



## Effect of macroeconomic and microeconomic variables on bank performance

Sudeep Raj Shrestha

Department of Management, Lumbini Baniya Campus, Tribhuvan University, Nepal

### Abstract

This study investigates the impact of macroeconomic and microeconomic variables on bank performance. Using the panel data from annual reports of 10 Nepal commercial banks and supplementary data on GDP and interest rates from macroeconomic and financial reports, as well as monetary policy from the NRB for fiscal year 2069/70 to 2078/79, a descriptive and causal-comparative research design was used. Correlation, regression, analysis of variance (ANOVA), and coefficient of regression were conducted. The findings conclude that there is a strong negative link between GDP and ROA, with CAR positively correlated with ROE. CAR and interest rates positively relate to ROA, while NPL and bank size negatively impact it. NPL especially has a strong adverse correlation. Interestingly, interest rates weakly correlate negatively with ROE, while bank size and GDP weakly correlate positively. GDP is the most influential variable that affects ROA negatively, implying that higher GDP doesn't guarantee bank profitability due to factors like competition. While CAR positively influences both ROA and ROE, emphasizing its importance for sustained bank profitability. Other factors like NPL, bank size, and interest rates lack statistical significance. While NPL is not statistically significant in this study, high NPL levels likely have a negative effect on profitability. Banks should use efficient loan management techniques to reduce NPL.

**Keywords:** Macroeconomic, Microeconomic, GDP, Interest rate, CAR, NPL, Bank size, ROA, ROE

### Introduction

The banking industry is essential to Nepal financial stability and economic growth. The performance of the nation's banks is significantly influenced by both macroeconomic and microeconomic factors. For the purpose of influencing policy, improving risk management procedures, and ensuring the strength of Nepal banking sector, it is important to understand the different and interconnected effects of these factors on different aspects of bank performance, such as profitability, asset quality, and stability.

Bank performance encompasses assessing how well a financial institution meets its goals, manages resources, and adds value to stakeholders. Microeconomics studies individual agents like households, firms, and consumers, while macroeconomics examines the economy as a whole, focusing on topics such as inflation, unemployment, and economic growth. Bank performance is influenced by various factors, including micro variables like bank size, capital adequacy, and non-performing loans (NPL). Larger banks benefit from economies of scale, while capital adequacy and NPL ratios affect stability and profitability (Martiningtias & Nitinegeri, 2021) <sup>[32]</sup>. High interest rates challenge bank profits, although they can stimulate lending. GDP growth is beneficial, but excessive growth can lead to inflation, affecting profitability. Olokoyo *et al.* (2019) <sup>[36]</sup> reveal the interplay between interest rates, GDP growth, and bank performance. So, both micro and macro variables significantly affect bank performance. The financial performance of banks is influenced by the interaction of micro factors like bank size, capital adequacy, and NPLs and macro factors like interest rates and GDP growth.

The performance of banks and the overall financial stability of an economy are seriously threatened by non-performing loans (Wangai *et al.* 2014) <sup>[48]</sup>. Hersungondo *et al.* (2021), found non-performing assets (NPA) and Capital adequacy has a significant negative impact on bank performance.

Irawati *et al.* (2019), study revealed Capital Adequacy Ratio, Managerial Ownership and bank Size influence positive significantly on financial performance while other variable NPL has a insignificant negative effect. In Nepal context, Bhattarai (2017) <sup>[81]</sup> and Poudel (2012) <sup>[37]</sup>, found that higher levels of capital adequacy are associated with lower bank profitability. Similarly, Jha and Hui (2012), found that capital adequacy ratio has negative and significant relationship with ROA but significantly positive relation with ROE, while NPL had no significant relation on bank performance. These conflicting findings raise questions about the broader applicability of these findings and the need for further exploration into the complexities of the relationship between micro and macroeconomic variables.

NRB Financial Stability Reports from 2018 to 2021, the banking sector's profits had significant changes. In 2019, profits increased by 21.01%, reaching NPR 74.23 billion from NPR 61.34 billion in 2018; the growth rate in 2018 was 12.20%. However, the 2019/20 NRB report indicated a decline of 20.61% in banking sector profits for the year 2020, dropping to 58.92 billion rupees from 74.22 billion rupees in 2019 due to pandemic effects. The 2020/21 report demonstrated a recovery, with profits increasing by 21.01% for the sector in the review year, reaching Rs. 71.30 billion from Rs. 58.92 billion the previous year. According to the NRB Financial Stability Report (2021/22), the overall Return on Assets (ROA) of BFIs raised to 1.23% in 2021/22 from 1.17% in 2020/21 and Return on Equity (ROE) increased to 13.48% in 2021/22 from 12.77% in 2020/21. However, these ROA and ROE values remained lower than those in 2017/18 and 2018/19. The fluctuation in ROA and ROE over the years, especially the comparison between 2017/18 and 2021/22, highlights a diminishing trend in performance. Consequently, my research study will explore the effects of these fluctuations and analyze bank performance from both micro and macro perspectives.

**Objectives of the study**

The objective of the study is to determine the effect of macroeconomic and microeconomic variables on bank performance of Nepalese commercial banks. The objectives of study are:

- To measure the relationship between gross domestic product, interest rate and financial performance of bank.
- To measure the relationship between capital adequacy ratio, nonperforming loan, bank size and financial performance of bank.
- To analyze the effect of gross domestic product, interest rate on financial performance of bank.
- To analyze the effect of capital adequacy ratio, nonperforming loan and bank size on the financial performance of bank.

**Theoretical Framework**

Portfolio Theory is a fundamental concept in understanding bank performance. Market Power and Efficiency Structure theories are key in analyzing bank profitability. Economic Efficiency Theory focuses on optimizing resources for bank performance. Economic Growth Theory explains economic evolution. Financial Intermediation Theory highlights intermediaries' role in efficient markets. Schumpeter's Economic Cycle Theory frames economic shifts. Capital Buffering and Bank Capitalization Theories stress capital adequacy for stability. Scale-Efficiency Hypothesis suggests an optimal bank size for efficiency.

Tan and Floros (2012), revealed a negative correlation between GDP growth and bank profitability, emphasizing the slight impact of cost efficiency, taxes, non-performing loans, and capital levels. Simultaneously, Samhan and Al-Khatib (2015) [39], explored the financial performance of Jordan Islamic Bank, clarifying both positive and negative correlations between GDP growth.

Molyneux and Thornton (1992) [33], examined the profitability of banking across European nations, revealing a significant direct relationship between return on equity and interest rates, bank concentration, and government ownership. Similarly, Ogunbiyi and Ihejirika (2014) [35], investigated how interest rates affected the profitability of Nigerian deposit money banks, demonstrating a significant and negative impact of real interest rates and savings deposit rates on bank profitability.

Gupta and Mahakud (2020) [11], examined Indian commercial banks, revealing that private sector banks show higher profitability compared to public sector counterparts, with determinants including bank size, non-performing loan ratio, and revenue diversification. Aladwan (2015) [1], investigated Jordanian commercial banks, categorizing them based on asset size and revealing a significant difference in profitability among differently sized banks.

Hersungondo *et al.* (2021), investigated the impact of bank-level factors, including non-performing assets and capital adequacy, on bank performance in Indonesia, revealing significant negative impacts on bank performance. On the other hand, Aspal and Nazneen (2014) [6], examined determinants of the capital adequacy ratio and highlighting its relationship with performance factors such as loans, asset quality, and management efficiency.

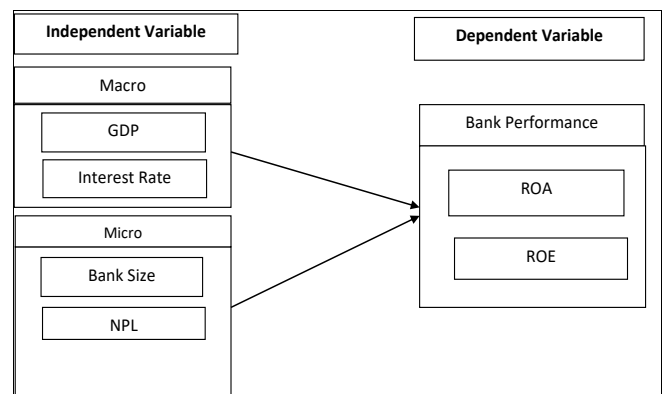
Anbar and Alper (2011), examined ten commercial banks' ten years' worth of data to acquire information about profitability. ROA and ROE were positively affected by

asset size and non-interest revenue while negatively affected by credit portfolio size and loan examinations. The only macroeconomic aspect that was in favor was the real interest rate. In contrast, Khrawish (2011), added complexity, showing ROA's positive links to bank size, certain ratios, and net interest margin, yet a negative connection with annual GDP growth rate and inflation.

Yakubu (2016) [49], took a similar approach, examining bank-specific and macroeconomic influences on profitability. Bank size, liquidity, and expense management played critical roles, while macroeconomic variables had lesser impact. On the other hand, Islam and Rana (2017), identified factors effecting profitability, highlighting negative influences of non-performing loans, operating expenses, and cost of funds on ROA and ROE.

**Theoretical Framework and Definitions of variables**

The theoretical framework provides a understanding of relationships between different variables in a research study. In the context of analyzing the effects of macroeconomic variables and microeconomic variables on bank performance



Note: Adopted from (Anbar & Alper, 2011 [5], Gnawali, 2018) [10].

Fig 1: Theoretical framework

**Definition of Variables**

**Dependent Variable**

ROA and ROE were used in this research to measure the bank's performance. ROA measures a bank's profit generation from its assets, calculated by dividing net income by total assets. ROE evaluates profitability from shareholders' perspective, calculated by dividing net income by shareholders' equity.

**Independent Variable**

Macroeconomic variables like GDP impact loan demand, credit quality, and investment opportunities for banks. Interest rate changes directly affect banks' profitability and lending activities by influencing borrowing and lending rates. On the micro side, bank size, NPLs, and capital adequacy are critical for bank performance. Bank size affects operational efficiency, NPLs indicate credit risk, and capital adequacy ensures financial stability and regulatory compliance.

**1. Research methodology**

The research design employed in this study includes both a descriptive research design and a causal-comparative research design. The population consists of 20 commercial banks operating in Nepal from fiscal year 2069/70 to 2078/79. However, the study utilized a sample size of 10 commercial banks selected through simple random

sampling. The nature of the data is quantitative, gathered from secondary sources such as annual reports available on each bank's website. Additional data on Gross Domestic Product (GDP) and interest rates were obtained from macroeconomic and financial situation reports, as well as the monetary policy of the Nepal Rastra Bank (NRB). The study used a panel data approach to analyze the collected data, focusing on examining relationships and causal effects among variables within the banking. Correlation, regression, analysis of variance (ANOVA), coefficient of regression was conducted.

The acquired data were statistically examined using SPSS software. The two models develop in equation (1) and (2) estimate the effect of macroeconomic and micro economic variables on bank performance. The data analysis tools are as follows:

$$ROA = \alpha + \beta_1 NPL + \beta_2 Banksize + \beta_3 CAR + \beta_4 Interestrate + \beta_5 GDP + \epsilon \tag{1}$$

$$ROE = \alpha + \beta_1 NPL + \beta_2 Banksize + \beta_3 CAR + \beta_4 Interestrate + \beta_5 GDP + \epsilon \tag{2}$$

**Results and Conclusion**

**Results**

**Descriptive Statistics**

Descriptive statistics summarize key aspects of a dataset, aiding researchers in understanding its central tendencies, variability, and distribution. These measures include central tendency, dispersion, and shape, forming the foundational step for extracting insights from data.

The NPL ranges from 0.01% to 5.24%, with an average of 1.20% and a standard deviation of approximately 1.14%. CAR varies from -59.00% to 22.99%, averaging at 13.15% with a standard deviation of about 2.78%. Bank size ranges from 21.98 to 419.82, averaging at 119.85 with a standard deviation of around 69.84. GDP varies from 1689.57 to 2529.24, averaging 2099.36 with a standard deviation of approximately 247.91. Interest rates on loans range from 5.0% to 8.0%, averaging 7.0% with a standard deviation of roughly 0.87%. ROA ranges from 0.55% to 3.25%, averaging at 1.64% with a standard deviation of about 0.53%. ROE varies from -361.24% to 44.62%, averaging at 13.22% with a standard deviation of approximately 38.35%. These results reflect varying levels and trends in the financial and operational performance of the sampled banks.

**Correlation**

Correlation is a statistical measure that quantifies the degree to which two variables change together.

**Table 1:** Analysis of Correlation

	NPL	CAR	Bank size	ROA	ROE	GDP	Interest rate
NPL	1	-.514**	-0.057	-.174*	-.359**	-.269**	.245**
CAR		1	.186*	0.163	.444**	.417**	-.312**
Bank size			1	-.168*	0.027	.804**	-.762**
ROA				1	.216*	-.228*	.176*
ROE					1	0.072	-0.061
GDP						1	-.879**
Interest rate							1

\*\* Correlation is significant at the 0.01 level (1-tailed).

\* Correlation is significant at the 0.05 level (1-tailed).

Note: SPSS Analysis

The correlation table 1, ROA reveals a weakly positive link (0.176\*) with interest rates, a slight negative correlation (-0.228\*) with GDP, and slight negative correlations (-0.174\* and -0.168\*) with NPL and bank size, respectively. CAR exhibits a positive correlation (0.163) with ROA, emphasizing the importance of capital adequacy. For ROE, interest rates have a small negative correlation (-0.061), GDP shows a weakly positive correlation (0.072), and NPL displays a moderately negative correlation (-0.359\*\*). Bank size has a weak positive correlation (0.027), while CAR shows a strong positive correlation (0.444\*\*), underscoring its significance for equity returns.

**Regression**

Regression analysis is a statistical technique for examining the relationship between one dependent variable and one or more independent variables. The r-squared value, indicating how well the model explains the variation in return on assets (ROA), is 0.169, suggesting that only 16.9% of the variation in ROA is explained by the independent variables. The standard error of the estimate, which measures the average difference between predicted and actual ROA values, is 49544.

**Table 2:** ANOVA Analysis in Regression with Dependent Variable ROA

	Sum of Squares	Df	Mean Square	F	Sig.
Regression	4.707	5	.941	3.835	.003
Residual	23.073	94	.245		
Total	27.780	99			

Note: SPSS Analysis

Dependent Variable: ROA

Predictors: (Constant), Interest rate, NPL, CAR, bank size, GDP

Table 2 shows F-statistic of 3.835 with a p-value of 0.003 indicates that the overall regression is statistically significant, implying that the independent variables collectively impact predicting ROA significantly. Regarding the residual, which deals with actual-predicted value differences, the sum of squares (23.073) and degrees of freedom (94) provide insights into model accuracy, contributing to the total sum of squares (27.780).

**Table 3:** Analysis Coefficient of Regression with Dependent Variable ROA

	Unstandardized Coefficients	Standardized Coefficients		T	Sig.
	B	Std. Error	Beta		
(Constant)	4.009	1.600		2.505	.014
NPL	-.079	.052	-.170	-1.510	.134
CAR	.053	.023	.277	2.327	.022
Bank size	.002	.001	.219	1.287	.201
GDP	-.001	.000	-.665	-2.782	.007
Interest rate	-.069	.124	-.113	-.556	.580

Note: SPSS Analysis

Table 3 shows statistically significant relationships with ROA at the 5% level are observed only for CAR (coefficient = 0.053, p-value = 0.022) and GDP (coefficient = -0.001, p-value = 0.007). CAR shows a positive relationship, indicating higher CAR relates to increased ROA, while GDP has a negative relationship, meaning higher GDP correlates with decreased ROA. Other variables like NPL,

bank size, and interest rate don't demonstrate significant relationships at this level, except for NPL, which approaches significance (p-value = 0.134), suggesting a potential weak negative relationship needing further exploration.

The r-square value of 0.250 indicates that 25% of the dependent variable's variability is explained by these independent variables. The standard error of the estimate, at 34.081924, assesses the accuracy of the model's predictions, with a lower value indicating better predictive accuracy.

**Table 4:** ANOVA Analysis in Regression with Dependent Variable ROE

	Sum of Squares	Df	Mean Square	F	Sig.
Regression	36429	5	7285.79	6.272	<.001
Residual	109188	94	1161.58		
Total	145617	99			
Unstandardized Coefficients		Standardized Coefficients			
	B	Std. Error	Beta	T	Sig.
(Constant)	45.982	110.098		0.418	0.677
NPL	-7.024	3.604	-0.208	-1.949	0.054
CAR	6.006	1.562	0.435	3.844	<.001
bank size	0.101	0.089	0.184	1.14	0.257
GDP	-0.049	0.032	-0.35	-1.543	0.126
Interest rate	-1.838	8.506	-0.042	-0.216	0.829

Note: SPSS Analysis

Table 4 shows significant statistics such as sum of squares (36428.950), degrees of freedom (5), mean square (7285.790), F-statistic (6.272), and a highly significant p-value (<.001). These values indicate a strong and statistically significant relationship between the independent variables and ROE.

Table 4 shows the relationship between ROE and various predictors. CAR has the highest absolute Beta value (0.435), indicating a strong relationship with ROE. GDP also shows a relatively high Beta value (-0.350), suggesting an

influence on ROE. NPL, Bank Size, and Interest Rate have lower Beta values, implying less significant impacts on ROE compared to CAR and GDP. Only CAR shows a statistically significant relationship with ROE at the 5% level (coefficient = 6.006, p-value < 0.001), indicating a positive relationship. The other variables didn't show statistically significant relationships but had p-values near the significance level, hinting at potential weak relationships.

**Table 5:** Hypothesis Test

Hypothesis	Regression weight	T value	P value	Result
H1	Interest rate has a significant effect on ROA	-.556	.580	Rejected
H2	GDP has significant effect on ROA	-2.782	.007	Accepted
H3	NPL has significant effect on ROA	-1.510	.134	Rejected
H4	CAR has significant effect on ROA	2.327	.022	Accepted
H5	Bank size has significant effect on ROA	1.287	.201	Rejected
H6	Interest rate has significant effect on ROE	-.216	.829	Rejected
H7	GDP has significant effect on ROE	-1.543	.126	Rejected
H8	NPL has significant effect on ROE	-1.949	.054	Rejected
H9	CAR has significant effect on ROE	3.844	.001	Accepted
H10	Bank size has significant effect on ROE	1.140	.257	Rejected
F-statistics on ROA (sig): 3.833		F-statistics on ROE (sig) 6.272		
R Square on ROA: 0.169		R Square on ROE: 0.25		

**Discussion**

The study shows the impact of GDP on bank performance metrics, specifically ROA and ROE, revealed a significant negative relationship between GDP and ROA. This contrasts with findings from Tan and Floros (2012), in China but aligns with De Leon (2020) [9], study showed robust GDP growth can lead to increased competition among banks, affecting profitability negatively. However, the study did not find a significant relationship between GDP and ROE, supporting the null hypothesis.

Regarding interest rates, my study did not find a significant association with ROA or ROE, as opposed to previous research by Molyneux and Thornton (1992) [33] and Ogunbiyi and Ihejirika (2014) [35]. This highlights the complex and possibly context-specific nature of the relationship between interest rates and bank performance.

In terms of bank size, the study supported the null hypothesis, indicating no significant relationship with either ROA or ROE. This differs from findings by Terraza (2015) [45], Gupta and Mahakud (2020) [11], Aladwan (2015) [1], and Unvan and Yakubu (2020) [47], underlining the complexity of factors influencing bank size and performance.

Similarly, NPL also supported the null hypothesis. While NPL is not statistically significant in this study, high NPL levels likely have a negative impact on profitability. Studies like Martiningtiyas and Nitinegeri (2021) [32] in Indonesia. Capital Adequacy Ratio (CAR) only variable which has a significant positive relationship with both Return on Assets (ROA) and Return on Equity (ROE). This is consistent with studies such as Hersungondo *et al.* (2021) in Indonesia, highlighting the importance of optimal capital levels for bank performance.

## Conclusion

The findings conclude that there is a strong negative link between GDP and ROA, with CAR positively correlated with ROE. CAR and interest rates positively relate to ROA, while NPL and bank size negatively impact it. NPL especially has a strong adverse correlation. Interestingly, interest rates weakly correlate negatively with ROE, while bank size and GDP weakly correlate positively. GDP is the most influential variable that affects ROA negatively, implying higher GDP doesn't guarantee bank profitability due to factors like competition. While CAR positively influences both ROA and ROE, emphasizing its importance for sustained bank profitability. Other factors like NPL, bank size, and interest rates lack statistical significance. While NPL is not statistically significant in this study, high NPL levels likely have a negative impact on profitability. Banks should use efficient loan management techniques to reduce NPL.

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