Is Banks' Profitability Affected by Monetary and Investment Freedom of the Economy? Nepalese Prospective

[1]Arjun Kumar Dahal, [2]Prem Bahadur Budhathoki, [3]Sagar Pokhrel

[1]Assistant Professor of Economics, Mechi Multiple Campus, Bhadrapur, Jhapa, Nepal
[Email: arjun.dahal@memc.tu.edu.np, ORCID: https://orcid.org/0000-0003-4816-4576]

[2]Associate Professor of Management (Corresponding author), Saraswati Multiple Campus, Lekhnath Marg, Kathmandu, Nepal
[Email: prem.budhathoki@mahmc.tu.edu.np, ORCID: https://orcid.org/0000-0002-1249-7005]

[3]Teaching Assistant (Management) Mechi Multiple Campus, Bhadrapur, Jhapa, Nepal
[Email: sagar.inform@gmail.com, ORCID: https://orcid.org/0000-0003-0496-1338]

Abstract

This study tries to navigate the impact of total loan volume, net interest margin, non-interest income, number of branches of banks, and monetary and investment freedom on determining the profit of commercial banks in Nepal. It is based on secondary data from the World Bank and World Heritage Index, with 27 data points from 1998 to 2024. The co-integration test and fully modified least square method explore the long-run impact of independent variables on dependent variables. It is based on the causal correlational research design. It follows the positivist research philosophy and deductive reasoning. The co-integration analysis confirms the validity of long-run equilibrium relationships among the variables, thus pointing out their interrelationship and continuing influence on profitability. The profitability of Nepalese commercial banks is significantly positively influenced by total loan volume, non-interest revenue, net interest margin, and investment freedom. The profitability of Nepalese banks rises by 0.671, 0.061, and 0.737 percent for every one percent growth in total loan amount, non-interest income, and net interest margin, respectively. Similarly, bank profitability rises by 0.022 percent for every one percent increase in investment freedom. On the other hand, branch numbers adversely affect profitability, suggesting possible inefficiencies or financial strains associated with branch growth. The commercial banks' profit decreased by 0.654 percent with the one percent increase in branches of commercial banks. However, monetary freedom has not significantly impacted banks' earnings in Nepal. Policymakers and banking regulators should focus on enhancing loan portfolio management, optimizing net interest margins, promoting digital banking, ensuring efficient branch expansion, and aligning monetary policy reforms with broader economic goals to boost banking sector profitability.

Introduction

Commercial banks' profitability is essential for ensuring financial stability and economic development. It measures banks' effectiveness and long-term capability to generate revenue related to their operating costs and assets. The central banking activities provide a significant share of commercial banks' earnings through lending, gathering interest, and providing financial services. Total loan volume expresses lending activity directly feeding into a bank's earnings. At the same time, the net interest income (NII) and net interest margin (NIM) measure the profitability of such lending activities through the contrast between interest income and interest expenses. Higher NII and NIM typically suggest better financial health, while poor margins may indicate inefficiencies or exposure to riskier loans (Dietrich & Wanzenried, 2011).

Other than interest-related income, banks generate income from various activities such as service fees, commissions, trading activities, and other non-lending operations. This is captured through non-interest income, which diversifies and acts as a buffer against volatility in interest rates (DeYoung & Rice, 2004). However, over-reliance on non-interest income does leave banks vulnerable to more significant risks, including market volatility and reputation concerns.

The broad economic landscape goes a long way in ruling a bank's profitability. Monetary freedom measures the degree to which a country's policies ensure price stability and the freedom of individuals and businesses to make financial transactions without government interference, reflecting inflation levels and price controls. Likewise, investment freedom evaluates the comfort individuals and companies can engage in domestic and foreign investments, free from restrictions, regulatory barriers, or discriminatory practices. (Heritage Foundation, 2023). These macroeconomic factors establish the foundation for financial institutions' operational strategies and risk-taking tendencies.

The number of bank branches reflects the scale and outreach of a bank's operations. While a more extensive branch network may enhance market penetration and customer accessibility, it also increases operational costs, potentially affecting profitability (Berger et al., 1999). Striking a balance between operational efficiency and service expansion remains a critical challenge for banks.

This study analyzes the influence of the volume of total loans, net interest income, non-interest income, net interest margin, monetary freedom, investment freedom, and the number of bank branches on commercial bank profitability. It searches for the individual and joint impact of total loan volume, interest and non-interest income, net interest margin, number of branches, and momentary and investment freedom on the Nepalese commercial banks' profitability.

This study is segmented into six chapters. The remaining chapters of this study are as follows: Segment two includes theoretical and empirical literature related to the topic in each pair of variables. The theoretical literature is presented first, followed by the empirical literature. Section three consists of the research methodology, including the research design, source of data, data processing technique, variable and model specifications, and data analysis models. The results are presented in section four, and the results are discussed in section five. In the six-segment conclusion, the policy implications and limitations of the study are presented.

Literature Review

Theoretical Literature

According to the theory of financial intermediation, banks serve as intermediaries between savers and borrowers. Higher loan volumes enable banks to utilize their resources more effectively, enhancing profitability. However, the quality of loans is as important as the quantity, as high non-performing loans (NPLs) can erode earnings (Goddard et al., 2004). The diversification theory suggests that non-interest income helps banks mitigate risks associated with interest rate fluctuations and loan defaults (DeYoung & Rice, 2004). According to the structure-conduct-performance (SCP) paradigm, higher NIM reflects a bank's ability to charge premium interest rates, indicative of market power and efficient operations (Claessens et al., 2001).

Economic liberalization and stable monetary policies create an environment conducive to banking efficiency and profitability. Higher monetary freedom is associated with lower inflation and interest rate volatility, positively affecting banks' profitability (Barth et al., 2006).

Open investment environments attract more capital and encourage efficient allocation of resources, boosting profitability (King & Levine, 1993). The theory of economies of scale suggests that more branches can increase market reach and deposit mobilization, enhancing profitability. However, excessive branch expansion may lead to higher operational costs, negatively impacting profits.

Empirical Literature

Empirical Study on Total Loan Volume and Bank's Profitability

The studies explore the relationship between factors and bank profitability across different countries and periods. Neupane (2020) finds that a bank's size and loan volume do not significantly affect profitability, while Chun and Ardaaragchha (2024) highlight that increased loan volumes and non-performing loans (NPLs) negatively impact profitability. Studies like Mulbah et al. (2024) demonstrate a positive relationship between bank size and profitability. Bhattarai et al. (2023) show that higher NPLs are linked to decreased bank profits. The empirical findings are arranged in the following meta-table.

Table 1: Empirical study on total loan volume and bank's profitability

Researchers	Data (Country)	Dependent variable	Independent variables	Method	Findings
Neupane (2020)	2010-2020 (Nepal)	Bank's profitability measured by ROA	GDP, Exchange rate, Inflation, Bank's size, loan	Panel regression model	Bank's profit is not significantly affected by the bank's size and loan
Chun and Ardaaragchha (2024)	2016-2022 (Magnolia)	Bank's Profit	NPL, Total loan, Liquidity ratio	OLS	Total loan volume increases NPLs, and NPL decrease profit
Mulbah et al. (2024)	2000-2022 (Tanzania)	ROA	Size of the bank, NIM, CAR	Random effect, GLS	There is a positive relationship between the size of the market and the bank's profit.

Researchers	Data (Country)	Dependent variable	Independent variables	Method	Findings
Agu (1992)	1970-1981 (Nigeria)	Bank's profit	Market structure, number of banks, total loan issue	Descriptive method	Excess loan issue hampers the bank's profitability
Bhattarai et al. (2023)	2003/04-2021/22 (Nepal)	Bank's profit	Staff bonus, NPL, ROA	Panel fully modified ordinary Least square (FMOLS)	Total loans and NPLs are positively related, and the bank's profit dropped due to a unit increase in NPLs.

Source: *Authors Own Work, 2025*

Empirical Study on Non-interest Income and Bank's Profitability

The studies investigate the impact of non-interest income (NIY) and other factors on bank profitability across various countries. Dahal et al. (2024) find that non-interest income has a minimal influence on bank profit in Nepal, while Stiroh (2004) suggests that diversification into non-interest income is beneficial for banks in the U.S. Ramsastri et al. (2004) show that fluctuations in non-interest and interest income can increase volatility in U.S. bank earnings. Craigwell and Maxwell (2006) link an increase in non-interest income to higher profitability in Barbados. Sufian and Habibullah (2010) find a positive relationship between non-interest income and bank performance in Indonesia. Overall, non-interest income plays a significant role in determining bank profitability and performance across diverse markets. The findings of an empirical study on the topic of non-interest income and profit of banks are listed in the following table.

Table 2: Empirical study on non-interest income and bank's profitability

Researchers	Data (Country)	Dependent variable	Independent variables	Method	Findings
Dahal et al. (2024)	2012-2022 (Nepal)	Bank's profit	NIM, NIY, NPLs and Political stability	Panel VECM	Non-interest income has a nominal influence on profit
Stiroh (2004)	1983-2001 (United States)	Bank's profit	Non-interest income	Correlation and Simple regression analysis	Diversification on benefit from the ongoing shit in towards non-interest income.
Ramsastri et al. (2004)	1997-2003 (United States)	Bank's total income	Interest and non-interest income	Dispersion analysis	The volatility of NIY and net interest income, as well as volatilities in the bank's revenue,
Craigwell and Maxwell (2006)	1985-2001 (Barbados)	ROA	Interest income and Financial Performance	Simple regression analysis	Increases in non-interest income are linked with the bank's profitability.
Sufian and Habibullah (2010)	1990-2005 (Indonesia)	Bank's performance	GDP, Interest, and non-interest income	Panel regression analysis	NIY and banks' performance are positively related.

Source: *Authors Own Work, 2025*

Empirical Study on Net-interest Margin and Bank's Profitability

Table 3 presents a summary of research on the determinants of bank profitability, with a focus on various independent variables such as interest rates, inflation, operating costs, and political stability across different countries. The studies employ different econometric models, including panel regression, regression analysis, and vector error correction models (VECM), to analyze data from various periods and regions. The findings highlight the significance of net interest margin (NIM), inflation, operating costs, and other factors in explaining variations in bank profitability. The empirical findings about the relation between banks' profit and net interest margin are summarized in Table 3.

Table 3: Empirical study on net-interest margin and bank's profitability

Researchers	Data (Country)	Dependent variable	Independent variables	Method	Findings
Dahal et al. (2024)	2012-2022 (Nepal)	Bank's profit	NIM, NIY, NPLs, and Political stability	Panel VECM	Profit is increased by 0.4867 percent with every increase in net interest margin.
Flannery (1981)	1959-1978 (12 banks)	Bank's profit	Total operation expenses, Net interest income.	Regression analysis	A sharp market interest rate increases banking failure.
Kunt and Huizinga (1999)	1988-1995 (80 countries)	Bank's profit	GDP, inflation, Interest margin.	Panel regression model	Net interest margin contributes to a bank's profit.
Mujeri and Younus (2009)	2004-2008 (Bangladesh)	Bank's profit	Interest rate spread, Inflation, Operating cost	Panel regression model, Fixed effect model	Net interest margin, inflation rate, and taxes matter the bank's profitability.
Hancock (1985)	1973-1978 (USA)	Bank's profit	Rate of Return, Interest rate, Monetary policy.	Regression analysis	The bank's profit increases with the increase in net interest margin.

Source: Authors Own Work, 2025

Empirical Study on Monetary Freedom and Bank's Profitability

Table 4 summarizes research findings on the relationship between monetary and economic freedom and banks' profitability across various countries and regions. Most studies highlight that monetary freedom positively impacts banks' profits, with Abdullahi et al. (2021) finding that a unit change in monetary freedom increases profits by 0.0027 units. However, some research, like Kumankoma et al. (2020), reveals negative impacts, indicating that financial freedom can lead to instability and risk. Overall, economic and monetary freedom are significant determinants of banks' profitability, although the effects can vary depending on regional and temporal contexts.

Table 4: Empirical study on monetary freedom and bank's profitability

Researchers	Data (Country)	Dependent variable	Independent variables	Method	Findings
Abdullahi et al. (2021)	2010-2019 (Africa, 1017 banks)	Bank's Profit	Monetary freedom	GMM estimation	Monetary freedom positively and significantly impacts a bank's profit. One unit change in monetary freedom results in a 0.0027 unit change in profit.
Asteriou et al. (2016)	2000-2012 (EU)	Bank's Profit	Economic freedom, corruption control, transparency	2SLS estimation	Monetary freedom positively influences a bank's performance
Azin and Knusten (2019)	1985-2016 (14 Arab countries)	Bank's Profit	Economic freedom and financial crisis	GMM estimation	Components of economic freedom, like monetary freedom, have a positive impact on the profit of banks.
Kumankoma et al. (2020)	2006-2012 (SSA Countries)	Bank's Profit	Economic freedom	GMM estimation	Financial freedom hurts banks' stability and profit, i.e., less stable and more risky.
Ahmad et al. (2011)	1972-2009 (78 Islamic countries)	Bank's Profitability/performance	NPLs. Monetary Freedom	Fixed effect model	Banks' profit is seriously affected by economic freedom.

Source: Authors Own Work, 2025

Empirical Study on Investment Freedom and Bank's Profitability

The empirical study on the relationship between investment freedom and a bank's profitability could investigate how regulatory environments, investment policies, and economic freedoms affect financial performance in the banking sector. In Table 5, some empirical findings are listed.

Table 5: Empirical study on investment freedom and bank's profitability

Researchers	Data (Country)	Dependent variable	Independent variables	Method	Findings
Abbas (2022)	2002-2018 (Pakistan)	Banks risk-taking and stability	Investment, financial, and trade freedom	Two-step system GMM	Investment freedom measures the risk-taking of well-capitalized and high-liquid banks but is insignificant in low-liquid banks.
Sarpong-Kumankoma et.al (2018)	2006-2012 (139 banks in SSA countries)	Banks' profit	Market power, financial, economic, and investment freedom	Regression analysis	Financial, economic, and investment freedom have an individual and joint impact on banks' profit.
Abbas et al. (2024)	2002-2022 (United States)	Banks' profitability	Economic freedom, capital ratio.	GMM	Economic freedom exerts a positive moderating influence on banks' capital ratio and profitability.
Yimam (2024)	2008-2020 (Islamic Cooperation member countries)	Banks' profitability	Net income margin, ROA, Return on average equity	GMM	Most economic freedom indicators expect investment freedom to harm banks' profitability.
Yap et al. (2019)	2012-2018 (ASEAN-5 countries)	Banks' profitability	Economic freedom	Regression analysis	The role of economic freedom on a bank's profitability is convergent, depending upon the level of economic freedom and country.

Source: *Authors Own Work, 2025*

Empirical Study on Branches of Banks and Bank's Profitability

An empirical study on the relationship between the branches of banks and their profitability could analyze how the expansion, distribution, and management of branches impact the financial success of banks. Table 6 summarizes some empirical studies and their conclusions.

*Table 6: Empirical study on branches of banks and bank profitability*

Researchers	Data (Country)	Dependent variable	Independent variables	Method	Findings
Arifi (2023)	2010-2022 (Kosovo and North Macedonia)	Banks' profit	Number of ATMs, Branches of banks, Inflation, GDP growth	Generalized method of moments (GMM)	The number of ATMs is positive, but the number of branches negatively impacts banks' profits.
Akhisar et al. (2016)	2005-2013 (23 developing countries)	Banks' profit	ROA, ROE, Number of ATMs and branches of bank	Correlation analysis and GMM	The number of branches and ATMs significantly impacts determining the bank's profit.
Al-Sahlani (2023)	2018-2022 (Iraq)	Banks' profit	Number of ATMs, internet banking,	Regression analysis	The use of banks and several banks significantly impact the short-run and long-run profit of banks.

Source: *Authors Own Work, 2025*

Where ATM= Automated Teller Machine, ROA= Return on Assets, OLS= Ordinary Least Square, NPL= Non-performing Loans, NIM= Net Interest Margin, NIY= Non-interest Income, CAR= Capital Adequacy Ratio, GLS= Generalized Least Square, SSA= Sub-Saharan African, GMM= Generalized Method of Moments, ROE= Return on Equity, and VECM= Vector Error Correction Method.

All these studies search for the individual impact of several banks, total loan volume, non-interest income, net interest margin, monetary freedom, and investment freedom on banks' profitability. However, this study explores these variables' individual and joint impact on the profitability of Nepalese commercial banks. The conceptual framework is developed as shown in

Figure 2: Conceptual framework of the study.
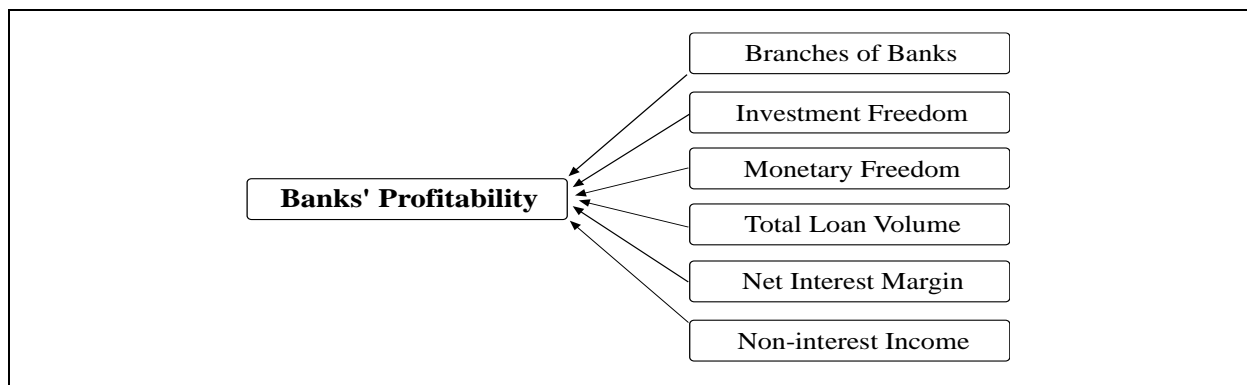
Source: *Authors own work, 2025.*

Research Methodology

Research Design

This study is based on analytical and causal correlational research design. It follows deductive reasoning and is based on the positivist research philosophy. So, it is based on quantitative analysis and single reality.

Data and Data processing

This study is based on secondary data from the World Bank Report, the World Heritage Index, and Nepal's economic survey. It covers 27 data points from 1998-2024. Descriptive statistics, correlational analysis, covariance analysis, Johnsen co-integration test, and fully modified least square regression analysis are used as the data analyzing tools. The EViews12 data processing software is used in the data analysis.

Variable Specification

This study used the volume of total loans, net interest income, non-interest income, net interest margin, monetary freedom, investment freedom, number of bank branches, commercial banks, and profitability. The bank's profitability regarding returns on assets is the dependent variable; the rest are taken as independent variables.

Model Specification

This study tries to navigate the impact of total loan volume, net interest margin, non-interest income, number of branches of banks, and monetary and investment freedom on determining the profit of commercial banks in Nepal. Banks' profit in terms of returns on assets depends upon total loan volume, net interest margin, non-interest income, branches of banks, and monetary and investment freedom. In this sense,

$$\text{Banks profitability} = f(\text{Total loan volume, net interest margin, non-interest income, branches of banks, monetary freedom, investment freedom}) \qquad (1)$$

In Symbol,

$$\text{ROACB} = f(\text{TOLCB NIMCB NIYCB LBRNCB MONF INVF}) \qquad (2)$$

Fully Modified Ordinary Least Squares (FMOLS) is a statistical method designed to estimate co-integrating relationships in time-series data while addressing serial correlation and endogeneity issues. It adjusts the dependent and independent variables using nonparametric corrections, ensuring robust estimates even when the regressors are not strictly exogenous. FMOLS is particularly useful in econometrics for analyzing long-run relationships in datasets with potential co-integration.

The original regression equation is specified as given below:

$$\text{ROACB}_t = \beta_0 + \beta_1 \text{TOLCB}_t + \beta_2 \text{NIMCB}_t + \beta_3 \text{NIYCB}_t + \beta_4 \text{LBRNCB}_t + \beta_5 \text{MONF}_t + \beta_6 \text{INVF}_t + \mu_t \qquad (3)$$

Where μ is the residual (error term). FMOLS assumes co-integration between the dependent variable (ROACB) and the independent variables. Co-integration implies that a linear combination of these variables is stationary even if the individual series are non-stationary. The residual or error term is calculated as given below:

$$\mu_t = \text{ROACB}_t - (\beta_0 + \beta_1 \text{TOLCB}_t + \beta_2 \text{NIMCB}_t + \cdots + \beta_6 \text{INVF}_t) \qquad (4)$$

The FMOLS estimator can be defined as given below:

$$\bar{\beta}_{\text{FMOLS}} = (X^T W X)^{-1} \cdot X^T W y \qquad (5)$$

Where W is the weight matrix, which adjusts for the serial correlation in the residuals

FMOLS adjusts for serial correlation through a nonparametric correction. The estimator of W is typically computed as given below:

$$W = \lim_{T \sim \infty} (\sum_{t=1}^{T} \bar{\mu}_t \bar{\mu}_t{}^{\mathrm{T}}) \tag{6}$$

FMOLS adjusts the estimated serial correlation and endogeneity parameters in the error term. The correction is made through a nonparametric adjustment to the long-run covariance structure of the residuals. The FMOLS estimator for the model can be written as:

$$\Omega_{\mathrm{FMOLS}} = (X^{\mathrm{T}}X)^{-1}X^{\mathrm{T}}y \tag{7}$$

Where y is the vector of observations for ROACB (dependent variable), X is the matrix of observations for the independent variables, like TOLCB, NIMCB, NIYCB, LBRNCB, MONF, INVF, and Ω_{FMOLS} is the vector of estimated coefficients. After adjustment of coefficients, the FMOLS estimated equations are:

$$\mathrm{ROACB}_t = \alpha + \bar{\beta}_1 \mathrm{TOLCB}_t + \bar{\beta}_2 \mathrm{NIMCB}_t + \bar{\beta}_3 \mathrm{NIYCB}_t + \bar{\beta}_4 \mathrm{LBRNCB}_t + \bar{\beta}_5 \mathrm{MONF}_t + \bar{\beta}_6 \mathrm{INVF}_t + \bar{\mu}_t \tag{8}$$

In equation (8), $\bar{\beta}_1, \bar{\beta}_2, \dots \bar{\beta}_6$ are the FMOLS estimates and $\bar{\mu}_t$ is the adjusted error term.

Presentation and Analysis

Condition of Variables

Eight variables are used in this study. The bank's profitability in terms of returns on assets is used as the response variable, and the total loan from commercial banks, net interest margin, non-interest income, number of branches of the bank, investment freedom, monetary freedom, and financial freedom are used as predictor variables. The condition of the study variables is presented in Figure 2. There is a slight variation in the study variables.

Figure 2: Condition of response and predictor variables
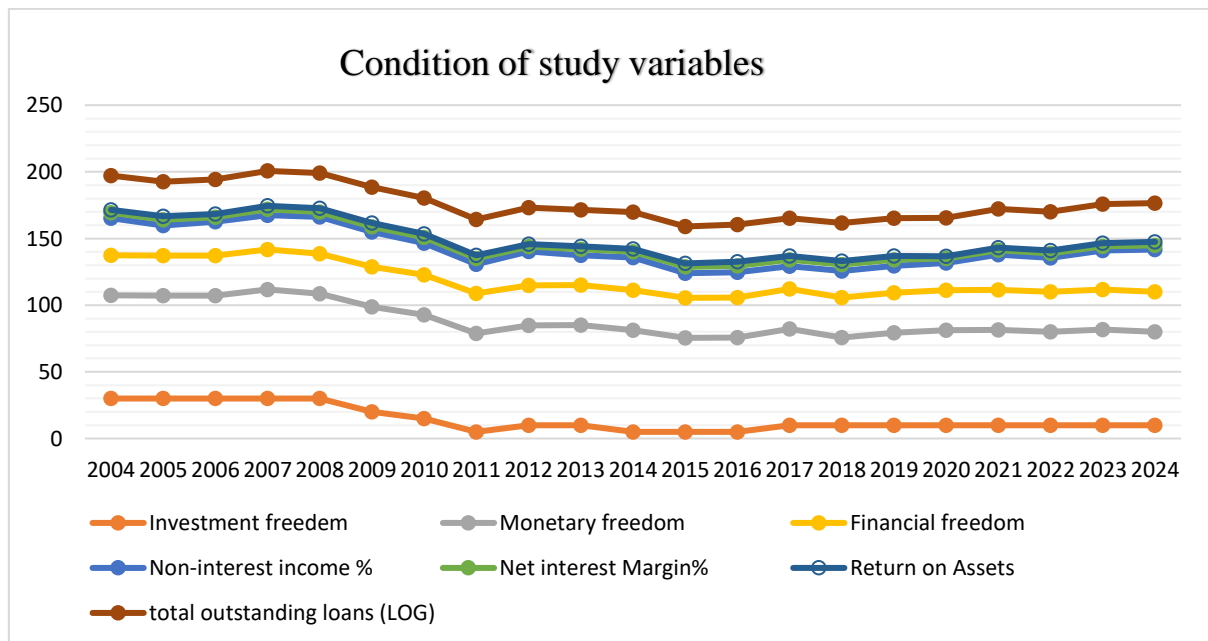
Source: Authors own work, 2025

Figure (2) depicts the trend of different financial variables from 2004 to 2024. The total outstanding loans remain the highest and are seen increasing steadily. At the same time, all other variables, including non-interest income, net interest margin, and return on assets, have shown minor fluctuation throughout the period. Investment and financial freedom appear stable, while monetary freedom gradually decreases.

Key Information of Study Variables

Descriptive statistics summarize and organize data to highlight key patterns and features, using measures like mean, median, and standard deviation. It provides information about the measures of central tendency, dispersion, moments, kurtosis, and other key information in the data of study variables. These statistics provide a quick dataset overview without concluding the population beyond the data. Table 7 displays the key information of the data of study variables.

Table 7: Key information of dependent and independent variables

Base	ROACB	TOLCB	NIYCB	NIMCB	MONF	LBRNCB	INVF
Mean	2.3475	26.707	24.012	4.012	73.777	6.836	16.888
Median	2.3342	26.992	24.7003	4.018	73.800	7.126	10.00
Maximum	3.1830	29.122	31.781	4.872	81.800	8.526	30.00
Minimum	1.1745	22.452	17.031	3.004	65.800	3.965	5.000
Std. Dev.	0.4982	1.9375	3.3969	0.513	3.633	1.290	9.755
Skewness	-0.4745	-0.633	-0.066	-0.336	0.099	-0.390	0.321
Kurtosis	2.5933	2.454	2.876	2.245	2.570	2.274	1.432
Coefficient of Variance	21.22	7.25	14.15	12.79	4.92	18.87	57.76
Jarque-Bera	1.1994	2.138	0.037	1.1489	0.251	1.275	3.229
Probability	0.5489	0.343	0.981	0.5630	0.881	0.528	0.198
Sum	63.383	721.099	648.339	108.328	1992.000	184.581	456.000
Sum Sq. Dev.	6.453	97.609	300.014	6.848	343.286	43.3186	2474.667
Observations	27	27	27	27	27	27	27

Where ROACB represents the return on assets of commercial banks (Percent), TOLCB indicates total loans from commercial banks (log-transformed form), NIYCB and NIMCB are the non-interest income to total income, and net interest margin percent, respectively. MONF and INF represent monetary and investment freedom, respectively, and BRNS shows the number of commercial bank branches in Nepal.

Source: *Authors own work, 2025*

Descriptive statistics provide a summation of both the dependent and independent variables within the study. ROACB stands for Return on Assets and averages 2.35 percent with moderate variability, which is proved by a coefficient of variation (CV) = 21.22 percent. The data on investment freedom has the most significant coefficient of variation, which means the data on investment freedom is more variable than others. The standard deviation of return on assets is lower than other variables, so the mean value of return on assets is more representative. All data are platykurtic because the value of kurtosis is less than 3. The investment and monetary freedom are positively skewed, and the rest are negatively skewed. The skewness values suggest that most of the series are close to symmetry.

Regarding the Jarque-Bera probabilities, it can be viewed that at a five percent level, all the variables are normally distributed. Generally, this data set seems to be well-suited for analyzing the relationships among these variables.

Covariance and Correlation Analysis

Covariance provides the direction of the linear relationship between two variables. It shows whether the variables move together or inversely. Correlation standardizes covariance to produce values between -1 and 1, showing the strength and direction of the relationship. Both are used to analyze the strength of association between the variables; however, due to their fixed range, the results from a correlation are more accessible to interpret. Table 8 represents the outcomes of covariance and correlation analysis of study variables.

Table 8: Results of covariance and correlation analysis:

Variables	Base	ROACB	TOLCB	NIYCB	NIMCB	MONF	INVF	BRNCB
ROACB	Covariance	0.144						
	Correlation	1.000						
	Probability	---						
TOLCB	Covariance	-0.0602	1.283					
	Correlation	-0.1408	1.00					
	Probability	0.542	-----					
NIYCB	Covariance	-0.2756	-0.3478	14.102				
	Correlation	-0.1931	-0.081	1.000				
	Probability	0.401	0.7246	-----				
NIMCB	Covariance	0.0995	-0.184	-1.680	0.326			
	Correlation	0.4589	-0.285	-0.783	1.000			
	Probability	0.0364	0.209	0.00	-----			
MONF	Covariance	0.0404	-3.659	5.138	0.024	15.271		
	Correlation	0.027	-0.826	0.350	0.0109	1.000		
	Probability	0.906	0.00	0.119	0.9625	-----		
INVF	Covariance	0.4344	-7.989	13.405	-0.658	25.642	85.487	
	Correlation	0.1236	-0.7625	0.3860	-0.124	0.709	1.000	
	Probability	0.593	0.0001	0.083	0.589	0.0003	-----	
BRNCB	Covariance	-179.295	1803.20	841.279	-491.632	-4947.39	-8776.054	2850665.
	Correlation	-0.2794	0.942	0.13265	-0.5099	-0.7498	-0.562179	1.000
	Probability	0.219	0.00	0.566	0.018	0.0001	0.0080	-----

Where ROACB represents the return on assets of commercial banks (Percent), TOLCB indicates total loans from commercial banks (log-transformed form), NIYCB and NIMCB are the non-interest income to total income, and net interest margin percent, respectively. MONF and INF represent monetary and investment freedom, respectively, and BRNS shows the number of commercial bank branches in Nepal.

Source: *Authors own work, 2025*

Correlation analysis shows that the return on assets is moderately positively related to the net interest margin at 0.4589, indicating that as the net interest margin increases, there is an increase in the return

on assets. Monetary freedom has a low degree of positive correlation (0.027) with banks' profitability. Likewise, investment freedom positively correlates with banks' profitability, but the bank's profitability decreases with increased branches of commercial banks in Nepal. The net interest margin has a moderate degree of positive correlation with the profitability of banks in Nepal. Non-interest income is strongly negatively correlated with net interest margin (-0.78), indicating that increasing non-interest income tends to decrease the net interest margin. The number of branches is strongly positively associated with total loan volume (0.94), meaning that more branches are associated with more total loans. Finally, investment freedom (INVF) positively correlates with monetary freedom (0.71), indicating a connection between more significant economic and investment freedoms.

Co-integration Test of Variables

The co-integration test helps to identify whether there is any long-run, stable relationship between two or more non-stationary time series. However, they might always be facing some short-term fluctuations. Suppose the series are found to be co-integrated. In that case, they tend to move together over time, maintaining constant equilibrium, whereas individually, they may follow stochastic trends. The Trace and Max-Eigen co-integration tests are the statistical significance tests used in identifying the number of co-integrating relationships among the non-stationary time series. The outcomes of the trace and Max-Eigen test of co-integration are displayed in Table 9.

Table 9: Outcomes of trace and max-Eigen co-integration test

Unrestricted Co-integration Rank test (trace and Maximum Eigenvalue)

Hypothesized (No of CEs)	Eigenvalue	Trace Method			Maximum Eigen Method		
		Trace statistics	0.05 critical value	P-value	Max-Eigen statistic	0.05 critical value	P- value
None	0.937	179.159	125.615	0.000	69.204	46.231	0.000
At most 1	0.822	109.954	95.7536	0.003	43.233	40.077	0.021
At most 2	0.715	66.720	69.8188	0.086	31.396	33.876	0.096
At most 3	0.486	35.323	47.856	0.431	16.649	27.584	0.610
At most 4	0.397	18.674	29.797	0.516	12.668	21.1316	0.483
At most 5	0.203	6.0054	15.494	0.694	5.6752	14.2646	0.655
At most 6	0.013	0.3302	3.841	0.565	0.3302	3.8414	0.565

Trace and max-Eigen test indicates two co-integrating equation(s) at the 0.05 level.

Source: *Authors own work, 2025*

The unrestricted co-integration rank test results show two co-integrating equations at the 5 percent significance level. The Test statistic with the trace method is greater than the critical value of the 'none' and, at most, 1' hypotheses, with P-values of 0.000 and 0.003, respectively. This, therefore, justifies the rejection of the null hypothesis of no co-integration. Similarly, this result is supported by the Max-Eigen method since its test statistics for 'none' and at most 1' also exceed the critical values (P-values: 0.000 and 0.021). Thus, two significant long-term equilibrium relationships exist among the

system variables. The trace and Max-Eigen method of the co-integration test shows that the bank's profitability, net interest income, non-interest income, net interest margin, monetary freedom, investment freedom, and branches of banks have long-run co-integration means to move together.

Fully Modified Least Square Regression Analysis

Fully Modified Least Squares (FMOLS) is an econometric technique that estimates long-run relationships among models with co-integrated variables, allowing for serial correlation and endogeneity. This will, in turn, give way to asymptotically efficient and unbiased parameter estimates by adjusting the problems that might destroy the validity of traditional ordinary least squares (OLS) estimation in the context of time series data. Table 10 shows the results of the fully modified least square regression analysis.

Table 10: Results of fully modified least square regression analysis

Dependent Variable: ROACB

Method: Fully Modified Least Squares (FMOLS)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOLCB	0.671	0.1900	3.5305	0.002
NIYCB	0.061	0.0291	2.0943	0.049
NIMCB	0.737	0.1886	3.9100	0.001
MONF	-0.019	0.0228	-0.8617	0.399
LBRNCB	-0.654	0.3168	-2.0648	0.052
INVF	0.022	0.0095	2.3633	0.028
C	-14.46	2.6558	-5.4474	0.000
R-squared	0.6716	Mean dependent variation		2.3926
Adjusted R-squared	0.5679	S.D. dependent variation		0.4483
S.E. of regression	0.2946	Sum squared residuals		1.6498
Long-run variance	0.0653			

Where ROACB represents the return on assets of commercial banks (Percent), TOLCB indicates total loans from commercial banks (log-transformed form), NIYCB and NIMCB are the non-interest income to total income, and net interest margin percent, respectively. MONF and INF represent monetary and investment freedom, respectively, and BRNS shows the number of commercial bank branches in Nepal.

Source: *Authors own work, 2025*

Table 10 shows the FMOLS analysis results that demonstrate the relationship between the dependent and independent variables. The coefficient for the volume of total loans of commercial banks is 0.671. Hence, for every increase in total loans by one unit, banks' profitability increases by 0.671%. It is statistically significant, as demonstrated by the p-value of 0.002. The coefficient of non-interest income is 0.061, meaning that a one-unit increase in non-interest income is associated with a 0.061 percent increase in the profit of commercial banks in Nepal. Its relatively small impact is statistically significant at $p = 0.049$. Every one percent increase in the net interest margin results in a 0.737 percent increase in returns on assets. It is a strong and significant determinant, as confirmed by the p-value of 0.001. In the case of monetary freedom, there is a negative coefficient of -0.019, which indicates a slight inverse relationship with return on assets. The result remains statistically insignificant, as confirmed by a relatively high p-value of 0.399, which has no meaningful impact. The number of branches of commercial banks' coefficient stands at -0.654, suggesting that an increase in branches harms banks' profit by 0.654 percent. This is a borderline significance with $p = 0.052$, which provides some likelihood of a trade-off between the spread of branches and profitability. An investment freedom coefficient of 0.022 means that for every one percent rise in investment freedom, there is an increase in banks' profit by 0.022 percent. This relation is statistically significant; that is, $p = 0.028$. Therefore, investment freedom is essential in improving the bank's performance.

R-squared was at 0.6716, which shows the 67.16 percent variation in banks profitability in terms of return on assets, which is explained through the independent variables in the model. Therefore, the adjusted R-squared for the degrees of freedom is 0.5679; hence, it explains 56.79 percent variation after changing the number of predictors. The standard error of regression gives the average distance the observed values fall from the regression line. It means that the regression equation, on average, is about 0.2946 units away from the actual values. The S.E. of regression value is lower; this concludes that the model is more accurate in its prediction, and the residuals (actual value minus predicted value) are relatively small. The mean of the dependent variable, banks' profitability in terms of return on assets (ROACB), is 2.3926, the average return on investments across the observations. The standard deviation is 0.4483, which shows low variability in banks' profit, establishing relatively consistent profitability for these banks.

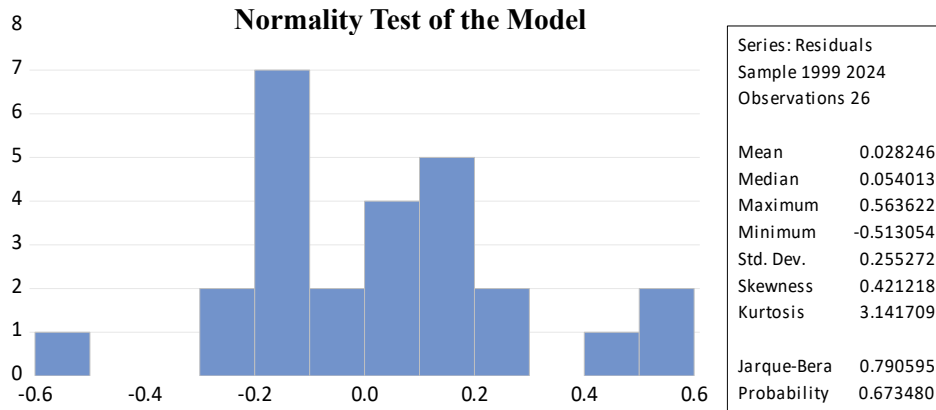The results are summarized in the following regression equation:

$$ROACB = -14.46 + 0.671*(TOLCB) + 0.061*(NIYCB) + 0.737*(NIMCB) - 0.019*(MONF)$$

$$- 0.654*(LBRNCB) + 0.022*(INVF) \tag{9}$$

The model suggests that total loans (TOLCB), non-interest income (NIYCB), net interest margin (NIMCB), and investment freedom (INVF) positively and significantly influence the return on assets. Conversely, the number of branches (LBRNCB) may have a negative effect, while monetary freedom (MONF) appears insignificant. The overall fit indicates the model is reasonably effective in explaining bank profitability variations (ROACB).

Validity Analysis of the Model

Validity analysis ensures the model accurately represents the relationship between the independent and dependent variables in regression analysis. This involves checking assumptions like linearity, normality, and homoscedasticity and evaluating measures such as R^2, adjusted R^2, and p-values to confirm the model's reliability and predictive power. Some methods of diagnostic checking are presented under this topic.

Figure 3: *Normality test of the regression model*

Normality Test of the Model

Series: Residuals
Sample 1999 2024
Observations 26

Mean	0.028246
Median	0.054013
Maximum	0.563622
Minimum	-0.513054
Std. Dev.	0.255272
Skewness	0.421218
Kurtosis	3.141709
Jarque-Bera	0.790595
Probability	0.673480

Source: Authors own work, 2025

A normality test in regression analysis assesses whether the residuals (errors) of the model are normally distributed. The histogram of residuals shows a roughly symmetric distribution centered around zero, indicating no significant deviations from normality. The Jarque-Bera test statistic is 0.79 with a p-value of 0.673, suggesting that we fail to reject the null hypothesis of normality (residuals appear typically distributed). It supports the validity of the regression model's normality assumption for the residuals.

Co-integration Test of Residuals

The Hansen Parameter Instability test evaluates whether a group of time series shares a stable long-term relationship (co-integration) by checking for instability in the co-integration parameters. A high p-value indicates stability in the relationship, suggesting the series are likely co-integrated.

Table 11: Results of Hansen parameter instability

Co-integration Test - Hansen Parameter Instability

Series: ROACB TOLCB NIYCB NIMCB MONF LBRNCB INVF

Null hypothesis: Series are co-integrated

	Stochastic	Deterministic	Excluded	
Lc statistic	Trends (m)	Trends (k)	Trends (p2)	Prob.*
0.673	6	0	0	0.162

Source: Authors own work, 2025

Using the Hansen Parameter Instability framework, the co-integration test examines whether the given series are co-integrated, meaning they share a long-term equilibrium relationship despite short-term fluctuations. The reported Lc statistic is 0.673 with a probability value (p-value) of 0.162. Since the p-value exceeds the significance threshold of 0.05, we fail to reject the null hypothesis that the series are co-integrated. This suggests that the series likely maintains a stable long-term relationship, indicating no evidence of significant instability or divergence over time.

Figure 4: Actual fitted residual graph
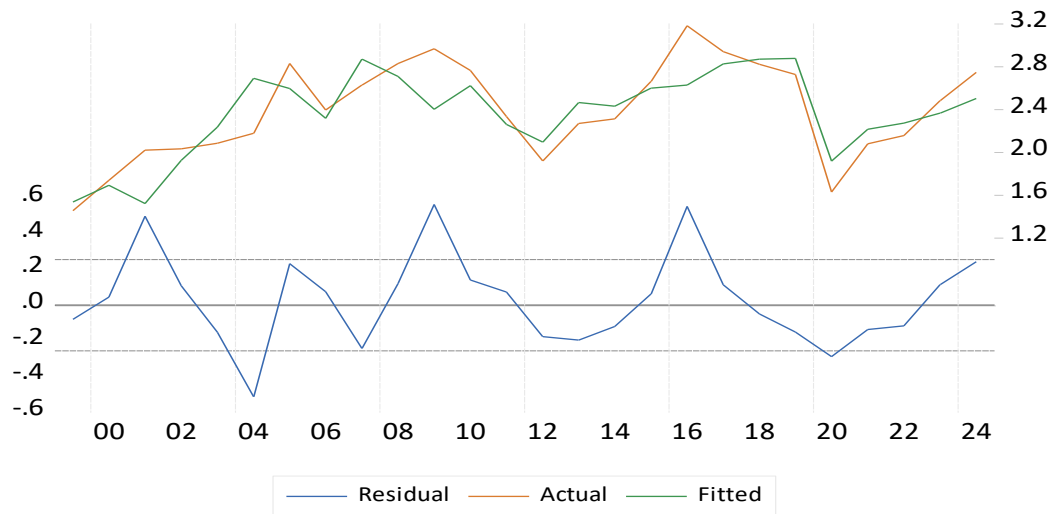
Source: Authors own work, 2025

The Actual Fitted Residual Graph shows how well the fitted values align with the data. The deviations between the actual and fitted lines highlight areas where the model struggles to capture the actual values accurately. If the residuals exhibit systematic patterns rather than randomness, it suggests potential model inadequacies or missing predictors. A well-fitting model should show residuals randomly scattered around zero without noticeable trends.

Result Discussions

The co-integration test highlights the variables' interdependencies and ongoing effects on profitability by validating long-term equilibrium linkages. According to the study, the profitability of Nepalese commercial banks, as determined by the return on assets (ROACB), is significantly positively influenced by total loan volume, non-interest revenue, net interest margin, and investment freedom. The profitability of Nepalese banks rises by 0.671, 0.061, and 0.737 percent for every one percent growth in total loan amount, non-interest income, and net interest margin, respectively. Neupane (2020) finds that a bank's size and loan volume do not significantly affect profitability, while Chun and Ardaaragchha (2024) highlight that increased loan volumes and non-performing loans (NPLs) negatively impact profitability. Dahal et al. (2024) found the nominal influence of non-interest income on banks profit. The findings of Craigwell and Maxwell (2006) and Sufian and Habibullah (2010) align with the research findings that establish the relationship between non-interest income and banks' profitability. The findings of Dahal et al. (2024), Flannery (1998), and Mujeri and Younus (2009) align with the findings of the study that found the positive and significant impact of net interest income on banks' profitability of Nepalese commercial banks. Similarly, bank profitability rises by 0.022 percent for every one percent increase in investment freedom. Yimam (2024) found that investment freedom hampers the bank's profitability, but the findings of Yap et al. (2019) and Abbas et al. (2024) align with this finding. On the other hand, branch numbers adversely affect profitability, suggesting possible inefficiencies or financial strains associated with branch growth. The commercial banks' profit decreased by 0.654 percent with the one percent increase in branches of commercial banks. The findings of Arifi (2023) align with this finding, but the findings of Akhissar et al. (2016)

and Al-Sahlani (2023) do not align with the findings of this study. However, monetary freedom has not significantly impacted banks' earnings in Nepal. The findings of Abdullahi et al. (2021), Azin and Knusten (2019), and Kumankoma et al. (2020) do not align with the findings of this study.

Conclusion, Policy Implications, and Limitations

This study has searched the impact of total loan volume, net interest margin, non-interest income, number of branches of banks, and monetary and investment freedom on determining the profit of commercial banks of Nepal. The co-integration analysis confirms the validity of long-run equilibrium relationships among the variables, thus pointing out their interrelationship and continuing influence on profitability. The study finds that total loan volume, non-interest income, net interest margin, and the degree of investment freedom are significant positive determinants of the profitability of commercial banks in Nepal, as measured by return on assets (ROACB). Every one percent increase in total loan amount, non-interest income, and net interest margin results in 0.671, 0.061, and 0.737 percent increase in Nepalese banks' profitability, respectively. Likewise, a one percent increase in investment freedom results in a 0.022 percent increase in bank profitability. In contrast, the number of branches negatively impacts profitability, hinting at potential inefficiencies or cost burdens linked with branch expansion. The commercial banks' profit decreased by 0.654 percent with the one percent increase in branches of commercial banks. However, monetary freedom has not significantly impacted banks' earnings in Nepal. In sum, the model does possess high explanatory power and explains 67.16 percent of the variation in profitability.

These results indicate that policymakers and banking regulators should implement policies that increase loan portfolio management, optimize net interest margins, and investment freedom to increase banks' profitability. Banks should be careful in branch network expansion and invest more in efficiency and digital banking solutions. Besides, a better investment climate can further improve the banking sector's performance. At the same time, the reforms in the monetary policy space may need to be carefully aligned with the broader economic objectives to see tangible results.

This study only includes seven variables. The banks' profitability is taken as the dependent variable, and total loan, net interest margin, non-interest margin, branches of banks, and monetary and investment freedom are taken as independent variables. It uses secondary data from the World Bank and World Heritage Index, with 27 data points from 1998 to 2024. The co-integration test and fully modified least square method explore the long-run impact of independent variables on dependent variables. It only covers the Nepalese commercial banks. So, further study is necessary by using more variables, countries, data points, and methods to make it more reliable, comprehensive, and representative of the concerned field.

References

Abbas, F. (2021). Impact of investment, financial and trade freedom on banks risk-taking. *Studies in Business and Economics. 16.* 5-23. https://doi.org/10.2478/sbe-2021-0041.

Abbas, F., Ali, S., Woo, K. Y., & Wong, W. (2024). Capital and profitability: The moderating role of economic freedom, *Heliyon, 10(16),* e35253. https://doi.org/10.1016/j.heliyon.2024.e35253.

Abdullahi, I. B., Oladele, T. C., & Sanni, P. A. (2021). Monetary freedom and the financial performance of banks in selected African countries: A dynamic panel approach. *Fuoye Journal*

of Finance and Contemporary Issue, 1(1), 61-70.
https://www.fjfci.fuoye.edu.ng/index.php/fjfci/article/view/8/6

Agu, C. C. (1992). Analysis of the determinants of the Nigerian banking system's profits and profitability performance. *Savings and Development*, *16*(4), 353–370. http://www.jstor.org/stable/25830315

Akhisar, I., Tunay, K.B., Tunay, N. 2015. The effects of innovations on bank performance: the case of electronic banking services. *Procedia-Social and Behavioral Sciences. 195*, 369-375. https://doi.org/10.1016/j.sbspro.2015.06.336

Al-Sahlani, H. K. (2023). The impact of financial innovation on the performance-evidence from the Iraqi banking system. *Journal of Economics, Finance and Management Studies, 6(10)*, 5036-5043. https://doi.org/10.47191/jefms/v6-i10-35

Arifi, E. (2023). Effect of automated teller machines and bank branches on the profitability of banking businesses: evidence from Kosovo and North Macedonia. *Journal of Liberty and International Affairs, Institute for Research and European Studies - Bitola. 9(3).* 136-156. https://doi.org/10.47305/JLIA2393136a.

Ahmad, N. H. B., Noor, M. A. & Noor, B. M. (2011). The impact of 1998 and 2008 financial crises on profitability of Islamic banks. *The Bangladesh Development Studies*, *34*(1), 1–22. http://www.jstor.org/stable/23342761

Asteriou, D., Pilbeam, K. & Tomuleasa, I. (2016). *The impact of economic freedom, business regulation and corruption on bank profitability and bank stability: Evidence from Europe.* City Research Online. University of London Institutional Repository. https://openaccess.city.ac.uk/id/eprint/16839

Aziz, O. G., & Knutsen, J. (2019). The bank's profitability and economic freedom quality: Empirical evidence from Arab economies. *Journal of Banking and Financial Economics,1(11),* 96–110. https://doi.org/10.7172/2353-6845.jbfe.2019.1.5

Berger, A. N., Demsetz, R. S., & Strahan, P. E. (1999). The consolidation of the financial services industry: Causes, consequences, and implications for the future. *Journal of Banking & Finance, 23(2-4)*, 135-194. https://shorturl.at/cFDAm

Barth, J. R., Caprio, G., & Levine, R. (2006). *Rethinking bank regulation: Till Angels Govern.* Cambridge University Press. http://dx.doi.org/10.1017/CBO9780511753817

Chun, S. H., & Ardaaragchaa, N. (2024). Analysis of factors affecting the loan growth of banks with a focus on non-performing oans. *Journal of Risk and Financial Management*, *17*(5), 203. https://doi.org/10.3390/jrfm17050203

Claessens, S., Demirgüç-Kunt, A., & Huizinga, H. (2001). How does foreign entry affect domestic banking markets? *Journal of Banking & Finance, 25*(5), 891–911. https://doi.org/10.1016/S0378-4266(00)00102-3

Craigwell, R., & Maxwell, C. (2006). Non-interest income and financial performance at commercial banks in Barbados. *Savings and Development*, *30*(3), 309–328. http://www.jstor.org/stable/25830936

Bhattarai, G., Dahal, A. K., & Budhathoki, P. B. (2023). Does the staff bonus fund decrease the net profit? Empirical insights from Nepalese commercial banks. *Nepal Journal of Multidisciplinary Research*, *6*(4), 14–28. https://doi.org/10.3126/njmr.v6i4.61991

Dahal, A. K., Bhattarai, G., & Budhathoki, B. P. (2024). Does political stability matter to the profitability of banks? *Financial Markets, Institutions, and Risks, 8*(2), 1-14. https://doi.org/10.61093/fmir.8(2).1-14.2024

DeYoung, R., & Rice, T. (2004). Non-interest income and financial performance at U.S. commercial banks. *Financial Review, 39(1),* 101-127. https://doi.org/10.1111/j.0732-8516.2004.00069.x

Dietrich, A., & Wanzenried, G. (2011*).* Determinants of bank profitability before and during the crisis: Evidence from Switzerland. *Journal of International Financial Markets, Institutions and Money, 21(3)*, 307-327. https://doi.org/10.1016/j.intfin.2010.11.002

Flannery, M. J. (1983). Interest rates and bank profitability: Additional evidence: Note. *Journal of Money, Credit and Banking*, *15*(3), 355–362. https://doi.org/10.2307/1992486

Goddard, J., Molyneux, P., & Wilson, J. O. S. (2004). Dynamics of growth and profitability in banking. *Journal of Money, Credit and Banking, 36*(6), 1069–1090. https://econpapers.repec.org/RePEc:mcb:jmoncb:v:36:y:2004:i:6:p:1069-90

Hancock, D. (1985). Bank profitability, interest rates, and monetary policy. *Journal of Money, Credit and Banking*, *17*(2), 189–202. https://doi.org/10.2307/1992333

Heritage Foundation. (2023). *Index of Economic Freedom*: *All country scores*. Washington, D.C., The Heritage Foundation, https://www.heritage.org/index

King, R. G., & Levine, R. (1993). Finance, entrepreneurship, and growth. *Journal of Monetary Economics, 32*(3), 513–542. https://doi.org/10.1016/0304-3932(93)90028-E

Kumankoma, E. S., Abor, J., & Aboagye, A., & Amidu, M. (2020). Economic freedom, competition, and bank stability in Sub-Saharan Africa. *International Journal of Productivity and Performance Management.* ahead-of-print. https://doi.org/10.1108/IJPPM-06-2019-0310.

Kunt, A. D., & Huizinga, H. (1999). Determinants of commercial bank interest margins and profitability: Some international evidence. *The World Bank Economic Review*, *13*(2), 379–408. http://www.jstor.org/stable/3990103

Mulbah, K. T., Kurbonov, S., & Nasriddinov, B. (2024). The effect of bank size, net interest margin, and capital adequacy ratio on commercial banks' return on assets: Empirical evidence from Tanzania. *European Scientific Journal ESJ. 28.* 474- 494. https://doi.org/10.19044/esipreprint.4.2024.p474.

Mujeri, M. K., & Younus, S. (2009). An analysis of interest rate spread in the banking sector in Bangladesh. *The Bangladesh Development Studies*, *32*(4), 1–33. http://www.jstor.org/stable/40795734

Neupane, B. P. (2020). Profitability determinants of Nepalese commercial banks. *PressAcademia Procedia (PAP), 12*, 40-45. http://doi.org/10.17261/Pressacademia.2020.134

Sarpong-Kumankoma, E., Abor, J., Aboagye, A. Q. Q. & Amidu, M. (2018). Freedom, competition and bank profitability in Sub-Saharan Africa. *Journal of Financial Regulation and Compliance*, 26(4), 462-481. https://doi.org/10.1108/JFRC-12-2017-0107

Stiroh, K. J. (2004). Diversification in banking: Is non-interest income the answer? *Journal of Money, Credit and Banking*, *36*(5), 853–882. http://www.jstor.org/stable/3839138

Sufian, F., & Habibullah, M. S. (2010). Assessing the impact of financial crisis on bank performance: Empirical evidence from Indonesia. *ASEAN Economic Bulletin*, *27*(3), 245–262. http://www.jstor.org/stable/25773881

Ramasastri, A. S., Samuel, A., & Gangadaran, S., (2004). Income stability of scheduled commercial banks: Interest vis-à-vis non-interest income. *Economic and Political Weekly*, *39*(12), 1311–1319. http://www.jstor.org/stable/4414810

Yimam, O. M. (2024). How do financial regulations and economic freedoms affect bank profitability? Empirical Evidence from the OIC Region. *Financial Economics Letters*, *3*(1), 21. https://doi.org/10.58567/fel03010001

Yap, W. K., Law, S. H., & Abdul-Ghani, J. (2020). Effects of economic freedom on bank profit beta-convergence in Asean-5 banking sectors. *Journal of Economic Integration*, *35*(3), 479-502. https://doi.org/10.11130/jei.2020.35.3.479

●