

### Exploring Drivers of Lending Interest Rates of Nepalese Commercial Banks

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#### Abstract:

One of the most significant functions of a commercial bank is lending, which contributes significantly to the bank's income in the form of interest. The lending interest rate (LIR) is the interest rate that a bank charges customers when it extends a loan to them. Banks must be aware of the variables affecting their LIR. This study aims to identify the drivers of LIR at Nepalese commercial banks (NCB). The role of bank-specific and macroeconomic factors is analyzed. In this paper, CAR, ME, NPL, LR, DR, ROA, and liquidity are used as bank-specific factors, and INF, RGDP, MS, and DIR are used as macroeconomic factors. This paper is based on the annual panel data of 20 NCB from 2014 to 2023. The driver of LIR is identified by estimating the regression model. The appropriate regression among the pooled OLS, RE, and FE models was identified based on the results of the Breusch and Pagan Lagrangian multiplier tests and the Hausman test. The results of these tests demonstrate that the FE model is the most appropriate regression model. Thus, the LIR determinants were identified using the FE regression model. This paper verifies the influence of bank-specific and macroeconomic factors in determining the LIR of NCBs. Furthermore, this paper asserts the favorable role of NPL, DR, LIQ, ROA, INF, MS, and DIR and the adverse role of CAR, ME, LR, and RGDP in determining the LIR of NCB. The research findings are applicable for identifying the determination of lending interest rates for Nepalese banks, which will help to develop proper lending rate policies. This paper highlighted that the LIR of NCBs is significantly influenced by bank-specific as well as macroeconomic factors. NCBs with higher NPL, DR, LIQ, and ROA charge higher interest rates on loans, whereas they charge lower interest rates with lower CAR, ME, and LR. Likewise, the LIR of the NCB becomes higher with increasing inflation, money supply, and deposit interest rates and lowers with higher economic growth (RDGP).

**Keywords:** panel data, bank-specific factors, macroeconomic factors, lending interest rate.

### 探究尼泊尔商业银行贷款利率的驱动因素

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**摘要：**

商业银行最重要的职能之一是贷款，贷款以利息的形式为银行的收入做出了重大贡献。贷款利率(激光雷达)是银行向客户提供贷款时收取的利率。银行必须了解影响其激光雷达的变量。本研究旨在确定尼泊尔商业银行(国家控制委员会)激光雷达的驱动因素。分析了银行特定因素和宏观经济因素的作用。在本文中，资本充足率、重大资产负债表、不良贷款、贷款损失准备、资产回报率和流动性被用作银行特定因素，信息、区域国内生产总值、多发性硬化症和目录被用作宏观经济因素。本文基于2014年至2023年20家国家控制委员会的年度面板数据。通过估计回归模型来确定激光雷达的驱动因素。根据布罗伊施和异教徒拉格朗日乘数检验和豪斯曼检验的结果，确定了汇总普通类目、普通类目和费米模型中适当的回归。这些测试的结果表明，费米模型是最合适的回归模型。因此，使用费米回归模型确定了激光雷达决定因素。本文验证了银行特定因素和宏观经济因素对确定国家控制委员会的激光雷达的影响。此外，本文主张不良贷款、存贷比、流动性、资产回报率、信息、多发性硬化症和目录在确定国家控制委员会的激光雷达方面起着有利作用，而轿车、中型轿车、轻型轿车和区域国内生产总值起着不利作用。研究结果适用于确定尼泊尔银行的贷款利率，这将有助于制定适当的贷款利率政策。本文强调，国家控制委员会的激光雷达受到银行特定因素和宏观经济因素的显著影响。不良贷款、存单、流动资产和资产回报率较高的国家控制委员会的贷款利率较高，而汽车、我和左心室较低的国家控制委员会的贷款利率较低。同样，随着通货膨胀、货币供应量和存款利率的增加，国家控制委员会的激光雷达也会升高，而经济增长(RDGP)越高，激光雷达就会越低。

**关键词：** 面板数据、银行特定因素、宏观经济因素、贷款利率。

**1. Introduction**

The lending function of a commercial bank is one of its most important functions and generates substantial revenue in the form of interest income (Haritone & Mirie, 2016). When a bank provides a loan to a customer, it charges interest on the basis of a certain rate, also known as the lending interest rate (LIR). The average cost of all types of loans provided by any financial institution (Kananu & Ireri, 2015). Customers always want a low interest rate for borrowing, whereas bank management always wants a higher interest rate for lending to boost profit and cover the cost of deposits and other expenses. However, financial institutions are offering attractive LIRs to their customers as a result of competition. Because credit from financial intuition is the largest source of funds for any business organization, organizations may refuse to borrow based on financial intuition if it means paying a higher interest rate. Thus, policymakers also want to maintain a considerable LIR to stabilize the economy (Asamoah & Adu, 2016). Likewise, financial intuition also wants to retain its customers by charging a lower LIR as much as possible (Shrestha, 2022). However, financial institutions charge considerably lower interest rates on loans provided to customers, making it important to cover their costs of funds (Itimu & Abdul, 2018). Thus, it is important for financial institutions to recognize the factors that influence their LIR. In this regard, several scholars (Arifi et al., 2014; Bhattarai, 2020; Itimu & Abdul, 2018; Mbowe et al., 2020, 2020; Niroula & Gnawali, 2023; Nitescu & Anghel, 2023) have identified the role of internal and external factors in influencing LIR in different contexts.

Additionally, the integrating relationship between NPL and LIR was reported by Bahruddin and Masih (2018) in Malaysia. Likewise, the role of inflation and exchange rates in determining LIR was reported by Nampewo (2021) in Uganda. In this regard, Georgievska et al. (2010) identified the deposit rate, bank size, NPL, liquidity, CAR, ROA, operating cost, and ownership as the major determinants of the LIR of Macedonia. However, Asamoah and Adu (2016) supported the role of exchange rates in determining the LIR in Ghana. The association between macroeconomic factors and lending behavior is observed in commercial banks in Vietnam (Korkmaz et al., 2022; Le et al., 2022). The role of macroeconomic forces in determining LIR is an extensively discussed issue (Janda & Zetek, 2013; Krnić, 2014; Nguyen & Boateng, 2013; Peiris & Jayasinghe, 2014). On the other hand, some empirical studies have also focused on the role of bank-specific factors in determining LIR (Arifi et al., 2014; Georgievska et al., 2010; Itimu & Abdul, 2018).

Using the ARDL approach, Bhuiyan (2021) reported the crucial role of DR and NPL in the long-run and short-term determination of LIR in Bangladesh. This discussion affirms that the LIR is a crucial phenomenon on which banks' overall lending activities depend. However, a lower interest rate helps banks enhance the total loan size, which increases the credit risk. Additionally, a higher interest rate may prevent banks from granting larger loans to their clients. Therefore, banks should maintain appropriate LIRs (Mbowe et al., 2020). Empirical evidence claims that it is influenced by multiple factors; these factors can be categorized into two broad areas, i.e., internal and external

factors. Internal factors are bank-specific, and external factors are macroeconomic factors (Fabbro & Hack, 2011).

The above discussion asserts that NPL, CAR, ROA, DR, LR, and liquidity are key bank-specific factors, and RGDP, INF, money supply, and deposit interest rates of the economy are major macroeconomic factors for determining lending interest rates. Thus, this paper attempts to recognize the factors that determine the LIR of Nepalese commercial banks (NCB).

## 2. Literature Review

LIR is a major concern for customers, firms, bank managers, and policymakers. Thus, concerned stakeholders should identify the major determinants of LIR. Some scholars, such as Arifi et al. (2014), Asamoah and Adu (2016), Bhuiyan (2021), Georgievska et al. (2010), and Mbowe et al. (2020) attempted to identify the major factors influencing LIR in different contexts.

Georgievska et al. (2010) analyzed the role of bank-specific factors in determining LIR in Macedonia. The author collected quarterly panel data from 27 banks operating in Macedonia for the period 2001–2009. Using the fixed effect and GLS regression models for panel data, this study demonstrated the significant positive role of NPL, market share, and ROA and the significant adverse role of bank size and capital adequacy in determining the LIR. Contrary to this, the paper did not find any influence on liquidity, operating costs, or ownership.

In this regard, using the quarterly data of commercial banks in Kosovo from 2006 to 2013, Arifi et al. (2014) reported the vital role of internal factors of banks, such as CAR, MER, AQR, liquidity, LR, and DR, in determining LIR. In another study, the role of operational cost in determining the LIR was documented by Kananu and Ireri (2015). This study was based on the annual data of 34 commercial banks in Kenya.

Bhattarai (2015) investigated the factors affecting commercial banks' lending interest rates in Nepal. This study analyzed the data of six years 2010 through 2015 of commercial banks. The study applied three commonly used regression models: pooled ordinary least squares (OLS), fixed-effects, and random effects. In this research, the lending interest rate is used as the dependent variable, and return on assets as profitability, operating cost to total assets, default risk, and deposit interest rate are considered explanatory variables. The estimated results show that default risk, profitability (ROA), and operating costs to total assets significantly positively influence Nepalese commercial banks' lending interest rates. Furthermore, the result reveals that deposit rates have a weak influence on the lending interest rate of Nepalese commercial banks. Therefore, this study concludes that bank profitability, default risk, and operating costs to total

assets are the principal drivers of Nepalese commercial banks' lending interest rates.

The positive association of exchange rates and monetary policy and the negative association of RGDP and inflation with LIR were observed during the period of 1970–2013 in Ghana (Asamoah & Adu, 2016). Thus, there should be a sound monetary policy for maintaining an appropriate interest rate on loans provided by financial institutions. Regarding factors influencing LIR, Itimu and Abdul (2018) identified NPL, CAR, liquidity risk, operating costs, and key determinants in Kenya. In this context a co-integrating relationship between NPL and LIR was found. The study was based on monthly data from January 2008 to December 2017. To identify the cointegrating relationship, the authors used the Johansen co-integration test, ARDL, and NARDL, and established the co-integrating relationship in all tests.

In investigating the transmission of policy rates influencing lending interest rates, Liu (2019) used the quarterly data for 2008–2017 to analyze factors affecting lending interest rates in China. The findings of this study reveal that partial changes in the money market rate transform the lending rates of banks, and improvements were observed after interest rate liberalization (October 2015). This transformation is the cause of the quality of Chinese commercial banks' assets and their shadow banking activities. Finally, the result of this study also concludes that macroeconomic conditions in the economy play a significant role in determining banks' lending interest rates. Furthermore, the application of the ARDL model revealed the short- and long-term associations of DR and NPL with LIR in Bangladesh (Bhuiyan, 2021). Based on time series data from 1998 to 2020, the authors observed a positive role for DR and NPL and no role for PCEC, PFR, and INSI.

In the investigation of factors influencing Jordanian commercial banks' lending interest rates, Al-Qudah (2021) used thirteen commercial banks listed on the Amman Stock Exchange for the period 2011–2018 considering lending interest rate as the dependent variable and bank size, profitability (ROA), liquidity, deposit interest rates, operating cost ratio, and inflation rate as explanatory variables. The results of the fixed-effects model in this study show that bank size and return on assets have a significant impact on lending interest rates, and liquidity has a negative relationship but not a significant effect. Furthermore, the estimated results indicate a significant positive influence of inflation and deposit interest rates on Jordanian commercial banks' lending interest rates. The operating cost ratio has a positive but insignificant association with lending interest rates. Therefore, the results of this research conclude that deposit interest rates, bank size, return on assets, and inflation rate are the major influencing determinants of lending interest rates for

Jordanian commercial banks.

In identifying factors affecting lending interest rates, Gharaibeh and Farooq (2022) investigated the macroeconomic indicators that determine the lending interest rate of Bahrain's conventional retail banks using data from the Central Bank of Bahrain and the Global database spanning the year 2012 to 2021. This study examined the impact of various explanatory variables, such as gross domestic product (GDP) growth rate, consumer price index (CPI), liquidity position, loan-to-total assets ratio, broad money supply growth, loan-to-deposit ratio, return on assets, and non-performing loans, on the lending interest rate. Results of this study show that liquidity, asset return on equity, consumer price index, and deposit ratio significantly impact lending interest rates. Moreover, the results indicate that GDP growth, non-performing loans, and money supply growth play an insignificant role in determining the lending interest rate for the business sector in Bahrain. This finding is not only significant to regulatory bodies but also important to lenders, investors, creditors, and other stakeholders.

Korkmaz et al. (2022) analyzed the influence of macroeconomic forces on LIR in BRICST, MINT, and the fragile five countries. This study was based on annual panel data from 1990 to 2019. This paper obtained the significant influence of macroeconomic forces, namely inflation, GDP, and the exchange rate, on the LIR of the sampled countries.

In the investigation of the factors affecting lending rates of Nepalese commercial banks, Ghimire and Bhandari (2023) used lending interest rate as the dependent variable and deposit ratio (DR), non-performing assets, profitability (ROA), and operating costs to total assets (OCTA) ratio as explanatory variables. Data were collected from annual reports of sample banks and banking and financial statistics published by the Central Bank of Nepal (NRB). This research study applied descriptive and causal comparative research designs to analyze the data of 14 commercial banks for the study period from 2016 to 2021 employing pooled ordinary least squares, fixed effects, and random effects of regression models. The regression results show that the deposit rate has a significant effect on the lending interest rate of commercial banks, whereas the return on assets (profitability), cost-to-total assets ratio, and non-performing assets have no significant impact on the lending interest rates of Nepalese commercial banks.

Niroula and Gnawali (2023) examined the factors affecting lending interest rates in Nepalese commercial banks. This study uses secondary sources of data that were collected from annual reports of sample banks (seven banks from 21 populations of commercial banks) in Nepal. This study applied correlation and simple regression techniques to analyze data and interpret results. This study uses lending interest rates as dependent variables and liquidity ratio, return on assets (profitability), default risk, deposit interest rate, inflation, and gross domestic product

as explanatory variables. The estimated results indicate that return on assets, deposit interest rate, and inflation significantly affect lending interest rates for Nepalese commercial banks.

### 3. Methodological Aspects

#### 3.1. Research Design

With the aim of identifying the drivers of LIR at a Nepalese commercial bank, this paper employed a descriptive and causal comparative research design. The behavior, patterns, and relationships of the dependent and independent variables were analyzed through the descriptive research design. For this purpose, descriptive statistics and the Pearson correlation coefficient are estimated. Furthermore, the drivers of LIR are estimated using a causal comparative research design. For this purpose, regression analysis is employed to identify the major bank-specific and macroeconomic determinants of LIR. Moreover, regression analysis is applied to examine the impact of various bank-specific and macroeconomic explanatory variables on lending interest rates for Nepalese commercial banks.

Figure 1 shows the research methodology flowchart.

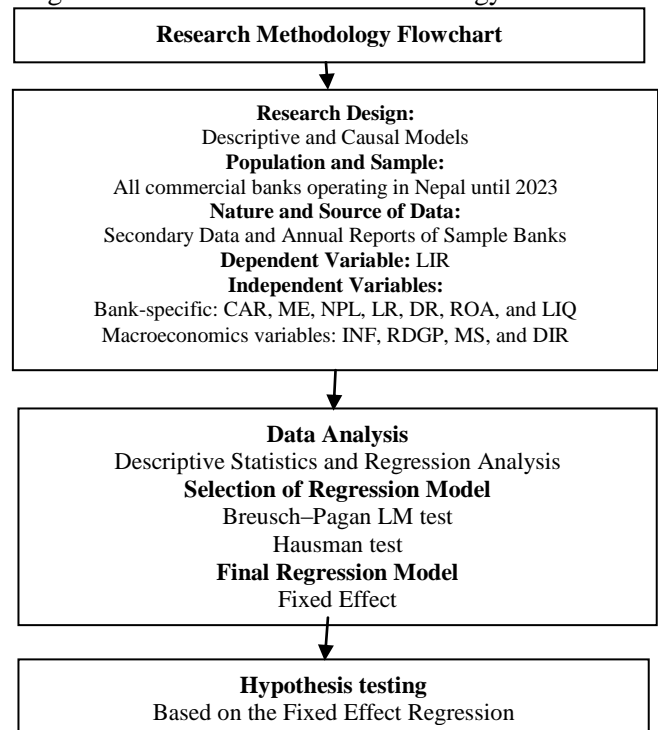


Figure 1. Research methodology flowchart

#### 3.2. Data Nature and Sources

To accomplish the aim of this study, secondary data were gathered using multiple sources. All commercial banks operating in the Nepalese market until mid-July 2023 are considered a sample bank. According to the official record of the Central Bank of Nepal (Nepal Rasra Bank), 20 commercial banks were operating until mid-July 2023. Therefore, bank-specific data are gathered through

the publication of their annual reports. Likewise, data related to macroeconomic variables are gathered through the quarterly economic bulletin, the official publication of the Nepal Rastra Bank (NRB). Finally, this study is confined to the annual panel data of 20 commercial banks from 2014 to 2023.

### 3.3. Variables and Hypotheses

To identify the determinants of lending interest rates (LIR), selected bank-specific and macroeconomic variables are used as independent or explanatory variables. Table 1 lists the variables used in this paper.

Table 1. Variables and hypotheses

S. N.	Variables	Measurement	Type
1	Lending Interest Rate (LIR)	Interest Received	Dependent
2	Capital Adequacy Ratio (CAR)	$\frac{\text{Total Loan}}{\text{Tier 1 capital} + \text{tier 2 capital}}$	Bank-specific independent variables
3	Management efficiency (ME)	$\frac{\text{Risk weighted asset}}{\text{Net Income}}$	
4	Non-performing Loan (NPL)	$\frac{\text{Total Revenue}}{\text{Non – performing Loan}}$	
5	Loan Ratio (LR)	$\frac{\text{Total Loan}}{\text{Total Loan}}$	
6	Deposit Ratio (DR)	$\frac{\text{Total Assets}}{\text{Total Deposit}}$	
7	Return on assets (ROA)	$\frac{\text{Total Assets}}{\text{Net Income}}$	
8	Liquidity (LIQ)	$\frac{\text{Total Assets}}{\text{Total Loan}}$	
9	Inflation (INF)	$\frac{\text{Total Deposit}}{\text{CPI}_t - \text{CPI}_{t-1}}$	Macroeconomic independent variables
10	Economic Growth (RGDP)	$\frac{\text{CPI}_{t-1}}{\text{RGDP}_t - \text{RGDP}_{t-1}}$	
11	Money Supply (MS)	$\frac{\text{RGDP}_{t-1}}{\text{M2}_t - \text{M2}_{t-1}}$	
12	Deposit Interest Rate (DIR)	$\frac{\text{M2}_{t-1}}{\text{Total Interest Paid}}$ $\text{Total Deposit}$	

The following hypotheses are formulated to identify the determinants of the LIR of NCB.

$H_{01}$ : There is a significant influence of the capital adequacy ratio (CAR) on the lending interest rate (LIR) of Nepalese commercial banks.

$H_{02}$ : There is a significant influence of management efficiency (ME) on the lending interest rate (LIR) of Nepalese commercial banks.

$H_{03}$ : There is a significant influence of non-performing loans (NPL) on the lending interest rate (LIR) of Nepalese commercial banks.

$H_{04}$ : There is a significant influence of loan ratio (LR) on the lending interest rate (LIR) of Nepalese commercial banks.

$H_{05}$ : There is a significant influence of deposit ratio (DR) on lending interest rate (LIR) of Nepalese commercial banks.

$H_{06}$ : There is a significant influence of return on assets (ROA) on the lending interest rate (LIR) of Nepalese commercial banks.

$H_{07}$ : There is a significant influence of liquidity ratio (LIQ) on lending interest rate (LIR) of Nepalese commercial banks.

$H_{08}$ : There is a significant influence of the inflation

rate (INF) on the lending interest rate (LIR) of Nepalese commercial banks.

$H_{09}$ : There is a significant influence of real economic growth (RGDP) on LIR of Nepalese commercial banks.

$H_{10}$ : There is a significant influence of money supply (MS) on the lending interest rate (LIR) of Nepalese commercial banks.

$H_{11}$ : There is a significant influence of deposit interest rate (DIR) on the LIR of Nepalese commercial banks.

### 3.4. Model Specifications

To identify the drivers of lending interest rates (LIR) for Nepalese commercial banks, an econometric model is estimated. The estimated regression model is as follows:

$$LIR_{it} = \alpha_0 + \alpha_1 CAR_{it} + \alpha_2 ME_{it} + \alpha_3 NPL_{it} + \alpha_4 LR_{it} + \alpha_5 DR_{it} + \alpha_6 ROA_{it} + \alpha_7 LIQ_{it} + \alpha_8 INF_t + \alpha_9 RGDP_t + \alpha_{10} MS_t + \alpha_{11} DIR_t + \varepsilon_{it}$$

### 3.5. Methods of Analysis

The purpose of this study is to determine macroeconomic and bank-specific factors that influence the LIR. It is based on the annual balance panel data of 20 commercial banks. To identify these determinants of LIR,

a regression model was estimated. Finding the best regression models from pooled ordinary least squares, fixed effect (FE), and random effect (RE) regression models is necessary for panel data regression analysis. Prior to estimating the optimal regression model, the Breusch and Pagan Lagrangian multiplier test is used to select the pooled ordinary least squares (OLS) or fixed/random effect model, and the Hausman test is used to select the fixed/random effect models.

## 4. Results

### 4.1. Descriptive Statistics

Table 2 displays the descriptive statistics of the dependent and independent variables in this paper.

Table 2. Descriptive statistics

	Mean	Std. Deviation	Minimum	Maximum
<b>LIR</b>	10.90	2.05	5.35	17.13
<b>CAR</b>	13.31	2.51	3.92	22.99
<b>ME</b>	24.15	11.39	-33.23	53.79
<b>NPL</b>	1.87	2.20	0.01	4.29
<b>LR</b>	66.45	0.12	42.55	89.93
<b>DR</b>	81.17	6.64	49.05	95.18
<b>LIQ</b>	82.59	9.24	48.92	107.01
<b>ROA</b>	1.55	0.60	0.14	4.16
<b>INF</b>	6.33	2.06	3.60	9.94
<b>RGDP</b>	4.36	3.32	-2.40	9.00
<b>MS</b>	16.72	4.35	6.80	21.84
<b>DIR</b>	5.65	1.49	3.28	7.86

Note: The authors estimate descriptive statistics based on data obtained from the NRB and annual reports of Nepalese commercial banks from 2014 to 2023.

The result shows an average value of 10.90% for the dependent variable, i.e., lending interest rate (LIR), with a minimum value of 5.35% and a maximum value of 17.13%. Similarly, bank-specific independent variables, i.e., capital adequacy ratio (CAR), management efficiency (ME), non-performing loans (NPL), loan ratio (LR), deposit ratio (DR), liquidity ratio (LIQ), and return on assets (ROA), demonstrated quite a bit of variation. The capital adequacy ratio (CAR) shows a minimum value of 3.92% and a maximum value of 22.90%, with an average value of 13.31%. Another bank-specific variable, i.e., management efficiency (ME), shows wide variation, with a minimum value of 33.23 % and a maximum value of 53.79 %. In addition, a non-performing loan (NPL) has a minimum value of 0.01% and a maximum value of 4.29%.

Likewise, the loan ratio (LR) shows minimum and

maximum values of 42.55% and 89.93%, respectively. Furthermore, the descriptive statistics of deposit ratio (DR) show an average value of 81.17 %, with minimum and maximum values of 49.05 % and 95.18 %, respectively. Similarly, liquidity (LIQ) has an average value of 82.59%, with a minimum and maximum value of 48.92% and 107.01%, respectively. Moreover, return on assets (ROA) as a measure of profitability has a minimum value of 0.14% and a maximum value of 4.16%.

The macroeconomic variables included in this study also exhibit wide variation. Inflation (INF) has an average value of 6.33%, with a minimum and maximum value of 3.60% and 9.94%, respectively. Inflation shows an increase in the consumer price index of an average of 6.33% during the study period. In addition, the growth rate of real gross domestic product (RGDP) shows a minimum value of 2.40% and a maximum value of 9.0%. This descriptive result implies that the average gross domestic product growth in the Nepalese economy is 4.36%. Moreover, the descriptive result of the growth rate of money supply (MS) shows an average value of 16.72 % and its standard deviation is 4.35 % along with minimum and maximum values of 6.80 % and 21.84 %, respectively. Finally, the deposit interest rate (DIR) shows an average value of 5.65%, with a minimum and maximum value of 3.28% and 7.86%, respectively.

### 4.2. Selection of Regression Model and Results Analysis

This research used the annual balance panel data of all commercial banks in Nepal for the study period from 2014 to 2023. In panel data analysis, it is important to identify the appropriate regression model among pooled ordinary least squares (pooled OLS), random effect (RE), and fixed effect (FE) models (Baltagi et al., 2003). In this study, for the selection of pooled ordinary least squares (OLS) or random effects (RE)/fixed effects (FE) models, Breusch and Pagan LM tests are used. The results of the Breusch and Pagan LM test results, presented in Table 3, show a  $\chi^2$  value of 20.33 (p-value <0.01), suggesting that the model should be estimated using RE or FE rather than pooled OLS. In another step, to identify the appropriate model between RE and FE, the Hausman test is used. The result of the Hausman test presented in Table 3 shows a  $\chi^2$  value of 107.01 (p-value <0.01), suggesting that the regression model should be estimated using the FE model. Thus, this paper, utilized the FE model to identify the determinants of the LIR of NCB. Table 4 presents the results of the FE regression model.

Table 3. Results of the Breusch–Pagan Lagrangian multiplier test for random effects

	Var	sd = sqrt(Var)
<b>LIR</b>	4.200	2.049
<b>E</b>	0.875	0.935
<b>U</b>	0.034	0.183
Test: Var(u) = 0 $\chi^2(01) = 20.33$ Prob > $\chi^2 = 0.0000$ , and		
<b>Result of the Hausman test</b>		
<b>(b) Fixed Effect</b>	<b>(B) Random Effect</b>	<b>(b-B) Difference</b> <b>Sqrt(diag(V_b-V_B))</b>

Continuation of Table 3

<b>CAR</b>	-0.091	0.043	-2.100	0.037
<b>ME</b>	-0.044	0.011	-4.020	0.000
<b>NPL</b>	0.148	0.050	2.960	0.004
<b>LR</b>	-0.142	0.015	-9.270	0.000
<b>DR</b>	0.039	0.014	2.680	0.008
<b>ROA</b>	1.107	0.185	5.990	0.000
<b>LIQ</b>	0.057	0.015	3.840	0.000
<b>INF</b>	0.376	0.069	5.440	0.000
<b>RGDP</b>	-0.005	0.029	-0.170	0.864
<b>MS</b>	0.295	0.036	8.310	0.000
<b>DIR</b>	1.840	0.108	17.010	0.000
$\chi^2(11) = 107.01$		$\text{Prob} > \chi^2 = 0.000$		

Note: The authors estimate the Breusch and Pagan Lagrangian multiplier test for random effects and Hausman test based on data obtained from the NRB and annual reports of Nepalese commercial banks from 2014 to 2023.

Table 4. Fixed effect regression results

Variable	Coefficient	Std. Error	t-statistics	p-value
CAR	-0.091	0.043	-2.100	0.037
ME	-0.044	0.011	-4.020	0.000
NPL	0.148	0.050	2.960	0.004
LR	-0.142	0.015	-9.270	0.000
DR	0.039	0.014	2.680	0.008
ROA	1.107	0.185	5.990	0.000
LIQ	0.057	0.015	3.840	0.000
INF	0.376	0.069	5.440	0.000
RGDP	-0.005	0.029	-0.170	0.864
MS	0.295	0.036	8.310	0.000
DIR	1.840	0.108	17.010	0.000
Cons.	-4.917	2.608	-1.890	0.061

$R^2$ : within = 0.8017;  $F(11,169) = 52.13$ ;  $\text{Prob} > F = 0.0000$ .

F test that all  $u_i=0$ :  $F(19, 169) = 5.33$ ;  $\text{Prob} > F = 0.0000$

Note: The authors estimate fixed-effects regression statistics based on data obtained from the NRB and annual reports of Nepalese commercial banks from 2014 to 2023.

The results presented in Table 4 show that bank-specific and macroeconomic factors play crucial roles in determining lending interest rates (LIR) in Nepalese commercial banks. It is evident from the result that bank-specific factors, namely capital adequacy ratio (CAR), management efficiency (ME), and loan ratio (LR), have significant negative influences and non-performing loans (NPL), deposit ratio (DR), liquidity ratio (LIQ), and return on assets (ROA), have significant positive influences on lending interest rates (LIR). The negative influence of CAR, ME, and LR implies that Nepalese commercial banks that have strong CAR, ME, and LR

maintain a lower LIR. Contrary to popular belief, the positive influence of NPL, DR, LIQ, and ROA implies that banks with higher NPL, DR, LIQ, and ROA charges higher LIR.

Additionally, the result reveals that macroeconomic factor, namely, inflation rate (INF), money supply (MS), and deposits.

Interest rates (DIR) have significant positive and real gross domestic product rate (RGDP) has significant negative influences on lending interest rate (LIR). The positive influence of INF, MS, and DIR implies that Nepalese commercial banks charge higher LIRs as the INF, MS, and DIR of the economy increase. Conversely, the negative influence of RGDP indicates that the LIR of Nepalese commercial banks decreases as the growth rate of the economy increases.

Finally, the value  $R^2$  (within) 0.8017 indicates that the explanatory variables of the estimated regression model have 80.17 % explanatory power to explain the variation in LIR, and the F-value 52.13 (p-value < 0.01) indicates that the estimated model is a well-fitted model.

### 4.3. Hypotheses Testing

Based on the results of the fixed-effects (FE) regression model, this study tested the developed hypotheses. The summary results of the hypothesis testing are presented in Table 5.

Table 5. Summary of hypothesis testing

S.N.	Hypothesis	Results	Remarks
1	$H_{01}$ : There is a significant influence of CAR on the LIR of NCB.	$\beta = -0.091$ , p-value < 0.01	Accepted
2	$H_{02}$ : There is significant influence of ME on the LIR of NCB.	$\beta = -0.044$ , p-value < 0.01	Accepted
3	$H_{03}$ : NPL has a significant influence on the LIR of NCB.	$\beta = 0.148$ , p-value < 0.01	Accepted
4	$H_{04}$ : LR has a significant influence on the LIR of NCB.	$\beta = -0.142$ , p-value < 0.01	Accepted
5	$H_{05}$ : There is a significant influence of DR on the LIR of NCB.	$\beta = 0.039$ , p-value < 0.01	Accepted
6	$H_{06}$ : ROA has a significant influence on the LIR of NCB.	$\beta = 1.107$ , p-value < 0.01	Accepted
7	$H_{07}$ : There is a significant influence of LIQ on the LIR of NCB.	$\beta = 0.057$ , p-value < 0.01	Accepted
8	$H_{08}$ : INF has a significant influence on the LIR of NCB.	$\beta = 0.376$ , p-value < 0.01	Accepted
9	$H_{09}$ : There is a significant influence of RGDP on the LIR of NCB.	$\beta = -0.005$ , p-value < 0.01	Accepted
10	$H_{10}$ : MS has a significant influence on the LIR of NCB.	$\beta = 0.295$ ; p-value < 0.01	Accepted
11	$H_{11}$ : There is a significant influence of DIR on the LIR of NCB.	$\beta = 1.840$ , p-value < 0.01	Accepted

*Note:* The authors estimate hypothesis test statistics based on data obtained from the NRB and annual reports of Nepalese commercial banks from 2014 to 2023.

Table 5 shows the results of the hypotheses tests; all the estimated regression coefficients of the fixed-effects models accept all the developed hypotheses as per expectation. Therefore, the hypotheses test results indicate that explanatory variables, both bank-specific and macroeconomic variables, significantly affect the lending interest rate of Nepalese commercial banks.

## 5. Discussion

Lending activities of commercial banks are essential for generating revenue. Interest received from the loan is the major source of revenue of the bank, which depends on the lending interest rate. To enhance revenue, the bank may want to charge a higher interest rate for loans. On the other hand, borrowers do not want to pay higher interest rates. If the bank charges a higher interest rate on its borrowings, it refuses to accept more loans from the bank, and the bank may not be able to generate more revenue from its lending activities. Thus, banks should charge an appropriate interest rate when lending. In this regard, this research paper analyzes the factors influencing lending interest rates (LIR) of Nepalese commercial banks. This paper uses the annual panel data of all commercial banks operating in Nepal until mid-July 2023. Using the fixed-effects (FE) model, this study verified the influencing role of bank-specific variables and macroeconomic factors in determining the LIR of Nepalese commercial banks. Further, the estimated result of this study demonstrates the positive influence of non-performing loans (NPL), deposit ratio (DR), liquidity ratio (LIQ), return on assets (ROA), inflation rate (INF), and deposit interest rate (DIR) and the negative influence of capital adequacy ratio (CAR), management efficiency (ME), loan ratio (LR), and real gross domestic product growth rate (RGDP) on lending interest rate in Nepalese commercial banks.

The positive influence of non-performing loans (NPL) indicates that the lending interest rate (LIR) of Nepalese commercial banks increases their interest rate on lending as their NPL increases. Higher NPL shows that banks incur higher costs. Subsequently, they charge higher interest on loans to borrowers to overcome higher costs. This result supports the prior findings of Bhuiyan (2021), Georgievska et al. (2010), and Nitescu and Anghel (2023), and contradicts the prior findings of Gharaibeh and Farooq (2022) and Mbowe et al. (2020). Using the ARDL model, Bhuiyan (2021) reported the significant positive influence of NPL on LIR in Bangladesh. Using the FE and GLS models, Georgievska et al. (2010) also reported the positive role of NPL in explaining LIR in Macedonia. In contrast, using quarterly time series data from 2012 to 2021, Gharaibeh and Farooq (2022) found no significant role for NPL in Bahrain. Additionally, Mbowe et al. (2020) also found no role for NPL in determining LIR in Tanzania.

Likewise, the positive association of deposit ratio (DR) in this study implies that a bank, having a greater deposit than its assets, tends to increase its lending interest rate (LIR). Banks have to pay a higher interest rate on their deposits with an increased amount of deposits because, as a result, they also charge higher interest rates on loans. This result is inconsistent with the previous findings of Ali et al. (2017) and Arifi et al. (2014). Using the annual data of 19 Pakistani commercial banks for the period of 2007-2014, Ali et al. (2017) reported the negative role of DR in determining LIR. Additionally, Arifi et al. (2014) reported that DR has no role in determining LIR in Kosovo.

The positive influence of liquidity (LIQ) indicates that Nepalese commercial banks charge higher interest on loans as their liquidity position increases. This result supports the prior findings of Ali et al. (2017) and Niroula and Gnawali (2023), but it is not aligned with the findings of Al-Qudah (2021). Ali et al. (2017) verified the significant positive influence of LIQ on the LIR of Pakistani commercial banks. Niroula and Gnawali (2023) also reported a significant positive influence of LIQ on the LIR of Nepalese commercial banks. Al-Qudah (2021) found a significant role for LIQ in LIR in Jordan.

Furthermore, the positive influence of return on assets (ROA) on lending interest rates (LIR) of banks implies that as LIR increases, banks' profitability, as measured by ROA, also increases in Nepalese commercial banks. In other words, Nepalese commercial banks tend to increase their LIR to improve profitability. This result corroborates the prior findings of Bhattarai (2020), Niroula and Gnawali (2023) and mismatches with the findings of Al-Qudah (2021). Based on the annual data of six commercial banks operating in Nepal during 2010-2015, Bhattarai (2020) observed the significant positive influence of profitability measured by ROA on LIR. In contrast, Al-Qudah (2021) found a significant negative influence of ROA on LIR in Jordan.

The positive influence of inflation (INF) on lending implies that Nepalese commercial banks charge higher interest rates on loans as inflation in the economy increases and vice-versa. This result is in line with the prior findings of Al-Qudah (2021), Mbowe et al. (2020), Niroula and Gnawali (2023). These scholars identified the positive association between INF and LIR of banks, which indicates that as the inflation of the economy increases, commercial banks also demand more interest rates on their lending. Contrarily, this result is not consistent with the findings of Janda and Zetek (2013), who found a negative association between INF and LIR in Latin America.

Furthermore, the result of this study finds a positive influence of deposit interest rates (DIR) on lending interest rate (LIR) of banks, which implies that as the rate of interest on deposits increases, commercial banks also

increase their interest rate on lending. As the DIR in the economy increases, a bank cannot obtain sufficient deposits from the public and has to pay a higher interest rate on deposits, which compelled them to increase the lending interest rate. This result aligns with the findings of Bhuiyan (2021), Georgievska et al. (2010), Niroula and Gnawali (2023) and contradicts the previous findings of Bhattarai (2020). Bhattarai (2020) did not find any significant influence of the DIR on the LIR in Nepalese commercial banks.

Moreover, the negative influence of the capital adequacy ratio (CAR) on the lending interest rate implies that banks with a strong CAR tend to lower their LIR. Higher CAR indicates that the bank has fewer banking assets, i.e., loans, which can be increased by lowering loan prices, i.e., LIR. Thus, banks with higher CAR always want to decrease LIR to increase loan amounts. This result is not aligned with prior findings of Ali et al. (2017), Gharaibeh and Farooq, (2022), who found no role for the capital adequacy ratio in explaining banks' lending interest rates.

Finally, the estimated result of this paper shows the negative influence of management efficiency (ME), which indicates that Nepalese commercial banks with sound management efficiency charge lower interest rates on loans. A bank with sound ME can decrease operating costs and increase revenue. Because of this, banks with higher ME can lower their LIR to improve profitability. This result is not consistent with the prior results of Ali et al. (2017). Another finding of this paper, i.e., the negative influence of loan ratio (LR), implies that banks with higher loan ratios maintain lower interest rates on their loans. This result is not consistent with the prior results of Ali et al. (2017). The negative influence of RGDP on banks' lending interest rate implies that economic growth enhances the LIR. This result supports the findings of Niroula and Gnawali (2023), whereas it contradicts the findings of Gharaibeh and Farooq (2022), who found no role for the RGDP in explaining the LIR of banks in Bahrain.

## 6. Conclusion

This study examined the drivers of the LIR of the NCB. To explore LIR drivers, bank-specific and macroeconomic factors are used as explanatory variables. The major finding of this paper is that bank-specific and macroeconomic variables contribute significantly to determining the LIR of Nepalese commercial banks. Therefore, this study concludes that bank- and macroeconomic factors are crucial for LIR. Further, this study concludes that NPL, DR, LIQ, ROA, INF, MS, and DIR have a significant positive influence on LIR. The positive influence of NPL, DR, LIQ, and ROA suggests

that NCB tends to maintain a high LIR as these variables increase. Similarly, the positive influence of INF, MS, and DIR infers that NCBs charge higher interest rates on loans as inflation, money supply, and deposits in the economy increase. On the other hand, this study found a negative influence of CAR, ME, LR, and RGDP on LIR. The negative influence of CAR, ME, and LR indicates that these variables play an inverse role in determining LIR. Likewise, the adverse role of RGDP implies that the LIR of NCBs decreases as the real gross domestic product increases.

The findings of this paper are applicable to the formulation of sound lending interest rate policies for commercial banks. Based on the findings of this paper, the Central Bank of Nepal and the management of all commercial banks operating in Nepal can develop appropriate lending interest rate policies for loans to their clients.

However, this study has analyzed the impact of bank-specific and macroeconomic variables on LIR lending interest rates, and only selected factors of these variables are used as explanatory variables. Future research can be conducted by incorporating more bank-specific variables, such as bank size, default risk, market share, operating costs, and ownership, and other macroeconomic variables, such as remittance, oil price, trade balance, and gold price. Furthermore, this study utilized panel data to identify the drivers of lending interest rates, and future research can be conducted using time series data.

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## Authors' Contributions

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Data collection: Purna Man Shrestha and Pitambar Lamichane

Statistical analysis: Purna Man Shrestha

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Overall write-up: Purna Man Shrestha and Pitambar Lamichane

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