply in accordance with predefined macroeconomic goals (Imoughle & Ismaila, 2014).

Monetary policy affects various economic factors, including bank credit, inflation rates, interest rates, national production, and employment. According to Mankiw (2013), monetary policy operates through two primary approaches: expansionary and contractionary policies. An expansionary policy aims to increase the money supply to stimulate economic growth, while contractionary policy seeks to reduce it to curb inflation. These policies significantly impact macroeconomic variables such as inflation, GDP, and employment (Reddy, 2011).

Monetary policy also contributes to the operational efficiency and profitability of banks, indirectly fostering long-term economic development. Mishra and Mishra (2024) emphasize that financial development is essential for enabling transactions across economic sectors. In an open economy, monetary policy affects economic activities through exchange rates and interest rates, with the latter playing a particularly significant role due to its impact on both short- and long-term market interest rates (Mishra & Paneru, 2021). Zaman et al. (2014) note that fluctuations in interest rates can affect banking operations, with larger banks typically being better positioned to manage these changes.

Countries like Nepal, with abundant labor and limited capital, must attract investment to address the capital gap and enhance productivity (Mishra et al., 2017). Governments use monetary policy extensively to regulate banking sector activities, with various tools that influence bank profitability. The effectiveness of these tools varies between developed and developing economies. Rao and Somaia (2006) find that monetary policy contributes to economic growth, optimal resource use, and the stabilization of interest and exchange rates. However, achieving goals like price stability and full employment can sometimes conflict in the short term, requiring intermediate targets to align with long-term macroeconomic objectives (Mishra et al., 2017).

Monetary policy tools are classified into quantitative and qualitative categories. Quantitative tools, such as bank rates, reserve requirements, and open market operations, manage money supply and credit. Qualitative tools, including selective credit controls and margin lending, focus on influencing credit distribution and availability (Zaman et al., 2014). In Nepal, Khatiwada (1994) emphasizes the stabilizing role of monetary policy in the economy. The Nepal Rastra Bank introduced monetary policy in 1960, employing tools like interest rate adjustments and cash reserve ratios. By the 1990s, Nepal shifted to indirect control mechanisms, with open market operations becoming central (Pokharel, 2009). The 2015/16 Monetary Policy

prioritized strengthening the capital base of commercial banks, ensuring price stability, and promoting growth despite political transitions and agricultural conditions.

Historical analyses, such as Sigdel (2006), demonstrate the evolution and effectiveness of Nepalese monetary policy, while Reddy and Prabhu (2005) highlights its role in fostering a competitive financial environment, positively affecting commercial bank profitability. Current research aims to fill the gap in understanding the relationship between monetary policy tools and firm profitability, specifically in Nepal's commercial banking sector. This research is crucial for advancing knowledge on how monetary policy influences economic outcomes and bank performance.

Overall, research into the link between monetary policy tools and firm profitability is of significant importance for understanding the impact of monetary policies on business performance and economic stability. While similar studies have been conducted internationally, there remains a gap in up-to-date data, particularly in Nepal. Therefore, the focus of this research is to explore this relationship in Nepal's commercial banking sector, bridging the knowledge gap with current and relevant data.

Problem Statement

This study seeks to examine the impact of monetary policy on the profitability of Nepalese commercial banks, focusing on key financial indicators such as return on assets (ROA), return on equity (ROE), net interest margin (NIM), cash reserve ratio (CRR), statutory liquidity ratio (SLR), investments in treasury bills (ITB), bank rates (BR), and broad money supply (MS). The role of monetary policy in shaping bank lending operations and borrower credit reliance is crucial, with the credit channel acting as a central mechanism through which banks adjust to monetary policy changes (Morris & Sellon, 1995). A specific area of focus is the reserve requirements, which influence banks' ability to extend credit by mandating that a certain percentage of domestic deposits be held in reserves with the central bank (Okoye & Eze, 2013).

Previous studies, such as those by Zaman et al. (2014), highlight the negative relationship between interest rates and firm profitability, as measured by return on equity (ROE) and return on assets (ROA). Additionally, Imoughele and Ismaila (2014) classified monetary policy instruments into qualitative and quantitative categories, with indirect tools like open market operations, cash reserve ratios, and bank rates being pivotal in liberalized financial systems (Rao & Somaiya, 2006). Despite the significance of these relationships, limited research has been conducted on the specific impact of monetary policy on the profitability of banks in Nepal, especially with recent data.

While studies in other countries, such as Punita and Somaiya's (2006) analysis of Indian banking institutions, offer valuable insights into the relationship between lending rates and bank profitability, research on the application of these findings within the context of Nepal's financial system remains scarce. Notably, Nepal's financial system faces challenges like high information asymmetry, underdeveloped infrastructure, and low financial stability (Budha, 2015), factors that may influence the dynamics of monetary policy and bank profitability in unique ways. This study aims to fill the gap in the literature by analyzing the impact of recent monetary policy tools on the performance of Nepalese commercial banks, thus providing valuable insights into how these tools affect bank profitability within the country's evolving financial landscape.

Research Objective

The major objective of the study is to investigate the impact of monetary policy instruments on firms' profitability in the context of Nepalese commercial banks.

Literature Review

Monetary policy plays a pivotal role in shaping economic dynamics, particularly in influencing aggregate demand and regulating key financial activities. Ghimire (2006) emphasizes that before Nepal's economic liberalization, the Nepal Rastra Bank (NRB) primarily employed direct monetary instruments such as interest rates, margin rates, and

statutory liquidity requirements (SLR) to manage the economy. Post-liberalization, however, the focus shifted to indirect tools such as open market operations (OMO), cash reserve ratios (CRR), and adjustments in bank rates. Despite these efforts, Nepal's monetary policy has faced challenges in achieving its objectives, as changes in the money supply alone do not fully explain fluctuations in price levels and other economic variables.

Budha (2013) explored the impact of monetary tightening on bank lending in Nepal, finding that restrictive monetary policies result in reduced lending activity. Larger banks exhibited greater resilience in maintaining loan availability, while private sector banks' liquidity levels significantly impacted their ability to respond to policy changes. Interestingly, bank capitalization was not found to influence lending activities significantly, but the overall economic growth, as measured by GDP, was strongly linked to bank lending dynamics.

Subedi (2014) focused on monetary policy as a tool for achieving price stability and balancing money supply with demand. The study highlighted how discrepancies between money supply and demand lead to inflationary or deflationary trends in the economy. In particular, Subedi argued that high interest rates attract foreign investment, thereby supporting financial stability while combating inflation. This strategy, however, can discourage borrowing and speculative investments, especially in foreign currencies.

Budha (2015) further examined the transmission mechanisms of Nepalese monetary policy, identifying challenges such as high information asymmetry, inadequate financial infrastructure, and concerns about financial stability. Despite these issues, the study found that transmission channels like the asset price, interest rate, and bank lending channels are still operational. These channels suggest that NRB's policies can achieve their objectives within specific time frames, provided that the hindrances to effective policy implementation are addressed.

Pradhan and Shrestha (2016) investigated the relationship between liquidity and the performance

of Nepalese commercial banks, focusing on key financial indicators such as investment ratios, liquidity ratios, capital ratios, and quick ratios. The study found a positive correlation between capital ratios and return on equity (ROE), while a negative relationship was observed between the quick ratio and ROE. The analysis suggested that improving the capital and investment ratios could enhance the profitability of banks.

Shrestha (2018) explored the impact of liquidity management on profitability in Nepalese commercial banks. The study found that liquidity management, while essential for mitigating risks, did not have a direct impact on profitability. The analysis highlighted the role of liquidity measures such as the current reserve ratio (CRR) and credit deposit ratio (CDR) in ensuring smooth banking operations, though their influence on financial performance was limited.

Pokharel (2019) analyzed how liquidity availability affects bank profitability in Nepal, noting mixed results in the relationship between liquidity ratios and profitability. The study found that effective liquidity management could enhance profitability, although liquidity ratios often fell below regulatory requirements. Positive correlations were observed between CRR and return on assets (ROA), while a negative correlation existed between current ratios (CR) and return on equity (ROE). These findings underscore the complex relationship between liquidity and profitability in Nepalese commercial banks.

Shrestha (2020) examined the causal relationship between monetary policy and stock prices in Nepal. The study found an inverse relationship between inter-bank interest rates and stock prices, suggesting that fluctuations in short-term interest rates are crucial in explaining stock price movements. This highlights the importance of interest rate management within Nepal's monetary policy framework, particularly the role of the interest rate corridor introduced by NRB in fiscal year 2016/17.

Dhawal and Timsina (2020) evaluated the effectiveness of excess reserves and interest rates

as operating targets for Nepal's monetary policy. Their study found that open market operations (OMO) need strengthening to better explain the inter-bank rate and that M2 is more influenced by its historical trends than by excess reserves. The research concluded that a dual operating target system, involving both excess reserves and interest rates, aligns well with Nepal's economic environment and ensures better policy outcomes.

Ghimire et al. (2024) analyzed the effects of monetary policy instruments on the profitability of Nepalese commercial banks between 2007/08 and 2021/22. The study revealed varied trends in profitability across banks, with net interest margin (NIM) and broad money supply (M2) showing positive relationships with return on investment (ROI), while CRR and treasury bill rates exhibited negative correlations. Regression analysis confirmed that CRR, bank rates, and M2 significantly influence profitability, highlighting the need for effective management of these monetary policy instruments to enhance bank performance.

Profitability in Nepalese commercial banks is greatly influenced by effective financial policies and sound management practices (Mishra et al., 2021).

The authors noted that building ethical practices within organizations leads to a stronger reputation and trust, ultimately contributing to better financial outcomes (Mishra & Aithal, 2023). Additionally, The study found that factors such as capital adequacy, liquidity management, and operational efficiency have a substantial effect on profitability. The authors also discussed how external factors, such as government policies and market conditions, influence the performance of commercial banks in Nepal, concluding that banks must adapt to these factors to optimize profitability (Mishra & Kandel, 2023).

While existing literature sheds light on the various aspects of monetary policy and its effects on banking profitability, it also reveals significant challenges faced by Nepalese commercial banks. These challenges include the limited impact of liquidity management on profitability and the

complexity of monetary policy transmission channels. Furthermore, the studies emphasize the need for more tailored and effective monetary policy tools to stabilize the banking sector and enhance its profitability.

Conceptual Framework

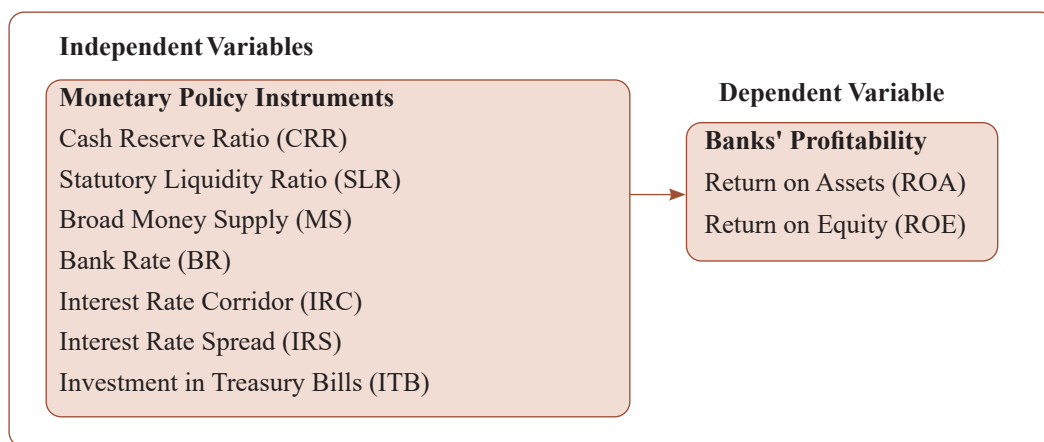
The impact of monetary policy instruments on bank profitability has been explored in various studies, including Ghimire (2006), which highlighted the role of monetary policy in influencing aggregate demand. However, a significant gap in the existing literature is the lack of studies that specifically investigate the impact of monetary policy on the profitability of commercial banks in Nepal. While previous research has addressed the broader effects of monetary policy, none have focused on the predictive relationship

between specific monetary policy instruments—such as Broad Money Supply (M2), Bank Rate (BR), Statutory Liquidity Ratio (SLR), Cash Reserve Ratio (CRR), and Investment in Treasury Bills (ITB)—and the profitability of Nepalese commercial banks.

Furthermore, the majority of existing studies have used outdated data or have not concentrated on recent economic conditions. This study seeks to fill this gap by examining the period from 2013 to 2022, incorporating more current data that may offer new insights into the relationship between monetary policy instruments and bank profitability. Thus, this research aims to contribute to a more nuanced understanding of how monetary policy tools directly affect the performance of the banking sector in Nepal, addressing a notable gap in the literature.

Figure 1

Conceptual Framework



Hypothesis

Hypotheses Development

Based on the literature review, the following hypotheses have been developed to guide this study:

H1: There is a significant relationship between the cash reserve ratio (CRR) and banks' profitability.

The cash reserve system illustrates the relationship between bank profitability and monetary policy tools, with studies such as

Nwannebuike and Chidimma (2019) and Punita and Somaiya (2006) highlighting an adverse effect of CRR on bank profitability.

H2: There is a significant relationship between the bank rate and banks' profitability.

Ajayi and Atanda (2012) found that the bank rate, along with inflation and interest rates, positively influences credit levels, while Punita and Somaiya (2006) observed a negative impact of the bank rate on profitability.

H3: There is a significant relationship between the statutory liquidity ratio (SLR) and banks' profitability.

Younus and Akhtar (2009) found that a reduction in SLR positively influenced investment and credit, particularly before the 1990s.

H4: There is a significant relationship between broad money supply and banks' profitability.

Amidu (2006) found that changes in money supply had a significant impact on bank lending and a positive relationship between broad money supply and bank profitability in Ghana.

H5: There is a significant relationship between investment in treasury bills and banks' profitability.

Suresh and Paul (2014) noted that central bank actions such as the sale and redemption of assets influence the money supply, thereby affecting bank profitability.

H6: There is a significant relationship between interest rate spread (IRS) and banks' profitability.

Karki (2020) discovered a significant relationship between IRS and profitability in Nepalese commercial banks.

Methodology

The study adopts a descriptive and causal-comparative research design to investigate the relationship between monetary policy instruments and the profitability of Nepalese commercial banks. The causal-comparative approach helps identify potential causal factors influencing bank profitability, including the cash reserve ratio (CRR), bank rate (BR), broad money supply (M2), investments in Treasury bills (ITB), and statutory liquidity ratio (SLR). The study analyzes existing outcomes to uncover the impact of these instruments on bank profitability.

Sample Description

The study examines the effect of monetary policy instruments on the profitability of Nepalese commercial banks. Secondary data from the financial statements of 20 commercial banks over a 10-year period (2013–2022) were collected

from sources such as the banks' official websites, Nepal Rastra Bank (NRB), Nepal Stock Exchange (NEPSE), and Sharesansar. A total of 200 observations were gathered for analysis.

Study Area and Variables

The study focuses on the effect of monetary policy instruments on the profitability of Nepalese commercial banks. The variables include:

Dependent Variables:

- **Return on Assets (ROA):** The percentage ratio of net income to total assets.
- **Return on Equity (ROE):** The percentage ratio of net income to total equity.

Independent Variables:

- **CRR:** Cash Reserve Ratio
- **BR:** Bank Rate
- **SLR:** Statutory Liquidity Ratio
- **In MS:** Natural logarithm of broad money supply (M2)
- **In ITB:** Natural logarithm of investment in T-bills
- **IRC:** Interest Rate Corridor
- **IRS:** Interest Rate Spread

Data Collection

Secondary data were collected from official reports of commercial banks, NRB, SEBON, NEPSE, and other sources. The data collection process was completed within three weeks, ensuring comprehensive coverage for the analysis.

Data Analysis

The data were analyzed using statistical and econometric models, including descriptive, correlation, and regression analysis. The following steps were employed:

1. **Descriptive Statistics:** Mean, median, standard deviation, minimum, and maximum values were used to describe the characteristics of the variables.
2. **Correlation Analysis:** Assessed the relationship between independent and dependent variables.
3. **Regression Analysis:** Evaluated the effects of monetary policy instruments on profitability using panel data regression models. The following regression models were applied:

Model-I

$$\text{ROAit} = \alpha_0 + \alpha_1 \text{CRRit} + \alpha_2 \text{BRit} + \alpha_3 \text{SLRit} + \alpha_4 \text{InMSit} + \alpha_5 \text{InITBit} + \alpha_6 \text{IRC} + \alpha_7 \text{IRS} + \text{Eit} \dots (1)$$

Model-II

$$\text{ROEit} = \alpha_0 + \alpha_1 \text{CRRit} + \alpha_2 \text{BRit} + \alpha_3 \text{SLRit} + \alpha_4 \text{InMSit} + \alpha_5 \text{InITBit} + \alpha_6 \text{IRC} + \alpha_7 \text{IRS} + \text{Eit} \dots (2)$$

Where,

- α = Constant term
 ROA = Return on Assets (variable of profitability)
 ROE = Return on Equity (variable of profitability)
 CRR = Cash reserve ratio (variable of monetary policy instrument)
 BR = Bank rate for the time period (variable of monetary policy instrument)
 SLR = Statutory liquidity ratio (variable of monetary policy instrument)
 In MS = Natural log of broad money supply (M2) (variable of monetary policy instrument)
 In ITB = Natural log of investment on T-bill (variable of monetary policy instrument)
 IRC = Interest rate corridor
 IRS = Interest rate Spread

Specification of the Model

The study utilizes a panel data model, which combines time-series and cross-sectional data for

enhanced statistical analysis. Panel data models allow for greater degrees of freedom, leading to more robust results.

Model Evaluation

- **Fixed Effects Model:** Assumes a correlation between the independent variables and individual-specific effects.
- **Random Effects Model:** Assumes uncorrelated individual heterogeneity with independent variables.

Unit Root Test

To ensure stationarity of time series data, the unit root test was conducted. This is important as non-stationary data could lead to misleading regression results.

Hausman Test

This test helps determine the suitable model (fixed or random effects) for panel data regression. A p-value greater than 0.05 suggests the random effects model is appropriate.

Normality Test

Ensures that the error terms follow a normal distribution, which is crucial for valid statistical inference.

Autocorrelation Test

The Durbin-Watson (DW) test was used to check for autocorrelation in the error terms. No autocorrelation is assumed, but the presence of autocorrelation can affect regression results.

Table 1

Summary of Variables

Variable	Symbol	Description
ROA	Return on Assets	Net income to total assets ratio
ROE	Return on Equity	Net income to total equity ratio
CRR	Cash Reserve Ratio	Monetary policy instrument
BR	Bank Rate	Monetary policy instrument
SLR	Statutory Liquidity Ratio	Monetary policy instrument
In MS	Log of Broad Money Supply (M2)	Monetary policy instrument
In ITB	Log of Investment in T-bills	Monetary policy instrument
IRC	Interest Rate Corridor	Monetary policy instrument
IRS	Interest Rate Spread	Monetary policy instrument

This methodology provides a structured approach to analyzing the relationship between monetary policy instruments and the profitability of commercial banks in Nepal.

Interest Rate Corridor(IRC) is significantly assessed in literature and framework and model but not considered in intellectual guess

Results and Discussion

This section examines the trends, structure, and patterns of monetary policy instruments and profitability for Nepalese commercial banks from 2013 to 2022.

Pattern of Return on Assets (ROA)

Appendix I presents the trend and composition of Return on Assets (ROA) for Nepalese commercial banks from 2013 to 2022. ROA is calculated as net income divided by total assets, with the mean value representing the average ROA across the banks and the standard deviation indicating variability.

Figure 2

Trend of Average ROA

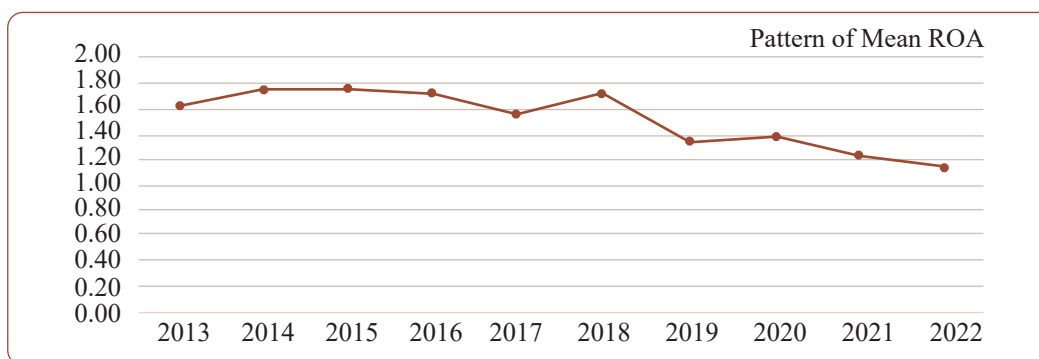


Figure 2 shows a slight decreasing trend in average ROA over the study period. The highest average ROA occurred in 2015 at 1.76%, while 2022 saw the lowest average at 1.13%. This indicates a general decline in profitability for Nepalese commercial banks, with a small uptick in 2018 (1.67%).

Pattern of Return on Equity (ROE)

The trend and structure of Return on Equity (ROE) for Nepalese commercial banks from 2013 to 2022. ROE is calculated as net income divided by total shareholder equity, with the mean

The analysis reveals that NABIL had the highest average ROA at 2.42%, followed by HBL (2.09%), SCB (2.05%), and CBIL (1.81%), among others. NMB had the lowest ROA at 1.42%. Over the years, NABIL and HBL saw a decline in ROA, with NABIL dropping from 3.39% in 2013 to 1.71% in 2022. Conversely, MBL, NMB, and PCBL experienced an increase in their ROA during the period, particularly MBL, which grew from 1.26% in 2013 to 2.83% in 2022.

The variation in ROA across individual banks is substantial, with NBL showing the highest variability, followed by NABIL, CBIL, and HBL. The coefficient of variation analysis further reveals that NBL had the largest dispersion around the mean, while NIC exhibited the smallest variability. Notably, the year 2022 saw the highest variability in ROA, reflecting significant changes in profitability among banks.

indicating average ROE and the standard deviation reflecting variability.

The analysis shows that RBB had the highest ROE at 20.07%, followed by SANIMA (20.03%) and NIC (19.96%). Over the study period, ROE declined for several banks, including EBL, KBL, and HBL. Conversely, NABIL, PCBL, and RBB experienced increases in ROE. Notably, KBL showed the greatest variability in ROE, while SBL had the least.

A slight decreasing trend in average ROE over the period. The highest average ROE was

recorded in 2014 at 19.92%, while 2019 saw the lowest at 12.27%.

Pattern of Statutory Liquidity Ratio (SLR)

The Statutory Liquidity Ratio (SLR) of Nepalese commercial banks from 2013 to 2022. SLR is calculated as total liquid assets to net demand and time liabilities. The analysis reveals that RBB had the highest SLR at 36.45%, followed by SCB at 32.10%. Over the years, most banks experienced a decline in SLR, with RBB and SCB showing significant reductions. A decreasing trend in the average SLR from 28.25% in 2013 to 20.45% in 2022.

Pattern of Cash Reserve Ratio (CRR)

The pattern of Cash Reserve Ratio (CRR) for individual commercial banks between 2013 and 2022. The CRR is regulated by Nepal Rastra Bank (NRB), with the requirement fluctuating between 3% and 6% over the period. EBL maintained the highest CRR at 13.93%, followed by SCB (13.05%).

A general decline in the average CRR, from 7.09% in 2013 to 5.84% in 2022, with the CRR maintained by commercial banks being higher than the minimum prescribed by NRB.

Pattern of Interest Rate Spread (IRS)

The Interest Rate Spread (IRS) for Nepalese commercial banks from 2013 to 2022. The IRS is the difference between the average lending rate and the average deposit rate. ADBL had the highest IRS

at 4.99%, while LSBL had the lowest at 3.76%. The average IRS fluctuated between 3% and 5% over the study period, with the average IRS slightly decreasing from 4.17% in 2013 to 4.12% in 2022.

Pattern of Bank Rate

The Bank Rate (BR) trends for Nepalese commercial banks between 2013 and 2022. The BR, determined by NRB, influences lending rates set by commercial banks. Over the study period, NRB's bank rate ranged from 5% to 8%. SBL maintained the highest average BR at 10.03%, while RBB had the lowest at 6.10%. An increasing trend in the average bank rate since 2020.

Pattern of Money Supply and Investment in Treasury Bills

The trends in Money Supply (MS) and investment in Treasury Bills (T-Bills). The money supply increased consistently, with a notable 12% year-on-year growth in 2022/23. Investment in T-bills fluctuated depending on the liquidity situation. A rise in money supply from 14.09 million in 2013 to 15.52 million in 2022, while T-bill investments adjusted according to liquidity needs, with the T-bill rate at 10.66%.

The analysis reveals significant trends in the profitability, liquidity, and regulatory compliance of Nepalese commercial banks, highlighting a general decline in key indicators like ROE, SLR, and CRR, and illustrating the regulatory dynamics shaping the banking sector.

Table 2

Descriptive Statistics

Variable	Mean	Standard Deviation	Median	Minimum	Maximum	CV (%)
ROA	1.52	0.60	1.44	-0.22	3.69	39.16
ROE	15.20	5.95	14.82	-1.33	30.47	39.16
SLR	23.95	0.61	22.75	3.88	48.59	27.14
CRR	6.81	3.44	6.07	3.10	24.03	50.56
IRS	4.12	0.61	4.09	2.55	7.09	14.72
BR	8.46	1.77	8.66	4.47	12.32	20.95
IRC	3.40	0.49	3.00	3.00	4.00	14.41
MS	14.85	0.47	14.86	14.09	15.52	3.15
ITB	9.90	0.78	10.12	8.12	11.00	7.90

Source: Researcher's Calculation

Table 2 presents the descriptive statistics for the dependent and independent variables of commercial banks from 2013 to 2022. The dependent variables are Return on Assets (ROA), defined as net income to total assets, and Return on Equity (ROE), defined as net income to total shareholders' equity. The independent variables include Statutory Liquidity Ratio (SLR), Cash Reserve Ratio (CRR), Interest Rate Spread (IRS), Bank Rate (BR), Interest Rate Corridor (IRC), Money Supply (MS), and Investment in Treasury Bills (ITB).

The analysis shows that ROA ranges from -0.22% to 3.69%, with an average of 1.52%, while ROE ranges from -1.33% to 30.47%, with a mean of 15.20%. The average statutory liquidity ratio (SLR) is 23.95%, and the cash reserve ratio (CRR) averages 6.81%. The interest rate spread (IRS)

varies from 2.55% to 7.09%, with a mean of 4.12%. The bank rate (BR) ranges from 4.47% to 12.32%, with an average of 8.46%. The interest rate corridor (IRC) averages 3.40%, while money supply (MS) and investment in treasury bills (ITB) average 14.85 and 9.90 million rupees, respectively.

The coefficient of variation (CV) analysis shows that the cash reserve ratio exhibits the highest variation among the independent variables, while ROA and ROE display moderate variation (CV of 39.16%).

Unit Root Test

A unit root test was conducted to check for stationarity of the time series variables. The Levin, Lin, and Chu (2002) test results in Table 3 indicate that ROA, ROE, SLR, IRS, BR, MS, and ITB are stationary at levels, while CRR is stationary at the first difference.

Table 3

Unit Root Test Results

Variable	Levin, Lin & Chu t	Prob. (Level)	Levin, Lin & Chu t	Prob. (1st Difference)
ROA	-2.99067	0.0014	-	-
ROE	-2.92093	0.0017	-	-
SLR	-4.71063	0.0009	-	-
CRR	-1.44253	0.0746	-8.06781	0.0009
IRS	-4.52709	0.0009	-	-
BR	-5.17732	0.0009	-	-
IRC	-2.78228	0.0027	-	-
MS	-9.69487	0.0009	-	-
ITB	-3.59845	0.0002	-	-

Note: Researcher's Calculation

Hausman Test

The Hausman test results for determining the appropriate model are presented in Tables 4 and

4.4. The test suggests that the fixed effect model is more appropriate for ROA and ROE, as the random effect model showed insignificant results.

Table 4

Hausman Test for ROA

Test Summary	Chi-Sq. Statistics	Chi-Sq. d.f.	Prob.
Cross-section random	0.00001	7	0.9998

Note: Researcher's Calculation

Table 5*Hausman Test for ROE*

Test Summary	Chi-Sq. Statistics	Chi-Sq. d.f.	Prob.
Cross-section random	0.00099	7	0.9989

Note: Researcher's Calculation

Random Effect Model

The random effect model was fitted for both ROA and ROE. The results from Table 5 show that

MS and IRS have a significant impact on ROA, while the results in Table 6 indicate that MS, ITB, SLR, and BR significantly affect ROE.

Table 6*Random Effect Model for ROA*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MS (Millions)	-0.3898	0.1013	-3.848	0.0002
ITB (Millions)	-0.0871	0.0610	-1.428	0.1552
IRS	0.1312	0.0663	1.979	0.0494
CRR	0.0206	0.0262	0.786	0.4331
SLR	-0.0058	0.0142	-0.410	0.6824
BR	-0.0150	0.0082	-1.836	0.0680
R-Squared	0.4853			
Adjusted R-Squared	0.4080			

Note: Researcher's Calculation

Table 7*Random Effect Model for ROE*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MS (Millions)	-4.0909	0.9908	-4.129	0.0001
ITB (Millions)	-1.5754	0.5968	-2.640	0.0091
IRC	-0.9594	0.7495	-1.280	0.2023
IRS	0.5236	0.6486	0.807	0.4206
CRR	0.2494	0.1384	1.802	0.0733
SLR	-0.5071	0.2559	-1.982	0.0491
BR	-0.1605	0.0798	-2.012	0.0458
R-Squared	0.5012			
Adjusted R-Squared	0.4263			

Note: Researcher's Calculation

Model Accuracy**Normality Test**

For Return on Assets (ROA), the data distribution is not normal, as indicated by a p-value below 0.05. Conversely, for Return on Equity (ROE), the data is normally distributed, as the p-value exceeds 0.05.

Durbin-Watson Test

The Durbin-Watson statistics for both ROA (1.3172) and ROE (1.0932) suggest a potential positive autocorrelation in the residuals, indicating a systematic pattern in the errors.

Table 8*Result of Hypothesis Testing*

Hypothesis	Description	ROA P-value	ROA Result	ROE P-value	ROE Result
H1	Significant relationship between CRR and banks' profitability	0.4331	Rejected	0.0733	Rejected
H2	Significant relationship between BR and banks' profitability	0.0680	Rejected	0.0458	Accepted
H3	Significant relationship between SLR and banks' profitability	0.6824	Rejected	0.0491	Accepted
H4	Significant relationship between MS and banks' profitability	0.0002	Accepted	0.0001	Accepted
H5	Significant relationship between IRS and banks' profitability	0.0494	Accepted	0.4206	Rejected
H6	Significant relationship between ITB and banks' profitability	0.1552	Rejected	0.0091	Accepted

Note: Researcher's Calculation

This study evaluates the impact of various monetary policy tools on the profitability of commercial banks in Nepal, particularly focusing on return on assets (ROA) and return on equity (ROE) as dependent variables. The monetary policy instruments analyzed include broad money supply (MS), investment in Treasury bills (ITB), interest rate spread (IRS), interest rate corridor (IRC), bank rate (BR), statutory liquidity ratio (SLR), and cash reserve ratio (CRR). The data covers the period from 2013 to 2022 for 20 commercial banks in Nepal.

Key Findings

Monetary Policy's Influence

Monetary policy significantly impacts the financial performance of banks. Its instruments regulate credit and money supply, influencing key financial metrics such as interest income, liquidity, and profitability. The findings show a strong relationship between money supply and

profitability, both for ROA and ROE, with high statistical significance (p-values < 0.05).

CRR and SLR

The study found mixed results for CRR and SLR. The cash reserve ratio (CRR) does not significantly affect profitability (ROA or ROE), contradicting studies in Bangladesh and Nigeria that found a negligible or positive impact. The statutory liquidity ratio (SLR), similarly, showed no significant relationship with ROA but was statistically significant in its negative correlation with ROE. This is in line with prior research suggesting the potential for liquidity constraints to influence profitability but not always in a direct manner.

Bank Rate and Interest Rate Spread

The bank rate (BR) was found to have a significant impact on ROE, while the interest rate spread (IRS) significantly impacted ROA but was not significant for ROE. These findings are

consistent with the literature that links changes in bank rates and spreads to profitability by influencing lending and borrowing rates, thereby affecting a bank's interest income.

Market Instruments

Investment in Treasury bills (ITB) showed a negative yet statistically significant relationship with ROE, which suggests that investment in these government securities might reduce profitability due to lower returns. Conversely, the money supply (MS) exhibited a strong positive relationship with both ROA and ROE, supporting the idea that an increase in money supply can enhance bank profitability through greater credit availability.

Comparisons with Previous Studies

This study's findings contrast with research in other countries. For instance, studies in Bangladesh (Houque et al., 2020) and Pakistan (Abid & Lodhi, 2015) identified varying effects of CRR on profitability, while the relationship with SLR was similarly contentious. These differences highlight the contextual nature of monetary policy effects across different economies and banking systems.

Conclusion

This study highlights the significant role of monetary policy tools in shaping the profitability of commercial banks in Nepal. While certain instruments such as money supply and interest rate spread exhibit a clear impact on profitability, others like the cash reserve ratio (CRR) and statutory liquidity ratio (SLR) show less pronounced or statistically insignificant effects. The mixed results underscore the need for a more localized understanding of how specific monetary policy tools affect the banking sector, especially in developing economies like Nepal. Future research could explore additional factors influencing profitability and further examine the role of regulatory changes and macroeconomic conditions in shaping banks' financial performance.

The study concludes that the bank rate, investment in Treasury bills, and money supply are the most influential monetary policy variables

affecting the profitability of Nepalese commercial banks. Notably, the cash reserve ratio was found to have a positive but statistically insignificant relationship with both return on equity (ROE) and return on assets (ROA). The bank rate exhibited a negative relationship with ROE, suggesting that higher bank rates could lead to lower profitability. Similarly, investment in Treasury bills showed a negative relationship with ROE, indicating that increased investments in Treasury bills might reduce returns on equity. Furthermore, the broad money supply also had an adverse effect on both ROA and ROE, suggesting that an increase in money supply tends to lower profitability.

The study also observed a negative relationship between ROA and variables such as investment in Treasury bills, broad money supply, interest rate corridor, SLR, and bank rate. This implies that higher investments in Treasury bills or an increase in the money supply result in a decline in ROA. On the other hand, the positive coefficient for the cash reserve ratio indicates that a higher CRR is associated with an increase in ROA.

Implications

The study recommends that commercial banks aiming to improve profitability should focus on maintaining a higher cash reserve ratio (CRR), as it showed a positive relationship with both ROA and ROE, in alignment with Nepal Rastra Bank (NRB) regulations. Additionally, the central bank should consider lowering the bank rate to facilitate increased credit flow to commercial banks, which could enhance their profitability and overall financial performance.

The research also highlights the negative relationship between investment in Treasury bills and ROA, suggesting that higher investments in low-risk, low-return Treasury bills may limit a bank's ability to maximize profits. As a result, commercial banks in Nepal are encouraged to reconsider or limit their reliance on Treasury bill investments to improve their financial performance.

Furthermore, the study found a positive association between interest rate spread and

profitability, indicating that banks could enhance profitability by widening the interest rate spread. This would enable banks to generate higher revenue from lending while managing costs more effectively. Therefore, commercial banks should strategically aim to increase their interest rate spreads to improve earnings and strengthen their competitive position in the market.

Finally, the study observed a negative correlation between SLR and ROA, suggesting that banks should collaborate with the central bank to reduce their statutory liquidity ratio, which could lead to improved returns on assets. Similarly, the research found that an increase in the broad money supply negatively impacts profitability, highlighting the importance for banks to carefully manage liquidity levels to avoid compressing interest rate margins or reducing loan demand.

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