

Exploring the Bank-Specific and Macroeconomic Determinants of Capital Structure: Evidence from Nepalese Commercial Banks

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Abstract

Background: Capital structure, i.e., the mixture between borrowed funds and shareholders' equity of a firm, is the major concern of financial management. It is affected by several internal and external factors. A firm's capital structure performs vital contribution in shaping profitability. Every firm must identify the factors influencing its capital structure.

Objectives: This research focuses on identifying the key drivers of the capital structure of Nepalese commercial banks using profitability (ROA), bank size [$\ln(TA)$], and liquidity (LIQ) as bank-specific variables, actual gross domestic product (GDP) growth rate, inflation (INF), and interest rate (IR) as macroeconomic independent variables, and the leverage as dependent variable as a proxy for capital structure.

Methodology: A pooled OLS, fixed effect, and random effect regression model is used to examine the annual panel data of twenty commercial banks operating in Nepal from 2014 to 2023.

Main Findings: This paper finds the considerable role of bank-specific and macroeconomic variables in determining the mixture of debt and equity of a firm. The capital structure of Nepalese commercial banks is negatively impacted by profitability and liquidity, whereas it is positively impacted by bank size. Furthermore, it is positively influenced by the GDP growth rate and inflation and adversely influenced by the interest rate.

Conclusion: This paper concludes that profitable commercial banks with higher liquidity heavily depend on equity capital rather than debt capital. On the other hand, larger banks tend to use more debt. It is further concluded that as economic growth becomes strong with lower interest rates, Nepalese commercial banks tend to use more debt.

Keywords: Bank size, Economic growth, Inflation, Liquidity, Profitability

JEL Classification Code: E40, G10, G21, G32

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Introduction

In the finance literature, the blend of external borrowing and shareholders' equity constitutes the company's capital structure. In the field of corporate finance, determining the right composition of debt and equity has great

importance. The choice between creditorship capital and ownership capital causes to enhancing the firm's overall profitability and helps to reduce risk (Abeysekara, 2020). However, the relevance of corporate funding structure is debatable, and some studies verify its significant influence on the profitability of a firm (Berger & Di Patti, 2006; Lamichhane & Shrestha, 2021; Sheikh & Wang, 2013). Empirical evidence reports that several factors influence the firm's composition of debt and equity (Benyamin & Soekarno, 2023; Kuč & Kaličanin, 2021), and these factors must be identified by the firm to maximize profitability. In this concern, the role of several firm-specific as well as macroeconomic factors is found to be the most influential (Allen et al., 2013; Baltacı & Ayaydın, 2014; Jõeveer, 2013, 2013; Karki et al., 2023; Khan et al., 2021; Mardani et al., 2023; Setiawan & Muchtar, 2021; Shahzad et al., 2020). However, Diamond and Rajan (2000) reported that the composition of financial institutions' debt and equity capital is comprehensively influenced by liquidity and credit. Abeysekara (2020) asserted that profitability, firm size, tax, GDP, and inflation also play vital roles in determining the financing mix of financial institutions. Commercial banking institutions are the prominent type of financial institution. The composition of debt and equity in a commercial bank is also affected by several factors (Khan et al., 2021). Concerning this issue, Ukaegbu and Oino (2013) verified that larger banks use more debt and highly profitable banks use less debt. In another study, size of banks, earnings sensitivity, and growth were shown to be the most influential factors in explaining the long-term financing mix of Saudi banks (Khan et al., 2021). In contrast, GDP is the most influential factor in determining the mix of debt and equity of Jordanian commercial banks (Almanaseer, 2019). Bank size, stock market conditions, and economic conditions are also found to be the most influential factors in the formulation of the composition of debt and equity in Vietnam (Tin & Diaz, 2017). Similarly, profitability and liquidity play dominant roles in determining the proportion of debt and equity in banks (Mutairi & Naser, 2015). It is also observed that larger banks with higher profitability tend to use more equity capital (Fauziah & Iskandar, 2015; Pervin & Nowreen, 2018; Sharif & Muhammad, 2019), whereas older banks often finance with higher debt ratios in their capital structures (Sharif & Muhammad, 2019). Higher-growing companies tend to employ more debt (Fauziah & Iskandar, 2015), and riskier banks also favor using larger debt levels (Pervin & Nowreen, 2018). The mix between long-term sources is, therefore, significantly influenced by bank-specific characteristics (Ahmeti et al., 2023; Al-Hunnayan, 2020; Ayanda et al., 2013; Pant et al., 2022; Shahzad et al., 2020; Sharif & Muhammad, 2019; Swai et al., 2016).

Literature Review

To recognize the determinants of the firm's combination of debt and equity, several empirical studies have been conducted in different contexts. Ayanda et al. (2013) found a significant positive role in dividend payout, bank size, and a significant adverse role in profitability, tangibility, risk, growth, and tax charge for shaping the long-term financing mix. Thus, the author concluded that larger banks with higher dividend payouts give more priority to using higher equity in contrast to banks with higher profitability, risk, and tangibility. Swai et al. (2016) found profitability, growth, bank size, tax shield, and volatility as the crucial determinants of the level of borrowings and ownership capital of banks operating in Tanzania. The author further found the positive role of bank size, profitability, and growth, the inverse role of volatility, and a tax shield for determining the long-term sources of funds. They concluded that banks with more earnings volatility and a stronger tax shield choose to utilize more equity capital, while larger banks that are more profitable tend to employ more leverage.

Al-Hunnayan (2020) verified that the highly growth larger size banks prefer to use larger debt capital, whereas more profitable banks with high physical assets prefer to use a smaller amount of borrowings. In another study, Sharif and Muhammad (2019) found the influencing role of bank-specific factors in fixing the optimal financing between debt and ownership capital of Bangladeshi banks. Using the panel data of 25 Bangladeshi banks during the period of 2013 to 2017, the authors concluded that bank size, tangibility, and profitability play an adverse role, whereas firm age plays a positive role whereas liquidity and growth have no role in shaping the amount of capital financing.

Makarla and Degefa (2019) found the most influential role of macroeconomic factors as well as bank-specific factors in deciding financing mix of Ethiopian banks. Author reported a positive role of bank age and inflation

and a negative role of profitability, bank size, tax shield, growth, and GDP in the mixes between them. The study concluded that Nigerian-aged banks tend to use a higher amount of debt in contrast to more profitable banks with larger sizes and higher growth. Additionally, the banks prefer to use a higher amount of debt at times of high inflation, and they prefer to use more equity at times of higher economic growth. Furthermore, Shahzad et al. (2020) also reported the vital role of firm-specific variables, namely firm size, profitability, tangibility, leverage, and macroeconomic variables, namely economic growth and stock market development, in establishing the financing mix of SAARC countries. Moreover, Kuč and Kaličanin (2021) reported that profitability, tangibility, liquidity, and the cash gap adversely affect firm size, and inflation positively affects the capital structure. Additionally, Ahmeti et al. (2023) also found the influencing role of bank-specific factors in determining banks' composition of debt and equity in Western Balkan countries. Using panel data of 27 banks operating in these countries from 2015 to 2020, it discovered that profitability leads to favorable outcomes while liquidity and earnings fluctuations have a negative effect. The conclusion of using the more debt amount by the profitable firms is contradictory to the pecking order theory. Moreover, it concluded that banks with high liquidity, growth, and earning volatility prefer to use less debt. Conversely, Nizam and Shafai (2023) found no role for profitability and liquidity in determining the composition in long-term sources of funds operating in Malaysia, and concluded an affirmative role for size and a negative role for tangibility.

Very few studies have been done to assess the components that affect the mixture of debt and equity in the context of Nepal (Baral, 2006; Dhodary, 2019; Timilsina, 2020). Baral (2006) stated that earnings of the firm, size of the firm, dividend payout ratio, debt service capacity, and growth rate are the major determinants of Nepalese firms. Further, the author found that larger firms and firms with higher growth tend to use more debt in contrast to firms with lower earnings, lower dividend payouts, and lower debt service capacity. In another study, Dhodary (2019) found interest coverage ratio, liquidity, profitability, and tangibility as the key determinants of the mixture of debt and equity of Nepalese manufacturing firms. Contrary to this, Timilsina (2020) asserts that profitability and liquidity adversely affect Nepalese firms' debt and equity level; therefore, firms with higher liquidity and profitability desire to use less debt.

The above-mentioned discussion proclaims that multiple variables that play a critical part in explaining the level of debt and equity of a firm. However, there is no uniformity in the results. This study aims to identify the influencers between the used of debt and ownership capital in the context of Nepalese commercial banks. The study considered selected bank-specific components (profitability, size, and liquidity) and selected macroeconomic components, namely economic growth, inflation, and interest rate, as explanatory variables.

Conceptual Framework and Research Hypothesis

The research framework presented in Figure 1 provides the relationship between the dependent variable, i.e., leverage (LIV), the proxy of the composition of debt and, equity and the explanatory variables of the study. This paper has used three major bank-specific variables, i.e., return on assets (ROA), bank size, and liquidity, and three major macroeconomic variables, i.e., inflation, economic growth, and interest rate, as explanatory variables.

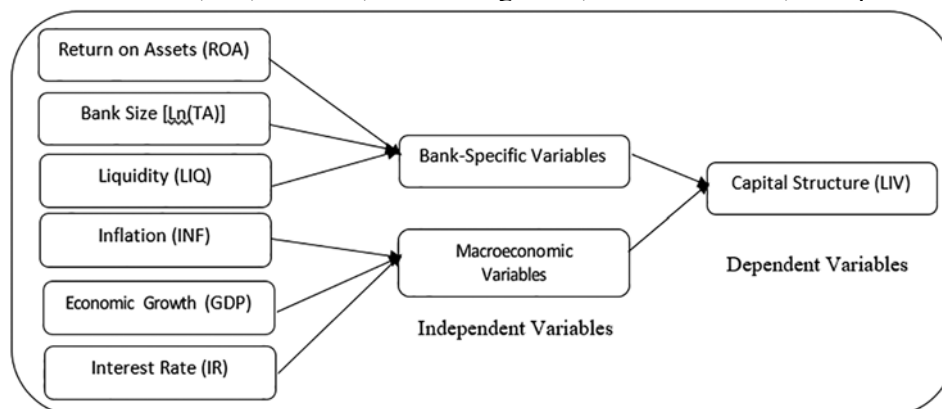


Figure 1: Conceptual framework

Research Hypothesis

- H01: There is negative association between return on assets (ROA) and capital structure (LIV).
 H02: There is positive association between bank size [Ln(TA)] and capital structure (LIV).
 H03: There is negative association between liquidity (LIQ) and capital structure (LIV).
 H04: There is positive association between inflation (INF) and capital structure (LIV).
 H05: There is positive association between economic growth (GDP) and capital structure (LIV).
 H06: There is negative association between interest rate (IR) and capital structure (LIV).

Methodology

The basic purpose of this paper is to identify the factors that shape the choice between debt and equity of Nepalese commercial banks. This study employed secondary data sourced from various channels. It analyzed annual balance panel data from all twenty commercial banks currently operating in Nepal, covering the period from 2014 to 2023. Bank-specific variables were extracted from the annual reports of these Nepalese commercial banks, while macroeconomic variables were gathered from the quarterly economic bulletin published by Nepal Rastra Bank. The study employed a pooled OLS, fixed effect (FE), and random effect (RE) regression models. The optimal model is selected based on the results of the Hausman test, the Breusch and Pagan Lagrangian multiplier tests, and other diagnostic tests. The following econometric model is estimated to examine the factors influencing capital structure:

$$LIV_{it} = \alpha_0 + \alpha_1 ROA_{it} + \alpha_2 Ln(TA)_{it} + \alpha_3 LIQ_{it} + \alpha_4 INF_t + \alpha_5 GDP_t + \alpha_6 IR_t + \varepsilon_{it}$$

The dependent variable is the leverage (LIV_{it}) of the bank at year t , obtained dividing the total debt by total assets. This is extensively used measure of capital structure (Ahmeti et al., 2023; Baral, 2006; Khan et al., 2021; Karki et al., 2024; Mardani et al., 2023; Pervin & Nowreen, 2018). ROA_{it} , $Ln(TA)_{it}$, and LIQ_{it} are the bank-specific explanatory variables. The return on assets (ROA_{it}) indicates the profitability of bank i in year t . It is calculated dividing net profit after tax by total assets. It is the widely recognized measure of firm profitability (Al-Hunnayan, 2020; Gurung et al., 2023; Oino & Ukaegbu, 2015; Pervin & Nowreen, 2018). $Ln(TA)$ is the natural logarithm of total assets, serving as a proxy for the size of bank i in year t , and widely used proxy to measure the profitability (Alipour et al., 2015; Lourenço & Oliveira, 2017; Mardani et al., 2023). The liquidity (LIQ_{it}) is the ratio of the total loan to the total deposit, as suggested by Ahmeti et al. (2023) and Al-Hunnayan (2020).

The macroeconomic variables considered in this study include GDP_t , INF_t , and IR_t . Previous research has highlighted these variables as significant determinants of capital structure. For example, the growth rate of real GDP_t has been identified as crucial by studies such as Abeysekara (2020), Almanaseer (2019), Gurung et al. (2024), and Khan et al. (2021). The rate of inflation, measured by the percentage change in the consumer price index (INF_t), is supported by findings from Abeysekara (2020), Almanaseer (2019), and Makarla & Degefa (2019). Additionally, the interest rate, measured by the 91-day T-bill rate (IR_t), has been emphasized by Setiawan & Muchtar (2021).

Results and Discussions

Table 1 demonstrates the summary statistics of various financial characteristics of Nepalese commercial banks and economic environment faced by them. The banks' leverage, ranging from 73.96% to 98.05% and averaging 89.24%, suggests a significant reliance on debt financing, potentially exposing them to financial instability due to their considerable reliance on borrowing for funding. ROA, averaging 1.55% with a minimum of 0.12% and a maximum of 3.22%, indicates modest profitability. This low ROA suggests that there is room for improvement in the operational efficiency of commercial banks in Nepal. $Ln(TA)$, which ranges from 23.78 to 26.99 with an average of 25.55, provides insights into a diverse range of bank sizes that could have implications for their market power and competitive dynamics. LIQ varies greatly, ranging from 48.92% to 107.01%, with an average of 82.59%, indicating that some banks have high liquidity buffers while others operate with lower liquidity. The fluctuations in INF from 3.60% to 9.94%, with an average of 6.33%, signify the variation in inflation rates,

impacting the banks' interest margins and overall profitability, as higher inflation can deteriorate the real value of returns on assets.

Table 1

Summary Statistics

| | Mean | Std. Deviation | Minimum | Maximum |
|--------|-------|----------------|---------|---------|
| LEV | 89.24 | 2.90 | 73.96 | 98.05 |
| ROA | 1.55 | 0.51 | 0.12 | 3.22 |
| Ln(TA) | 25.55 | 0.64 | 23.78 | 26.99 |
| LIQ | 82.59 | 9.25 | 48.92 | 107.01 |
| INF | 6.33 | 2.06 | 3.60 | 9.94 |
| GDP | 4.36 | 3.32 | -2.40 | 9.00 |
| IR | 3.15 | 2.85 | 0.13 | 9.51 |

The real GDP growth rate exhibits a wide range, from a minimum of -2.40% to a maximum of 9.00%, highlighting the economic volatility within the period under review and suggesting a significant impact on banking performance during an economic downturn. IR shows high variations ranging from 0.13% to 9.51%, with an average of 3.15%, which could reflect a significant impact on banks' net interest margins and profitability.

Table 2 reports the results of Pearson correlation coefficients between the pair of variables. Capital structure (leverage) exhibits a positive correlation with inflation, suggesting that higher inflation is associated with increased leverage in Nepalese commercial banks. Conversely, leverage shows negative correlations with profitability (ROA), bank size (Ln(TA)), liquidity (LIQ), economic growth (GDP), and interest rate (IR), indicating that leverage also tends to increase with a decrease in these variables. Moreover, the low degree of correlation among the independent variables suggests that multicollinearity is not a concern in this analysis.

Table 2

Correlation Results

| | LEV | ROA | Ln(TA) | LIQ | INF | GDP | IR |
|--------|---------|---------|---------|---------|---------|---------|--------|
| LEV | 1.0000 | | | | | | |
| ROA | -0.2984 | 1.0000 | | | | | |
| Ln(TA) | -0.1260 | -0.2991 | 1.0000 | | | | |
| LIQ | -0.3024 | -0.2751 | 0.2445 | 1.0000 | | | |
| INF | 0.3654 | -0.0011 | -0.3345 | -0.2963 | 1.0000 | | |
| GDP | -0.1500 | 0.2505 | -0.1826 | 0.0578 | -0.4914 | 1.0000 | |
| IR | -0.1782 | -0.3766 | 0.7128 | 0.3199 | -0.1266 | -0.0711 | 1.0000 |

Table 3 presents the regression results obtained from the pooled Ordinary Least Square (OLS), Fixed Effect (FE), and Random Effect (RE) models used in the study.

Table 3

Result of Regression Analysis

| Panel: A | | | |
|-----------|---------------------|-------------------------|--------------------------|
| Variables | Pooled OLS Model | Fixed Effect (FE) Model | Random Effect (RE) Model |
| ROA | -2.8272* (-3.76) | -1.1356* (-3.53) | -1.5433* (-4.82) |
| Ln(TA) | 1.1564* (2.62) | 1.9435* (3.99) | 1.5578* (3.41) |
| LIQ | -0.0818* (-4.11) | -0.1093* (-4.71) | -0.0939* (-4.37) |

| | | | |
|-----------------------------------|---------------------|---------------------|---------------------|
| INF | 0.6099* (5.33) | 0.6413* (6.81) | 0.6194* (6.51) |
| GDP | 0.1926* (2.90) | 0.1702* (3.26) | 0.1642* (3.08) |
| IR | -0.4006* (-4.38) | -0.3827* (-4.79) | -0.3671* (-4.60) |
| Constant | 67.3852* (5.64) | 46.7719* (3.66) | 56.1023* (4.63) |
| Wald χ^2 | ---- | ---- | 139.9* |
| Adjusted R ² | 0.3705 | ---- | ---- |
| R ² : within | ---- | 0.4544 | 0.4476 |
| R ² : between | ---- | 0.1212 | 0.2350 |
| R ² : overall | ---- | 0.2912 | 0.3415 |
| F | 20.52* | 24.16* | |
| P-value (F-test & χ^2 -test) | 0.0000 | 0.0000 | 0.0000 |
| Panel: B | | | |
| Breusch-Pagan LM test | | | |
| χ^2 | | 139.63 | |
| p-value | | 0.0000 | |
| Hausman test | | | |
| χ^2 | | 7.40 | |
| p-value | | 0.2852 | |

Note. * indicates significance at one, five and ten percent levels respectively. Figures in the parentheses are the t-values.

The results from all three models demonstrate that both bank-specific and macroeconomic factors significantly influence the debt-equity composition of Nepalese commercial banks. Bank-specific variables such as profitability (ROA) and liquidity (LIQ) consistently show significant negative beta coefficients across all models, whereas bank size, measured by total assets (Ln(TA)), exhibits a significant positive beta coefficient. These findings validate hypotheses H01, H02, and H03, suggesting a relationship between lower debt levels and higher profitability and liquidity, and a correlation between higher debt levels and larger bank sizes, inferring that more profitable commercial banks in Nepal tend to rely less on debt financing.

These results align with the findings of Fauziah and Iskandar (2015), Pervin & Nowreen (2018), Sharif and Muhammad (2019), and Ukaegbu and Oino (2013), but contradict the findings of Ahmeti et al. (2023) and Swai et al. (2016). Additionally, the negative coefficient for liquidity suggests that Nepalese commercial banks with higher liquidity tend to use less debt. This outcome supports the findings of Ahmeti et al. (2023), Al-Hunnayan (2020), Kuč and Kaličanin (2021), and Mardani et al. (2023), while it contradicts the results reported by Al-Hunnayan (2020), Benyamin and Soekarno (2023), Mutairi and Naser (2015), and Nizam and Shafai (2023). Additionally, the negative coefficient of liquidity implies that Nepalese commercial banks with high liquidity prefer to use less debt. This result corroborates with the findings of Al-Hunnayan (2020), Mardani et al. (2023), and Ukaegbu & Oino (2013) and does not support the results of Abeysekara (2020), Fauziah and Iskandar (2015), Pervin and Nowreen (2018), and Sharif and Muhammad (2019). The results also highlight the significant influence of macroeconomic variables—economic growth, inflation, and interest rates—on the debt-equity mix. Specifically, the results show significant positive beta coefficients for inflation and GDP, and a significant negative beta coefficient for interest rates, supporting hypotheses H04, H05, and H06.

The significant positive beta coefficient for inflation (INF) indicates that inflation positively influences the level of debt and equity. This implies that as inflation increases, Nepalese commercial banks are more likely to increase their use of debt. This finding is consistent with the research of Abeysekara (2020), Ahmeti et al. (2023), Kuč and Kaličanin (2021), and Makarla and Degefa (2019), but contradicts the findings of Almanaseer (2019), Setiawan & Muchtar (2021), and Tin and Diaz (2017). Similarly, the significant positive beta coefficient for GDP indicates

that economic growth positively impacts the debt-equity mix. As the economy strengthens, Nepalese commercial banks tend to increase their debt levels. This result aligns with the findings of Khan et al. (2021), but contradicts those of Abeysekara (2020), Makarla and Degefa (2019), Tin and Diaz (2017), and Ukaegbu and Oino (2013). The significant negative beta coefficient for interest rates (IR) indicates that higher interest rates hurt the debt-equity mix. This suggests that as interest rates increase, Nepalese commercial banks are less inclined to increase their debt levels. This finding is consistent with the research of Setiawan and Muchtar (2021). The pooled OLS model shows an F-statistics value of 20.52 ($p < 0.01$), the FE model is 24.16 ($p < 0.01$), and the RE model is 139.9 ($p < 0.01$). The statistics suggest that all the estimated regression models are well-fitted for identifying the determinants of capital structure.

Panel B in Table 3 presents the results of the Breusch-Pagan LM test and the Hausman test, which confirm the optimal regression model selection for the given data set. The Breusch-Pagan LM test returns a χ^2 value of 139.3 ($p < 0.01$), indicating that the pooled OLS model is not suitable. The Hausman test results show a χ^2 value of 7.40 ($p > 0.01$), suggesting that the FE model is also not appropriate. Therefore, the Random Effect (RE) model is determined to be the best for estimating the regression model. The estimated model summary is presented as follows

$$LIV_{it} = 56.1023 - 1.5433 ROA_{it} + 1.5578 \ln(TA)_{it} - 0.0939 LIQ_{it} + 0.6194 INF_t + 0.1642 GDP_t - 0.3671 IR_t$$

Conclusions

Capital structure is a crucial aspect for any organization. This paper examines various bank-specific and macroeconomic factors as determinants of capital structure. Utilizing annual panel data from twenty commercial banks operating in Nepal over the period 2014 to 2023, the study finds that both bank-specific and macroeconomic factors play a significant role in determining the mix of debt and equity. Based on the alternative models: pooled OLS, fixed effect (FE), and random effect (RE), the Breusch-Pagan LM test and the Hausman test suggest the RE model as the most suitable option. The RE model results indicate that total assets ($\ln(TA)$) measure the positive influence of bank size, while the growth rate of GDP assesses economic growth. The consumer price index (CPI) represents inflation (INF), the return on assets (ROA) measures profitability, the loan-to-deposit ratio indicates liquidity (LIQ), and the rate of 91-day Treasury bills determines the interest rate (IR). This paper concludes that larger banks tend to utilize a higher amount of debt during favorable economic conditions. In contrast, Nepalese commercial banks with greater liquidity and profitability prefer to rely more on equity capital. Additionally, these banks often rely heavily on equity due to unfavorable interest rates. Ultimately, the study suggests that Nepalese commercial banks should carefully consider their size, profitability, and liquidity when determining their debt levels, while also taking into account economic growth, inflation, and interest rates to optimize their debt-equity mix.

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