CAMELS Analysis and Market Stress Testing of Top Nepalese Banks

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Abstract

This study presents a comprehensive study of the financial stability and resilience of commercial banks in Nepal using the CAMELS approach and market stress testing. The study analyzes the performance of sample banks and examines the relationship between CAMELS variables and bank performance. The results highlight five key factors influencing bank performance in Nepal: capital adequacy (CA), asset quality (AQ), management quality (MQ), liquidity (LQ), and sensitivity to market risks (SQ). These factors have a direct influence on performance i.e. earnings per share (EPS) of the banks. Multiple regression analysis confirms significant relationships between EPS and CA, AQ, MQ, LQ, and SQ, with no significant relationship with earnings quality (return of assets; ROA). Variance inflation factor analysis confirms no multicollinearity among the variables. The study conducts stress tests on market risks such as interest rate changes, exchange rate shocks, and equity shocks to assess and measure the risks associated with market uncertainties. The findings demonstrate that top-performing banks can maintain their Capital Adequacy Ratio (CAR) above 11% under different base rate changes, showcasing their ability to maintain the required level of soundness for operations. Considering all aspects of the CAMELS analysis and market stress testing, NABIL Bank emerges as the top-performing bank, followed by Nepal Investment Bank. This research holds significant importance in assessing the financial stability and resilience of commercial banks in Nepal. The findings provide valuable insights for decision-makers in the banking sector to identify areas for improvement, contributing to a robust financial system. It also contributes to financial performance evaluation literature for researchers, policymakers, and banking industry stakeholders.

Keywords: Financial stability, CAMELS, Stress test, Capital adequacy, Earnings, Liquidity

1. Introduction

The financial sector plays a crucial role in driving economic growth and industrialization by facilitating the allocation of funds, establishing efficient financial systems, ensuring investor confidence, and optimizing resource utilization (Raza, 2011). Among the key players in the financial sector, the banking sector holds particular significance as it channels capital to businesses, promoting general stability and growth in the financial and economic spheres. A strong foundation for a nation's economic structure is provided by a well-developed banking sector, which also absorbs large financial crises (Aburime, 2009). Extensive evidence of cointegrated economic variables and long-term relationships demonstrates that the expansion of the banking sector stimulates the expansion of the economy as a whole (Karki, 2012, 2018b).

One of the primary challenges for commercial banks and other financial institutions is to ensure their survival by effectively managing their assets and liabilities to maximize profits while minimizing the exposure of assets to risk. Achieving a balance between solvency, liquidity, and profitability is essential. The CAMELS framework has been used in previous research, such as the analysis by Roman and Sargu (2013), to assess the financial soundness of

commercial banks and highlight their strengths and weaknesses. These studies emphasize the need for improved decision-making to enhance the soundness of banks. Additionally, Misra and Aspal (2013) stress the importance of assessing the overall conditions, strengths, weaknesses, opportunities, and threats faced by banks, highlighting the necessity of financial and statistical tools such as the CAMELS model.

In the context of Nepal, the banking system has undergone significant transformations since the inception of Nepal Rastra Bank, the country's first central bank, in 1956. The Nepalese banking sector has evolved from a few government banks offering limited services to a diverse range of banks providing a wide array of services. This period has witnessed an expansion in the services offered by commercial banks, contributing to the overall development of the sector. The evaluation of bank performance is crucial for understanding how effectively banks utilize their assets, liabilities, shareholders' equity, income, and expenditures (Lin et al., 2005). Performance evaluation serves as a means of motivating bank employees boosting their professional commitment and supplying performance data to stakeholders (Sun, 2011).

The CAMELS model has gained widespread usage and recognition within the fields of finance and management for assessing the financial stability of commercial banks. Regulators have found the CAMELS model to be effective in assessing the performance of the financial sector. Nepal Rastra Bank has accepted the CAMELS framework as the rating model for banks operating in Nepal. In recent times, the Nepalese banking sector has experienced a significant trend of merger and acquisition activities owing to meeting capital requirements and regulatory obligations. Given this dynamic environment, the purpose of this research is to analyze the financial fortitude of commercial banks in Nepal utilizing the CAMELS approach. The study explores the relationships between various measures like operational efficiency, bank size, asset management, interest income, and return on assets, shedding light on their impact on the overall bank performance. Furthermore, the study aims to address pertinent research questions by incorporating a market stress test to identify banks capable of better absorbing market uncertainties.

2. Literature Review

The evaluation of financial institutions' safety and stability is a critical aspect of regulatory oversight. Dang (2011) describes the CAMELS rating framework as a regulatory measure used by bank supervisors to evaluate financial institutions' safety and stability. The CAMELS ratings (capital adequacy, asset quality, management efficiency, earnings quality, liquidity, & sensitivity to market risks), are useful in predicting bank risk changes according to Cole et al. (1995).

Capital adequacy ratios have a substantial effect on bank health and failure risk. Insufficient minimum capital requirements contribute to bank failures in certain regions, as found by Mpuge (2002). Vong and Chan (2009) highlight the link between capital adequacy and bank profitability, while Scott and Arias (2011) demonstrate the effect of the capital-to-asset ratio on US bank profitability. Asset quality plays a vital role in assessing the risks and financial stability of a bank. The Loans/Assets ratio is commonly used to evaluate asset quality, and high loans-to-assets ratios indicate a structure prone to loan losses. Non-performing loans are a threat to a bank's long-term profitability and viability, as emphasized by Berger and DeYoung (1997). Management quality, although difficult to quantify, is an important aspect that goes beyond financial performance. It includes the skills and expertise of the management team. Efficient management, as recognized by the International Monetary Fund (IMF), is vital to bank performance. Wall (1985) emphasizes the importance of asset, liability, funding, and non-interest cost management, while Zimmerman (1996) highlights the influence of management actions on the performance of the bank. EPS is a key indicator of the profitability of a company, and its computation helps assess profitability before investing, as stated by Kosmidou (2008). Earnings are essential for a financial institution's capital, resources, and competitiveness, thus impacting performance significantly. Balogh (2012) used macro-prudential measures to evaluate bank earnings and profitability while emphasizing the importance of net income and other factors.

Liquidity, representing the ability of a bank to fulfill financial requirements and maintain stability, is crucial for solvency. Bourke (1989) finds a positive correlation between liquid assets and bank profitability across countries, while Kosmidou (2008) demonstrates the impact of liquidity on EPS during financial integration in Greece. Market risk sensitivity, an aspect of the CAMELS model, is evaluated using the long-term assets to total assets ratio, as done by Dincer et al. (2011) in their assessment of the banking sector in Turkey. A higher ratio of long-term debt to assets suggests risk and the possible inability to meet debt obligations, forcing lenders to be cautious and investors to be wary. Investor sentiment was found to have the greatest impact on performance and return expectation decisions (Karki, 2017). Return on assets (ROA) is a key indicator of a bank's profitability. According to Khrawish (2011), the income production capacity of a bank is determined by the utilization of its total assets. Management's ability to generate income from the institution's resources is also measured by ROA.

Stress testing is globally recognized as a risk management tool, helping regulators and banks assess the capital needed to withstand potential shocks, as highlighted by Flannery et al. (2004). Nepal's banking system is expanding and integrating with the global financial system. Stress testing in bank management has grown since the global financial crisis. Authorities agree that increased monitoring and different initiatives are required for financial stability in the context of the increasing adoption of technology and innovation (Besancenot & Vranceanu, 2011). Flannery et al. (2004) found that financial volatility increases bank opacity. Since historical data may have limitations, risk management must include forward-looking methods. Stress testing helps regulators analyze banking system stability and susceptibility (Peura & Jokivuolle, 2004). Stress testing includes scenario analysis and simple sensitivity tests. These methods help regulators and banks assess the capital needed to withstand potential shocks that could affect their capital ratio. Stress tests measure market risk as well as interest rate, exchange rate, and equity price shocks. Stress tests measure market risk, interest rate shocks, exchange rate shocks, and equity price shocks. Huang and Xiong (2015) argue that stress tests help banks choose capital buffers.

Factors such as bank size, asset management, and operational efficiency influence profitability and performance, as found by Tarawneh (2006), Siddiqui and Shoaib (2011), and Sahota and Dhiman (2017). Dhungana (2013) emphasizes the importance of upholding international competitiveness norms and Karki (2018a) claims that earnings per share (EPS) is the best market performance indicator for banks for Nepalese banks, as such CAMEL ratings serve as an oversight mechanism for banks in Nepal. While there have been numerous studies conducted on bank performances, a consensus has yet to be reached regarding the findings. In light of the literature review, this study has proposed the following hypotheses:

H_1: *A significant relationship exists between the capital adequacy ratio and EPS of Nepalese Commercial banks.*

H_2: *A significant relationship exists between asset quality and EPS of Nepalese Commercial banks.*

H_3: *A significantly positive relationship exists between management quality and EPS of Nepalese Commercial banks.*

H_4: *A significantly positive relationship exists between the earnings quality and EPS of Nepalese Commercial banks.*

H_5: *A significantly negative relationship exists between liquidity and EPS of Nepalese Commercial banks*

H_6: *A significantly positive relationship exists between sensitivity to market risks and EPS of Nepalese Commercial banks.*

Conceptual Framework

Regarding the assessment of financial performance, Rahim et al. (2018) examined the CAMEL framework on financial performance. The researchers used secondary data from 63 ASEAN publicly listed banks to assess them based on the average results for five criteria (Capital adequacy, Asset Quality, Management Quality, Earnings, and liquidity). Based on the literature review, this study extends this model to develop the following theoretical framework.

CAMELS Model
- Capital Adequacy (CA)
- Assets Quality (AQ)
- Management Quality (MQ)
- Earning Quality (EQ)
- Liquidity Quality (LQ)
- Sensitivity to Market Risk (SQ)

Market Stress Tests
- Interest Rate Shocks (IR)
- Exchange Rate Shocks (ER)
- Equity Price Shocks (EP)
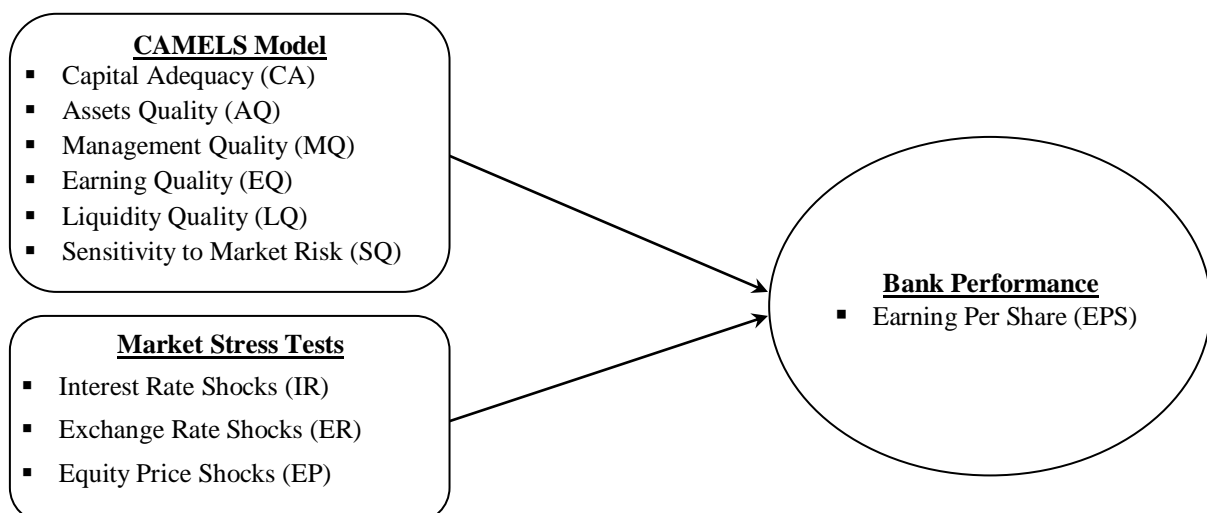
Bank Performance
- Earning Per Share (EPS)

Figure 1: Theoretical Framework of the Study

3. Methodology

The research design employed in this study is a quantitative approach with a descriptive and analytical focus. The primary objective is to gather reliable quantitative data from published financial reports and secondary sources for analysis and conclusion. The target population for this research consists of all commercial banks currently operating in Nepal. Out of the 28 commercial banks till 2020, this study adopts purposive sampling and focuses on the financial performance of three top-performing banks: Nepal Investment Bank Ltd, NIC Asia Bank Ltd, and Nabil Bank Ltd. These three banks have demonstrated high-profit indicators and a strong presence in the market. The data for analysis covers five years from 2013/14 to 2017/18.

Various tools have been utilized for data collection, management, analysis, and reporting in this study. The descriptive analysis includes the calculation of Pearson's coefficient of correlation, which measures the linear correlation between variables. This analysis helps in understanding the relationships between different factors.

Model Specification

The regression analysis has been employed to analyze the impact of one or more independent factors on dependent variables. The regression model developed for this study is as follows:

$$EPS_{it} = \beta_0 + \beta_1 CA_{it} + \beta_2 AQ_{it} + \beta_3 MQ_{it} + \beta_4 EQ_{it} + \beta_5 LQ_{it} + \beta_6 SQ_{it} + \epsilon_{it} \quad \text{----------- ---------- (i)}$$

Where,

EPS_{it} = Dependent Variable; earnings per Share for bank 'i' during the period 't'

CA_{it} = Capital adequacy ratio for bank 'i' during the period 't'. It is estimated by dividing the net income of the company by the number of shares outstanding.

AQ_{it} = Assets Quality for bank 'i' during the period 't'. It is measured by the size of non-performing loans

MQ_{it} = Management Quality for bank 'i' during the period 't'. Total expenses to total income ratios (Cost of fund & staff expenses to total operating income ratios) are used as a measure of management efficiency for converting the bank deposits available to generate greater profits.

EQ_{it} = Earnings Quality for bank 'i' during the period 't'. Net profit is the major yardstick to measure such profits. Net income to total assets ratios are utilized to determine the earning quality.

LQ_{it} = Liquidity for bank 'i' during time-period 't'. Total loan-to-total deposit ratios (CD: credit/deposit ratios) are used to determine the liquidity position of banks.

SQ_{it} = Sensitivity to market risk for bank 'i' during time-period 't'. It is assessed by monitoring the management of credit concentrations. Market risk management addresses risks related to unfavorable changes in interest rates, exchange rates, and equity investments. In our model, total long-term assets and liabilities to Total assets ratios are used to determine SQ.

β_0 = Constant

β_i = Regression coefficients for respective independent variables

ϵ_{it} = Error component

Market Stress Tests

To ensure a full examination, the study conducted market stress tests that included interest rate shocks (IR), exchange rate shocks (ER), and equity price shocks (EP). Interest Rate Shocks (IR) are derived by determining what happens if deposit interest rates increase by 100, 150, or 200 basis points while loan interest rates decrease by the same amount. Exchange rate shocks (ER) are estimated by examining what happens if the currency exchange rate rises by 20%. Similarly, equity price shocks (EP) are calculated by analyzing what happens if equity prices fall by 50%.

Further, the T-test was employed to evaluate the statistical significance between the dependent and independent variables, thereby indicating the actual disparity in the population from which the groups were sampled. The 1 percent and 5 percent levels of significance are employed to assess the likelihood of accepting or rejecting the null hypothesis set for the research. The research conducted diagnostic tests, including multicollinearity analysis, to identify the suitability of the independent variables for incorporation into the model.

4. Results and Discussion

The analysis of data is carried out using the mentioned models, incorporating data collected from three specific commercial banks that were selected from a total population of 28 banks. The analysis is conducted within the

framework of the CAMELS approach and market stress test, aiming to examine the financial performance of top-performing banks in Nepal. The variable description provides a concise overview of the dependent and independent variables, including their mean values and standard deviations.

Table 1: Descriptive Statistics Related to the Factors of the CAMELS Approach (2013/14-2017/18)

	Minimum	Maximum	Mean	Std. Deviation
Capital Adequacy (CA)	11.24	14.92	12.64	1.0594
Assets Quality (AQ)	0.07	2.23	1.05	0.6782
Management Quality (MQ)	21.92	62.04	31.53	11.4475
Earning Quality (EQ)	0.78	2.67	1.89	0.5398
Liquidity Quality (LQ)	64.42	88.46	78.81	6.4480
Sensitivity to Market Risk (SQ)	1.00	1.81	1.56	0.2517
Earnings Per Share (EPS)	16.62	83.68	40.33	18.0955

Table 1 displays descriptive statistics for the CAMELS approach variables of sample banks in Nepal from 2013/14 to 2017/18. The average EPS is 40.33% with a moderate standard deviation of 18.0955%, suggesting moderate earnings volatility. Capital adequacy, asset quality, and management quality were satisfactory to moderate, with means of 12.64%, 1.05%, and 31.53% respectively. Earnings quality and liquidity were at moderate levels with means of 1.89% and 78.81% respectively. Sensitivity to market risk was 1.56%. The data clustered closely around the means (s.d.), indicating consistent performance for the selected banks.

Table 2: Bank-wise Descriptive Statistics Regarding CAMELS Factors (2013/14-2017/18)

Descriptive statistics Bank-wise		*NIBL*	*NABIL*	*NICA*
Capital Adequacy (CA)	Minimum	11.27	11.24	12.37
	Maximum	14.92	13	14.05
	Mean	12.754	11.992	13.188
	Std. Deviation	1.388	0.709	0.764
	Rank	2	3	1
Assets Quality (AQ)	Minimum	0.68	0.55	0.07
	Maximum	1.77	2.23	1.99
	Mean	1.178	1.308	0.667
	Std. Deviation	0.435	0.702	0.8
	Rank	2	3	1
Management Quality (MQ)	Minimum	22.8879	21.925	34.12
	Maximum	29.7337	28.388	62.04
	Mean	25.685	24.069	44.832
	Std. Deviation	2.77	2.564	10.533
	Rank	2	1	3
Earnings Quality (EQ)	Minimum	1.8792	1.8017	0.7809
	Maximum	2.2506	2.6677	1.6147
	Mean	2.057	2.333	1.266
	Std. Deviation	0.144	0.354	0.327
	Rank	2	1	3
Liquidity (LQ)	Minimum	72.4059	64.423	80.5091
	Maximum	88.4614	82.353	85.6249
	Mean	80.089	73.764	82.57
	Std. Deviation	6.754	6.658	2.008
	Rank	2	1	3
Sensitivity to Market Risk (SQ)	Minimum	1.4848	1.0004	1.538
	Maximum	1.7552	1.8055	1.7181
	Mean	1.591	1.477	1.61
	Std. Deviation	0.118	0.435	0.076
	Rank	2	1	3

Table 2 presents a comparative analysis of the CAMELS factors for three commercial banks in Nepal: NIBL, NABIL, and NICA, from 2013/14 to 2017/18. NIC Asia Bank demonstrates the highest capital adequacy ratio (CAR) of 12.37%, securing the top position, while NABIL Bank Ltd has the lowest CAR of 11.24%, ranking third. NIC Asia Bank also exhibits the lowest non-performing assets (NPA) ratio of 0.667%, earning it the first position in asset

quality, while NABIL Bank Ltd has the highest NPA ratio of 1.308%. NABIL Bank Ltd leads in management quality with the lowest total expenses to total income ratio of 24.069%, followed by NIBL (25.685%) and NICA (44.832%). NABIL Bank also demonstrates a higher return on assets (ROA) of 2.333%, securing the first rank in earnings quality, while NIBL (2.057%) ranks second and NICA (1.266%) ranks third. NABIL Bank exhibits the lowest loan-to-deposit ratio of 73.764%, indicating better liquidity management, while NIBL (80.089%) and NICA (82.57%) rank second and third respectively. Lastly, NABIL Bank has the lowest sensitivity to market risk with a ratio of 1.477%, followed by NIBL (1.591%) and NICA (1.61%).

Table 3: Descriptive Statistics for Market Stress Tests to Sample Banks FY 2017/18 ('million).

	NIBL			NABIL			NICA		
Fundamentals									
Capita fund:	22695			18710			15350.01		
CAR:	12.66%			13.00%			12.24%		
Total Risk-Weighted Exposures	179258			143877			125370.8		
Deposits (Excluding Fixed & Current):	50599			69212			62751		
Loan & Advances (Excluding Term Loan):	74320			92514			93912		
Net Open Position:	841			359			754		
Investment in Shares & Debentures:	219			517			571		
Interest Rate Shocks									
Deposit Int. Increase by (bps)	**100**	**150**	**200**	**100**	**150**	**200**	**100**	**150**	**200**
Impact (-) on Profit	(50599 x0.01)/12 =42	63	84	(69212 x 0.01)/12 =58	87	115	(62751 x 0.01)/12 =52	78	105
Revised Capital Fund	22695-42 =22653	22632	22611	18710-58 =18652	18623	18595	15350-52 =15298	15272	15245
Pre Shock CAR	12.66	12.66	12.66	13	13	13	12.44	12.44	12.44
Revised CAR	12.63	12.62	12.61	12.96	12.94	12.92	12.20	12.18	12.16
Loan Int. decrease by (bps)									
Impact (-) on Profit	(74320 x 0.01)/12 =62	93	124	(92514 x0.01)/12 =77	116	154	(93912x 0.01)/12 =78	117	157
Revised Capital Fund	22695-62 =22633	22602	22571	18710-77 =18633	18594	18556	15350-78 =15272	15233	15193
Pre Shock CAR	12.66	12.66	12.66	13	13	13	12.44	12.44	12.44
Revised CAR	12.62	12.60	12.59	12.95	12.92	12.89	12.18	12.15	12.12
Exchange Rate Shocks									
Impact in Profit	841x0.20 = 168			359x0.20 = 72			752x0.20 = 150		
Revised Capital Fund	22695-168 = 22527			18710-72 = 18638			15350-150 = 15200		
Pre Shock CAR	12.66			13			12.44		
Revised CAR	12.57			12.95			12.12		
Equity Price Shocks									
Impact (-) on Profit	219x0.20 = 43			517x0.20 = 103			571x0.20 = 114		
Revised Capital Fund	22695-3 = 22652			18710-103 = 18607			15350-114 = 15238		
Pre Shock CAR	12.66			13			12.44		
Revised CAR	12.64			12.93			12.15		
Overall: Post-Impact CAR Stats.									
Minimum	12.57			12.89			12.12		
Maximum	12.64			12.96			12.20		

	NIBL	NABIL	NICA
Mean	12.61	12.933	12.158
Std. Deviation	0.023	0.023	0.029
Rank	**2**	**1**	**3**

Table 3 presents how different factors affect the Capital Adequacy Ratio (CAR) of sample Banks. For NIBL, an increase of 100 base points in deposit interest results in a marginal CAR decrease from 12.66% to 12.63%. Similarly, a 150 base point increase leads to a CAR of 12.62%, and at 200 base points, the CAR reaches 12.61%. Despite these changes, NIBL maintains its CAR above the 11% minimum threshold. A similar pattern is observed for a 100 base point increase in loan interest, with the CAR changing to 12.62% from 12.66%. At 150 and 200 base points, the CAR reaches 12.60% and 12.59% respectively, still above the minimum requirement. A 20% currency exchange rate appreciation causes a slight CAR decline from 12.66% to 12.57%, while a 50% fall in equity price leads to a minor decrease from 12.66% to 12.64%. CAR remains above the required level in both cases. Moving on to NABIL Bank and NIC Asia Bank, similar patterns could be observed from Table 3, which shows a marginal decrease in CAR with the 100, 150, and 200 basis points increase and decrease for the Deposit and loan portfolios of the respective banks.

Based on the stress test results in Table 3, all three banks, NIBL, NABIL Bank, and NIC Asia Bank, effectively maintain their Capital Adequacy Ratios (CAR) above the minimum requirement of 11%. NABIL Bank demonstrates a greater ability to sustain equilibrium in its CAR compared to the other two banks when facing fluctuations in external factors. These findings validate the performance of the respective banks, with NABIL emerging as the top performer, followed by NIBL and NIC Asia Bank.

Table 4: Correlation of Independent Variables with Bank Performance (EPS)

	CA	AQ	MQ	EQ	LQ	SQ	EPS
CA	1						
AQ	-0.427	1					
	0.112						
MQ	0.166	-0.539*	1				
	0.554	0.038					
EQ	-0.282	0.480	-0.895**	1			
	0.309	0.070	0.000				
LQ	0.613*	-0.473	0.337	-0.257	1		
	0.015	0.075	0.219	0.355			
SQ	-0.120	0.351	0.223	-0.270	-0.114	1	
	0.670	0.199	0.425	0.330	0.687		
EPS	-0.540*	0.624*	-0.633*	0.766**	-0.560*	-0.024	1
	0.038	0.013	0.011	0.001	0.030	0.932	

Note: '' and '**' denote that correlations are statistically significant at the 0.05 and 0.01 levels respectively.*

Table 4 shows the outcomes of a correlation analysis, revealing valuable insights into the relationships between variables. Notably, earnings per share (EPS) shows a negative correlation with the capital adequacy ratio (CAR) (-0.540), indicating that as EPS increases, CAR tends to decrease. There is a positive correlation between EPS and asset quality (0.624), reflecting better loan portfolio management. EPS also shows a negative correlation with management quality (-0.633), indicating more efficient expense-to-income ratios. Furthermore, a strong positive correlation exists between EPS and earnings quality (0.766), while EPS shows a negative correlation with liquidity (-0.560). However, no significant association is found between EPS and sensitivity to market risks (-0.024).

Regression models have been employed to evaluate the results' statistical validity and dependability. The purpose of the regression study was to determine whether the CAMELS variables had any impact on the earnings per share.

Table 5: Multivariate Regression Analysis with VIF on EPS

Particulars	Beta	Sig.	VIF
(Constant)	15.222**	0.008	
Capital Adequacy (CA)	-0.110**	0.009	2.194
Asset Quality (AQ)	6.554**	0.033	2.508
Management Quality (MQ)	0.934**	0.019	7.425

Earning Quality (EQ)	36.383	0.205	6.705
Liquidity Quality (LQ)	-1.009**	0.014	2.088
Sensitivity to Market Risks (SQ)	0.681**	0.009	1.633

Note: '' and '**' represent significance at the 0.05 and 0.01 level respectively.*

Considering the study's findings, a regression model was developed to further examine the relationships between the earnings per share and the influencing variables of the CAMELS approach. The regression equation obtained is as follows:

$$EPS_{it} = 15.222 - 0.110\ CA_{it} + 6.554\ AQ_{it} + 0.934\ MQ_{it} + 36.383\ EQ - 1.009\ LQ_{it} + 0.681 SQ_{it}\quad \text{--- (ii)}$$

The outcome demonstrates that there is no significant association between earnings quality and EPS, but there is a strong relationship between EPS and capital adequacy, asset quality, management quality, liquidity, and sensitivity-to-market risk. The robust positive association shows that asset quality, management quality, and sensitivity to market risks will affect the dependent variable EPS in such a way that a rise in the value of these factors would raise the value of earnings per share, and vice versa. The unfavorable impacts are indicated by the negative significant association between capital adequacy and liquidity and EPS. This result contradicts the findings of Karki and Aryal (2019), who demonstrated that the capital adequacy ratio positively affects bank performance. Except for the hypothesis relating to earnings quality and EPS, all study hypotheses were accepted. Before data analysis, the study checks for multi-collinearity among the selected variables. To demonstrate the reliability of the regression results, the variance inflation is carried out. Given that the variance inflation factor (VIF) values for the variables are all below 10, it implies that there isn't any multi-collinearity.

According to model (ii), the beta indicates that for every 1% increase in each of the variables, such as AQ, MQ, EQ, SQ, the EPS will increase by 6.554%, 0.934%, 36.383%, and 0.681%, respectively. In contrast, for each 1% increase in the variables, such as CA and LQ, the EPS will decrease by 0.110% and 1.009%.

Table 6: Model Summary for Estimating the Impact of CAMELS Variables on Bank Performance (EPS)

R	R-Square	Adjusted R-Square	Std. Error of the Estimate
0.903	0.815	-0.677	10.290

As shown in Table 4, the regression model yielded compelling results, demonstrating a robust and significant association between the variables used in the study. The R-squared value of 0.815, representing the coefficient of determination, implies that the independent variables in the model explained 81.5% of banking performance. The model is robust and predictive with a high R-squared value. It suggests that CA (capital adequacy), AQ (asset quality), MA (management quality), EQ (earnings quality), LQ (liquidity), and SQ (sensitivity to market risk) explain a large percentage of the earnings of the banks. The model's adjusted R-Square of 0.677 also indicates its validity. Adjusted R-squares account for the model's predictors and provide a more conservative estimate of explanatory power. The model's conclusions are trustworthy since the adjusted R-squared value reaffirms the strong link between the dependent and the independent variables. Moreover, the low Standard Error of the Estimate (10.29) suggests that the predicted values from the regression model are quite close to the actual values of the dependent variable. This indicates a good fit for the model and strengthens the statistical significance and robustness of the findings. Based on these findings and statistical analyses, the study concludes the hypotheses testing as follows:

Table 7: Summary of Hypothesis Testing

Hypothesis	Contents of Hypothesis	Findings
H₁:	'A significant relationship exists between the capital adequacy ratio and EPS of Nepalese Commercial banks'.	Accepted
H₂:	'A significant relationship exists between asset quality and EPS of Nepalese Commercial banks'.	Accepted
H₃:	'A significantly positive relationship exists between management quality and EPS of Nepalese Commercial banks'.	Accepted
H₄:	'A significantly positive relationship exists between the earnings quality and EPS of Nepalese Commercial banks'.	Rejected
H₅:	'A significantly negative relationship exists between liquidity and EPS of Nepalese Commercial banks'	Accepted
H₆:	'A significantly positive relationship exists between sensitivity to market risks and EPS of Nepalese Commercial banks'.	Accepted

5. Conclusion

This research aimed to explore the financial stability of top-performing banks in Nepal using the CAMELS approach and a market stress test. The findings provide valuable insights into the factors that contribute to bank performance

and their ability to withstand market uncertainties. The analysis revealed that capital adequacy (CA), asset quality (AQ), management quality (MQ), liquidity quality (LQ), and sensitivity-to-market risks (SQ) are significant factors influencing bank performance in Nepal. The findings of this research are consistent with prior studies in several aspects. Similar to previous studies, it was proved that capital adequacy ratios (CAR) exert a substantial influence on the health of banks and the likelihood of their failure (Mpuge, 2002). The importance of asset quality, particularly the loans/assets ratio, in assessing a bank's risk and financial stability was also supported (Berger & DeYoung, 1997). Furthermore, the study confirmed the positive association between management quality and profitability, as well as the crucial role of efficient management in bank performance (Wall, 1985; Zimmerman, 1996). The analysis also highlighted the significance of earnings per share (EPS) as a key indicator of bank profitability (Kosmidou, 2008). The study found a positive correlation between EPS and asset quality and earnings quality, aligning with previous findings but revealed a negative correlation between EPS and capital adequacy, management quality, liquidity quality, and sensitivity-to-market risk. This suggests that a balance must be struck between profitability and risk management to achieve sustainable performance. Multiple regression analysis confirms significant relationships between EPS and CAMELS factors, with no significant relationship with earnings quality. Variance inflation factor analysis shows no multicollinearity in the variables. The market stress test conducted in this study demonstrated that the selected commercial banks were capable of maintaining the required level of soundness to withstand market risks. Although some variations were observed, all banks maintained their capital adequacy ratio (CAR) above 11%, indicating their ability to navigate different scenarios. This resilience reflects the importance of periodic stress testing in assessing and managing risks within the banking sector (Flannery et al., 2004). The market stress test suggests that NABIL Bank is better at maintaining stability than others. All banks have CARs above 11%, showing market resilience. NABIL Bank tops the CAMELS study and market stress testing. Taking into account all components of the CAMELS study and market stress testing, NABIL Bank comes out on top, followed by Nepal Investment Bank.

The study suggests that policymakers and regulators should focus on enhancing risk management frameworks, improving capital adequacy, and promoting efficient management practices in the banking sector. By addressing these factors, banks can enhance their profitability, stability, and overall performance. The findings also emphasize the need for ongoing monitoring and stress testing to ensure the resilience of the banking system in the face of market uncertainties. It is critical to recognize that this research has certain limitations. The use of ratio-based analysis may not capture all aspects of bank performance, and further research incorporating qualitative factors is warranted. Additionally, the study focused on a specific set of top-performing Nepalese banks, limiting the generalizability of the findings. Future research could explore a broader sample of banks and consider additional variables to gain a more comprehensive understanding of bank performance in the country. Especially, this research contributes to the existing literature on financial performance evaluation in the banking sector and provides valuable insights for decision-makers, policymakers, and stakeholders in Nepal.

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