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# The Impact of Liquidity, Leverage, and Total Size on Banks' Profitability: Evidence from Nepalese Commercial Banks

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## Abstract

This paper examined the impact of liquidity, leverage, and total assets size of the bank on profitability. This study employed bank scope data of all 28 commercial banks operating in Nepal during the period of 2010/11 – 2016/17. Altogether, the 168 observations were used in the study. Three ordinary-least-squares models were applied to analyze the impact of liquidity, leverage, and the total size on the bank's profitability. The first regression model reveals that the higher loan to deposit ratio (low level of liquidity) was observed to have the negative effect on the bank's *ROA*, *ROE*, and *NIM*; however, *ROE* and *NIM* were statistically insignificant. The result of the second regression model shows that higher equity to assets ratio (lower leverage) positively affected two profitability measures, *ROA* and *NIM*, and was statistically significant—but was negatively related to *ROE* and statistically insignificant. The result of the final regression model reveals that the higher bank size appeared favorable to the Nepalese commercial banks and was found to have positive effects on all three profitability measures: *ROA*, *ROE*, and *NIM*. The results of the study could help bankers and policymakers to take an effective action in order to improve banks' profitability.

**Keywords:** Liquidity, Leverage, Bank Size, Profitability

## 1. Introduction

Nepalese banking sector plays a crucial role in the economy because of its dominant position in the financial system. Most transfers of funds between the surplus unit and deficit unit take place through the banking channel because other forms of financial intermediation are not well developed (Nepal Rastra Bank [NRB], 2018). Commercial banks (CBs) are the financial institutions that channel funds from surplus units to deficit units. Now, commercial banks hold around 70 percent shares of the total financial system in Nepal (NRB, 2019). It is a plausible fact that the role of banking sectors is much more about bank-dominated economy than about the market-dominated economy in order to obtain the economic objective of the nation, and Nepal is no exception. In a bank-dominated economy, on the one hand, the failure of financial institutions is likely to put a huge impact on the overall financial system; on the other hand, it could have domino effects on the healthier financial

institutions. For a sound financial system, therefore, commercial banks need to earn sufficient profit—at least in the long-run. As a financial intermediary, the bank eliminates the mismatches between the firm and savers by performing four types of intermediation: size intermediation, maturity intermediation, risk intermediation, and information intermediation (Kolb & Rodriguez, 1996). There are two contrasting hypotheses regarding the performance of commercial banks. First, the traditional structure-conduct-performance (SAP) hypothesis asserts that high market concentration (low level of competition) leads to higher profitability. The Nepal government brought the merger and acquisition program in 2007. The main objective of this program is to make an able, efficient, healthy, and competitive business environment by reducing the number of financial institutions in the financial system and by increasing the capital base of the banks. It also builds public confidence and provides a modern facility by enhancing the financial, human, and technical capacity of the banking system (Merger and Acquisition by Law, 2011). This merger program reduces the number of banks, and increases their capital base and total size. If the traditional SAP hypothesis is true, the merger program increases the bank's profitability. This fact can be explained by the possibility that a fewer number of banks can make a larger profit by charging a higher interest rate on loans and advances and pay low interest to depositors; this may be possible through collusion. Merger and acquisition programs can bring synergic effects. Synergistic effects can arise from four sources: (1) operating economies, which result from economies in management, marketing, production, or distribution; (2) financial economies through lower transactions costs (3) differential efficiency through the better use of weaker firm's assets by more efficient firm's management, and (4) increased market power through the reduction in the number of commercial banks. Socially desirable are the operating and financial economies that increase managerial efficiency; nonetheless, the mergers that reduce competition are socially undesirable and often illegal (Brigham & Houston, 2013). However, the efficiency hypothesis argues that the performance of individual banks depends on bank efficiency, not on the market structure. When a bank is able to produce a menu of service products at a relatively reasonable lower cost than the major competitors, the bank can maximize profits and increase its size and market shares (Samad, 2008). Therefore, these two-variable equity to total assets ratio (leverage ratio) and total assets size are important in explaining the performance of financial institutions. A positive impact of capitalization on bank profitability is expected for the following reasons: First, the funding cost can be reduced for the banks with higher capital levels because a higher capital ratio indicates that the banks have higher creditworthiness. Second, the bank with higher capital levels is more likely to engage in prudent lending, which could increase bank profitability. Third, capital plays an important role in absorbing the risk arising from higher risk assets such as loans; the interest revenue generated from loans fosters bank profitability. Finally, the banks with higher capital levels need to borrow less, thereby reducing the cost and further increase profitability (Tan, 2016). However, relatively higher total assets can decrease the bank's profitability due to diseconomies of scale, higher administrative procedures, and excessive overhead expenses (Ahamed, 2017). Similarly, higher equity to assets ratio decreases the bank's risk and profitability. The traditional risk-return hypothesis argues that lower risk provides a lower rate of returns.

Liquidity is an important determinant of bank performance. A lower level of liquidity (higher loan to deposit ratio) is likely to increase the banks' profitability because traditional bank business is mainly concerned with the loan business, and it generates interest income to the commercial banks. But the high volume of loan to deposit ratio can create a liquidity risk and larger non-performing loans to the commercial banks, eventually leading to lower profitability to the commercial banks. In this paper, therefore, we have attempted to establish the relationship of liquidity, leverage, and total assets size with profitability measures—*ROA*, *ROE*, and *NIM*—in the context of Nepalese banking sectors.

The rest of the study has been presented in this way: Section 2 overviews the literature review and hypothesis development; Section 3 is associated with variables selection and research methods; Section 4 presents empirical results and discussion; Section 5 ends with the conclusion, implications, and limitations of the study.

## **2. Literature Review and Hypotheses Development**

### *2.1 Liquidity and bank profitability*

Liquidity is often considered one of the important determinants of the bank's profitability. The loan to deposit ratio (*LTDR*), a measure of liquidity, can affect banks' profitability. A higher value of this ratio indicates lower liquidity, and vice versa. There are conflicting facts regarding the relationship between the loan to deposit ratio and banks' profitability. On the other side, *LTDR* is expected to be positively related to profitability measures—such as *ROA*, *ROE*, and *NIM*—because the main sources of income come from the loan assets. A higher volume of deposit collection—and lending it to quality assets—therefore, generate more interest income to the commercial banks. Larger volumes of liquid assets (holding a larger volume of cash or near cash assets) reduce the bank's ability to generate interest income (Tan, 2017). This argument is in line with the empirical findings of prior researchers (Karimzadeh & Akhtar, 2013; Sufian & Kamarudin, 2012).

However, there may be a negative relationship between *LTDR* and profitability measures—such as *ROA*, *ROE*, and *NIM*—because high volume of loans can create the larger non-performing loans and results in lower profit to the commercial banks if the banks do not have a good risk monitoring and management system. During the crisis period, moreover, financial institutions should increase their liquidity holding in order to reduce their risk through costly sources, which leads to the decrease in bank's profitability (Sufian & Kamarudin, 2012). Poor level of liquidity (higher level *LTDR*) represents poor liquidity management that increases the bankruptcy cost and reduces bank's profitability. This argument is consistent with the empirical findings of some previous researchers (Ahmed, Koh, & Shaharuddin, 2016). The third line of empirical evidence shows either a positive or a negative insignificant relationship between liquidity and bank profitability. For example, a research conducted by Almaqtari, Al-Homaidi, Tabash, and Faharan (2018) showed a positive but statistically insignificant effect of liquidity on *ROA* and *ROE*. Similarly, a study by Adolopo, Lloydking, Western, & Tauringana (2018) found a liquidity to be negatively related to *ROA* and to be positively related to *NIM*, albeit statistically insignificant; Paolucci (2016) conducted a study and found a positive, but statistically insignificant, relationship of liquidity with *ROA*, *ROE*, and *NIM*. Tan's (2017) study found liquidity to have an insignificant negative relationship with *ROA* but an insignificant positive relationship with *NIM*.

Though there are two conflicting arguments and empirical evidence, higher loan to deposit ratio gives higher interest income to the commercial banks. In this research, therefore, the following hypothesis was set:

*H1*: The loan to deposit ratio has a positive relationship with the bank's profitability measures: *ROA*, *ROE*, and *NIM*.

## 2.2 Leverage and bank profitability

Bank capital is considered to be an important determinant of the bank's profitability. The bank's equity capital to total assets ratio is a direct measure of financial leverage that can influence profitability measures, such as *ROA*, *ROE*, and *NIM*. The high equity capital to total assets ratio implies low financial leverage. There are conflicting arguments and empirical evidence as regards the relationship between the equity capital to total assets ratio and banks' profitability. On the one extreme, there could be a positive relationship between equity to total assets ratio and profitability measures. The high equity capital has a positive impact on the bank's profitability because it reduces the funding cost (Paolucci, 2016), increases banks' creditworthiness (Tan, 2017), lowers the needs for external funding, and increases safety for depositors during unstable macroeconomic condition (Sufin & Kamrudin, 2012). It helps to grab more business opportunities by investing in various securities and portfolios of risky assets and has more time, and flexibility, to deal with problems arising from expected losses, thereby eventually leading to earning higher profits (Athanasoglou, Brissimis, & Delis, 2008; Sinha & Shrama, 2016). Equity as sources of funds, more expensive than deposits increased equity, may increase cost capital of the bank, which needs to establish a higher margin; the mounting pressure on banks to reduce costs encourages them to engage in riskier income generating activities for the larger profitability (Messai, Gallali, & Jouini, 2015). In general, banks with higher capital ratios are considered safer. The conventional risk-return hypothesis would thus imply a negative relationship between the equity to assets ratio and bank profitability. However, a lower risk should increase a bank's creditworthiness and reduce the funding cost. Furthermore, banks with higher equity to asset ratio normally have reduced external funding needs, putting a positive effect on their profitability (Dietrich & Wanzenried, 2014). The higher capital requirements help to maintain discipline, to increase

supervision and monitoring activities, and to increase bank efficiency along with profitability. The banks with higher capital ratios have higher loan-loss reserves, are more efficient, and more profitable. Higher capital with an appropriate institutional environment can drive the investment strategies of larger banks towards more careful lending activities, prudent risk management, and better supervision. This results in a better alignment of interests between bank owners and depositors, reducing agency costs and ameliorates bank performance (Bitar, Saad & Benlemlin, 2016). Shareholders will have a greater incentive to monitor management performance and ensure that the bank is efficient. Specifically, holding buffers capital makes bank owners and bank managers more prudent with regard to their investment choices. Higher capital ratios can align the interests of bank shareholders with depositors—thereby mitigating agency problems, ultimately decreasing costs, and improving efficiency (Bitar, Pukthuanthong, & Walker, 2018). The signaling hypothesis suggests that management might be willing to convey information to the market about its future prospects and capacity to generate profits, which leads to increase bank's profitability (Saona, 2016). This argument is in congruence with the empirical findings of prior researchers (Ahamed, 2017; Athanasoglou, Brissimis, & Delis, 2008; Paolucci, 2016; Sufin & Habibullah, 2009; Sufin & Kamrudin, 2012; Tan, 2017; Trad, Trabelsi, & Goux, 2017).

On the other hand, there could be a negative relationship between equity to total assets ratio and profitability measures, such as *ROA*, *ROE*, and *NIM*. When capital ratio increases substantially, banks do not take advantage of debt-for-financing future growth option and the firm value erodes. The traditional view of bank profitability suggests that excessively high capitalization is associated with both a decline in risk of equity and tax subsidy provided by interest deductibility on debt. Therefore, a bank with a high capital to assets ratio might suggest that it is operating with overcautious policies. Highly conservative management might not benefit from market opportunities, triggering lower profitability (Saona, 2016). According to trade-off theory, the greater use of debt, or less equity capital, in the financial statement poses greater interest expenses and raises the probability that the bank will be unable to meet its financial duties; consequently, the declining rate of return to new incoming shareholders and saver units will reduce the bank's profitability and increase the probability of bankruptcy (Saona, 2016). This argument is in line with the empirical findings of these researchers (Saona, 2016; Ahamad, Koh, & Shaharuddin, 2016).

Some empirical evidences that reported no relationship between capital ratio and banks' profitability are in line with the empirical findings of the previous researchers (Bhattarai, 2016; Patria, Capraru & Ihnatov, 2015). Dietrich and Wanzenried (2014) found a similar result in low-and-middle countries. They argued that a high capital adequacy ratio may reduce the risk of the banks, but at the same time they would not benefit from the leverage effect.

Though there are two conflicting arguments and empirical evidence, it can be expected that the high equity capital ratio reduces the bank's funding cost and increases creditworthiness, and public confidence, in the overall banking system. Thus, the following hypothesis was proposed in this research:

*H<sub>2</sub>*: There is a positive relationship between leverage and bank's profitability measures: *ROA*, *ROE*, and *NIM*.

### 2.3 Bank size and profitability

Bank size is also regarded as one of the important determinants of the bank's profitability, but the bank's total assets represent only on-balance sheet activities and ignore off-balance sheet activities. After the liberalization policy adopted by the Nepal government in the early 1990s, this industry is facing major changes in recent years. In 2007, Nepal Rastra bank brought merger and acquisition policies to build public confidence in the overall banking system. Owing to the fierce competition, the financial institutions find many of the old ways of doing business no longer profitable; the financial services and products they have been offering to the public are not saleable in the market. Many financial intermediaries found that they were no longer able to acquire funds with their traditional financial instruments and that they would soon be out of business without these funds. To survive in the new economic environment, financial institutions have to run research and development programs in order to develop new products and services that will meet customer needs and that will be profitable (Miskin & Eakins, 2012). The research and development require huge capital investment in high-technology-based fixed

assets. The question may arise as to whether banks are able to make a larger profit as a result of an increase in the bank's size or total assets. There are distinct arguments and empirical evidences on the relationship between bank size and profitability. First, Larger banks could benefit from economies of scale and greater diversification, which reduces risk and cost, and increases banks' profitability (Sinha & Shrama, 2015; Tan, 2017). Dietrich & Wanzenried (2014) argued that larger banks, as compared to smaller banks, are likely to have both economies of scale (increased operational efficiency) and economies of scope (higher degree of product and loan diversification) advantages. Thus, the expectation is a positive effect of size on bank profitability. Sinha & Shrama's (2015) empirical findings showed a positive, and statistically significant, relationship with *ROA*—suggesting that larger banks operate at a more efficient level than smaller banks and exploit all economies of scale to reap the higher benefit (Sinha & Shrama, 2015). Larger banks may have better opportunities for income diversification because they can reach out to new markets and reduce income volatility (Ahamed, 2017).

Second, it is argued that large banks could have more serious asymmetric information problems and that the increase in the cost of monitoring the lending activities could reduce bank profitability (Tan, 2017). Other scholars argued that extremely large banks would exhibit a negative relationship between size and profitability due to bureaucratic and other size-related reasons. Accordingly, the overall effect needs to be investigated empirically (Dietrich & Wanzenried, 2014). Larger banks may also suffer from diseconomies of scale due to agency costs, nitty gritty of administrative procedures, and excessive overhead expenses (Ahamed, 2017). A large size could have negative impact on bank profitability: The large size is difficult to manage, it needs greater efforts, and the resultant increase in the cost is likely to reduce bank profitability (Fang, Lau, Lu, Tan & Zhang, 2019). The coefficient of bank size was found to be negative and significant, suggesting a negative impact of bank size on *ROA*, *NIM*, and *PBT*: The small banks are easier to manage, and bank managers can concentrate on a smaller number of businesses—thereby leading to higher profitability (Tan, 2016).

Albeit two contradictory arguments and empirical evidences, NRB has implemented a merger and acquisition program since 2007; It has increased the size of banks and reduced the number of commercial banks. The structure-conduct-performance hypothesis explains that a few numbers of banks can earn more profit through collusion. In this research, therefore, the following hypothesis was proposed:

*H3*: There is a positive relationship between size and bank's profitability measures: *ROA*, *ROE*, and *NIM*.

### 3. Variables Selection and Research Methods

#### 3.1 Variable Selection

3.1.1 Dependent variable: The aim of the study was to examine the impact of bank size, leverage, and liquidity on banks' profitability. This study considered the three dependent variables: *ROA*, *ROE*, and *NIM*. The first measure of profitability, *ROA*, is measured by dividing net income by total assets of the bank; most of the authors were found using this method to measure the banks' performance (for example, Adolopo, Lloydking, Western, & Tauringana, 2018; Almaqrari & Al-Homaidi, 2018; Athanasoglou, Brissimis, & Delis, 2008; Paolucci, 2016; Sinha & Sharma, 2015; Tan, 2017). The second measure of the dependent variable, *ROE*, is measured by dividing net income by total equity of the bank—a tool that was found to be widely used by various authors to measure the banks' performance (for example, Almaqrari & Al-Homaidi, 2018; Paolucci, 2016). Finally, the third measure of the dependent variable, *NIM*, divides net interest income by total assets of the bank: It is also a widely used tool to measure the banks' performance (for example, Adolopo, Lloydking, Western, & Tauringana, 2018; Paolucci, 2016; Sufian & Kamarudin, 2012).

3.1.1 Independent variables: Three predictor variables were used in the study. The first was the liquidity measured by the dividing total loan by total deposits—a widely used tool to measure the banks' liquidity (for example, Adolopo, Lloydking, Western, & Tauringana, 2018; Ahmad, Koh, & Shaharuddin, 2016). A higher value of the loan to deposit ratio indicates lower liquidity, and vice versa. The second independent variable, the leverage measured by dividing equity capital by total assets, is also a widely used tool to measure the banks' leverage. Higher equity capital to total asset ratio indicates that the bank has lower leverage and lower risk—a

tool widely used to measure the banks' leverage position and its impact on banks' profitability (for example, Athanasoglou, Brissimis, & Delis, 2008; Paolucci, 2016; Sinha, & Sharma, 2015; Sufian & Kamarudin, 2012; Tan, 2017). Finally, the third independent variable was the bank size measured by taking the natural logarithm of total assets—another tool widely used to measure the banks' liquidity and the impact of assets size on bank's profitability (for example, Adolopo, Lloydking, Western, & Tauringana, 2018; Almaqrari & Al-Homaidi, 2018; Athanasoglou, Brissimis, & Delis, 2008; Paolucci, 2016; Tan, 2017).

### 3.2 Research Methods

All twenty-eight commercial banks, operating now in Nepal, were considered as a target-population size and taken for the study. The study covered the period from 2011/12 to 2016/17. This empirical study was based on time-series balanced panel data collected from the review of the bank supervision report, 2017, published by the central bank of Nepal (i.e., Nepal Rastra Bank). The collected time-series data were analyzed, using descriptive statistics, Pearson correlation coefficient, and multiple regression models. Therefore, this research employed a descriptive and explanatory research design. The mean, standard deviation, maximum, and minimum value were used to describe the characteristics of data from 2011/12 to 2016/17. The correlation matrix was used to examine the relationship between a response variable and predictor variables. The correlation matrix helps to identify the multicollinearity problem: A common rule of thumb is that correlations among the independent variables between -0.7 to 0.7 do not cause difficulties (Lind, Marchal, & Wathen, 2006). In addition, the multicollinearity problem was detected, based on *VIF*—a problem that arises if *VIF* is greater than five (Titko, Skvarciany, & Jureviciene, 2015). Durbin Watson test was conducted to check the autocorrelation problem in the time series data. Finally, the collected data were analyzed by using the Statistical Package for Social Sciences (SPSS).

### Multiple regression models

To examine the relationship between the dependent variable and independent variables, the following three multiple regression models were tested:

$$\text{Model 1: } ROA = \alpha + \beta_1 (LTDR) + \beta_2 (ETAR) + \beta_3 (LNTA) + \epsilon_{ij}$$

$$\text{Model 2: } ROE = \alpha + \beta_1 (LTDR) + \beta_2 (ETAR) + \beta_3 (LNTA) + \epsilon_{ij}$$

$$\text{Model 3: } NIM = \alpha + \beta_1 (LTDR) + \beta_2 (ETAR) + \beta_3 (LNTA) + \epsilon_{ij}$$

Where *ROA* = Return on Assets, *ROE* = Return on Equity, *NIM* = Net Interest Margin, *LTDR* = Loan to Deposit Ratio, *ETAR* = Equity to Asset Ratio, *LNTA* = Natural Log of Total Assets,  $\alpha$  = Constant Term, and  $\epsilon_{ij}$  = Error term

## 4. Empirical Results and Discussion

### 4.1. Summary of descriptive statistics and correlation matrix

Table 1 reports a summary of the descriptive statistics of three response variables: *ROA*, *ROE*, and *NIM*; three predictor variables—liquidity, capital fund ratio, and bank size—were used in the study. The results reveal that the average net interest margin of Nepalese commercial banks became much higher than that of return on assets, implying that Nepalese banks were found to be involved in traditional loan business and to earn very low amount from asset diversification. The average *ROE* of Nepalese commercial banks was much higher than that of *ROA* and *NIM*—suggesting that they benefited from leverage effects. The standard deviation of *ROE* indicates much more volatility among the response variables. Similarly, the standard deviation of *LNTA* also indicates much more volatility among the explanatory variables.

Table 1 Descriptive statistics of response and predictors variables

| Variables                             | <i>N</i> | Minimum | Maximum | Mean  | <i>SD</i> |
|---------------------------------------|----------|---------|---------|-------|-----------|
| <i>ROA</i>                            | 168      | -.0344  | .0401   | .0149 | .0082     |
| <i>ROE</i>                            | 168      | -.5594  | 1.0291  | .1608 | .1331     |
| <i>NIM</i>                            | 168      | .0172   | .0576   | .0315 | .0077     |
| Loan to deposit ratio ( <i>LTDR</i> ) | 168      | .4832   | .9565   | .7726 | .0933     |

|  |     |        |         |         |       |
|--|-----|--------|---------|---------|-------|
| Equity to assets ratio ( <i>ETAR</i> ) | 168 | .0120  | .2045   | .1019   | .0306 |
| Ln Total assets ( <i>LNTA</i> )        | 168 | 8.6401 | 12.0642 | 10.7653 | .6348 |

Table 2 presents the correlation matrix of response and predictor variables. Both *ETAR* and *LNTA* became positively correlated with *ROA* and statistically significant at 5% and 1% level, respectively. But *ROA* was negatively correlated with *LTDR* and statistically insignificant. Similarly, *ROE* was positively correlated with *LNTA* and statistically significant at 1% level, but negatively correlated with *LTDR* and *ETAR* and statistically significant at 1% level. *NIM* was negatively correlated with *LTDR* and statistically insignificant—but positively correlated with *LNTA* and statistically significant at 1% level. However, the relationship between *NIM* and *ETAR* was positive and statistically insignificant.

Table 2 Correlation matrix of response and predictor variables

| Variables   | <i>ROA</i>        | <i>ROE</i>        | <i>NIM</i>        | <i>LTDR</i>       | <i>ETAR</i>       | <i>LNTA</i>       |
|-------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| <i>ROA</i>  | 1                 | .651**<br>(.000)  | .412**<br>(0.000) | -.096<br>(.221)   | .168*<br>(.031)   | .477**<br>(.000)  |
| <i>ROE</i>  | .651**<br>(0.000) | 1                 | .194*<br>(0.012)  | -.390**<br>(.000) | -.358**<br>(.000) | .477**<br>(.000)  |
| <i>NIM</i>  | .412**<br>(0.000) | .194*<br>(.012)   | 1                 | -.011<br>(.888)   | .115<br>(.142)    | .325**<br>(.000)  |
| <i>LTDR</i> | -.096<br>(.221)   | -.390**<br>(.000) | -.011<br>(.142)   | 1                 | .615**<br>(.000)  | -.229**<br>(.002) |
| <i>ETAR</i> | .168*<br>(.031)   | -.358**<br>(.000) | .115<br>(.142)    | .615**<br>(.000)  | 1                 | -.238**<br>(.002) |
| <i>LNTA</i> | .477**<br>(.000)  | .477**<br>(.000)  | .325**<br>(.000)  | -.229**<br>(.003) | -.238**<br>(.002) | 1                 |

Note: \*Correlation is significant at the 0.01 level (2-tailed), \*\*Correlation is significant at the 0.05 level (2-tailed).

The above correlation matrix reveals that all the correlation coefficients, among the response and predictor variables, less than 0.7 implies no evidence of multicollinearity problem among independent variables.

#### 4.2. Regression results

This study focused mainly on regression results. Tables 3, 4, and 5 show the results of regression analysis. Table 3 reports the results related to *ROA*; Tables 4 and 5 report the results related to *ROE* and *NIM*.

Table 3 reports the effects of liquidity, capital ratio, and size of banks on bank *ROA*. The value of  $R^2$  (.35) reveals that the overall explanatory power of the regression model was fair with—indicating that 35 percent of the variation in bank *ROA* was explained by the variation in the independent variables. The  $p$ -value of  $F$ -statistics clearly indicates that this regression model is a good fit. Besides, the variance inflation factor (*VIF*) of all the variables, less than 5 (Titko, Skvarciany, & Jureviciene, 2015), indicates the non-presence of the multicollinearity problem. In Table 3, the regression coefficient of loan to deposit ratio ( $\beta_1 = -0.022$ ,  $p < .01$ ) indicates that a higher loan to deposit ratio resulted in the lower *ROA* to the Nepalese commercial banks. This result is in line with the findings of prior researchers (Adolopo, Lloydking, & Tauringgana, 2018; Asmed, Koh, & Shaharudin, 2016; Tarraze, 2015), but contradicts the findings of some other researchers (Pradhan, 2016; Tan, 2016; Tan, 2017). The result of this regression coefficient was supported by these facts: Relatively high levels of loan to deposit ratio (lower liquidity) produced negative *ROA* and reduced liquid funds in order to grab market opportunities, eventually lowering the bank's profitability. Even though the liquidity deficit can be fulfilled either borrowing from a short-term money market or selling short-term marketable securities, the Nepalese commercial banks should have sufficient liquidity to prevent the bank from descending into insolvency. The regression coefficient of equity to total assets ratio ( $\beta_2 = .119$ ,  $p < .01$ ) indicates that a higher *ETAR* ratio resulted in the higher *ROA* to the banks. This result is consistent with the findings of some prior researchers (Ahtanasoglou, Brissimis, & Delis, 2008; Paoluchhi, 2016; Sinha & Sharma, 2015; Sufin & Habibullah, 2009; Sufin & Kamarudin, 2012) but is in contrast with the findings of some other researchers (Asmed, Koh, &

Shaharudin, 2016). The result of the study was supported by this evidence: A higher *ETAR* reduced bank risk. The regression coefficient of bank size ( $\beta_3 = .007, p < .01$ ) indicates that a higher *LNTA* resulted in the higher *ROA* to the banks—the result that is in line with the findings of the previous researchers (Almaqtari, Al-Homaidi, Tobash, & Faharan, 2018; Paoluchhi, 2016; Adolopo, Lloydking, & Tauringgana, 2018, Bhattra, 2016) and in contrast with the findings of others (Fang, Lau, Tan & Zhang, 2019; Tan, 2016). The result of the study was supported by this evidence: A higher bank size increased both bank's assets and capital funds, which might be beneficial to geographical expansion and to the development of new service products. The banks also benefited from economies of scale and economies of scope.

Table 3 Multiple regression equation of *ROA* on all predictor variables

| Variables                   | Coefficient | <i>t</i> -statistics  | <i>P</i> -value | <i>VIF</i> |
|-----------------------------|-------------|-----------------------|-----------------|------------|
| Intercept                   | -.053*      | -4.847                | .000            |            |
| Loan to deposit ratio       | -.022*      | -3.090                | .002            | 1.629      |
| Equity to total asset ratio | .119*       | 5.504                 | .000            | 1.635      |
| LN total assets             | .007*       | 7.988                 | .000            | 1.072      |
| <i>F</i> -statistics        | 28.883*     | <i>R</i> <sup>2</sup> | .35             |            |
| <i>P</i> -value             | .000        |                       |                 |            |

Note: \*Statistical significance at the 1% level, \*\*Statistical significance at the 5% level,

Table 4 reports the effects of liquidity, capital ratio, and size of banks on bank *ROE*. The value of *R*<sup>2</sup>, .321, reveals that the overall explanatory power of the regression model appeared fair—indicating that 32.1 percent of the variation in bank *ROA* was explained by the variation in the independent variables. The *p*-value of *F*-statistics clearly indicates that this regression model was a good fit. Moreover, the variance inflation factor (*VIF*) of all the variables—less than 5 (Titko, Skvarciany, & Jureviciene, 2015)—indicates the non-presence of the multicollinearity problem. In Table 4, the regression coefficient of *LTDR* ( $\beta_1 = -.315, p < .01$ ) indicates that a higher *LTDR* led to the lower *ROE* to the Nepalese commercial banks. The regression coefficient of *ETAR* ( $\beta_2 = -.557$ ) indicates that a higher *ETAR* ratio resulted in the lower *ROE*, but it was statistically insignificant to the Nepalese commercial banks—the result that was supported by the fact that a higher *ETAR* reduced bank risk and increased the benefit of leverage. The regression coefficient of bank size ( $\beta_3 = .083, p < .01$ ) indicates that a higher *LNTA* resulted in the higher *ROE* to the banks: The result of the study was supported by the evidence that a higher bank size increased both bank's assets and capital funds that might be beneficial to geographical expansion and to the development of new service products. The banks also benefited from economies of scale and economies of scope.

Table 4 Multiple regression equation of *ROE* on all predictor variables

| Variables                   | Coefficient | <i>t</i> -statistics  | <i>P</i> -value | <i>VIF</i> |
|-----------------------------|-------------|-----------------------|-----------------|------------|
| Intercept                   | -.435**     | -2.37                 | .019            |            |
| Loan to deposit ratio       | -.315*      | -2.665                | .008            | 1.629      |
| Equity to total asset ratio | -.557       | -1.543                | .125            | 1.635      |
| LN total assets             | .083*       | 5.885                 | .000            | 1.072      |
| <i>F</i> -statistics        | 25.361*     | <i>R</i> <sup>2</sup> | .321            |            |
| <i>P</i> -value             | .000        |                       |                 |            |

Note: \*Statistical significance at the 1% level, \*\*Statistical significance at the 5% level,

Table 5 reports the effects of liquidity, capital ratio, and size of banks on bank *NIM*. The value of *R*<sup>2</sup> (.149) reveals that the overall explanatory power of the regression model was fair, indicating that 14.9 percent of the variation in bank *NIM* was explained by the variation in the independent variables. The *p*-value of *F*-statistics clearly indicates that this regression model was a good fit. Furthermore, the variance inflation factor (*VIF*) of all the variables, less than 5 (Titko, Skvarciany, & Jureviciene, 2015) indicates the non-presence of the multicollinearity problem. In Table 5, the regression coefficient of *LTDR* ( $\beta_1 = -0.007$ ) indicates that a higher loan to deposit ratio lowered *NIM*, but it became statistically insignificant to the Nepalese commercial banks: This result is in contrast with the findings of some prior researchers (Paolucci, 2016; Tan, 2017). The result of

this regression coefficient was supported by the fact that relatively high levels of *LTDR* (lower liquidity) produced negative *NIM* and decreased liquid funds in order to grab market opportunities, which eventually led to lower the bank's *NIM*. Even though the liquidity deficit can be fulfilled either by borrowing from a short-term money market or by selling short-term marketable securities, the Nepalese commercial banks should have sufficient liquidity to prevent the bank from plunging into insolvency. The regression coefficient of *ETAR* ( $\beta_2 = .064, p. < .01$ ) indicates that a higher *ETAR* ratio resulted in the higher *NIM* to the banks. This result is in line with the findings of these researchers (Adolopo, Lloydking, & Tauringgana, 2018) and in contrast with the findings of some others (Sufin & Kamarudin, 2012). The result of the study was explained by the evidence that a higher *ETAR* reduced bank risk and increased the benefit of leverage. The regression coefficient of *LNTA* ( $\beta_3 = .004, p. < .01$ ) indicates that a higher *LNTA* brought about the higher *NIM* to the banks. This result is consistent with the findings of the prior researchers (Adolopo, Lloydking, & Tauringgana, 2018; Paolucci, 2016) but in contrast with the findings of this researcher (Tan, 2017). The result of the study was explained by the fact that a higher bank size increased both bank's assets and capital funds for the traditional loan business, thereby eventually leading to increase bank's interest income and boosting the *NIM*.

Table 5 Multiple regression equation of *NIM* on all predictor variables

| Variables                   | Coefficient | <i>t</i> -statistics  | <i>P</i> -value | <i>VIF</i> |
|-----------------------------|-------------|-----------------------|-----------------|------------|
| Intercept                   | -.017       | -1.482                | .140            |            |
| Loan to deposit ratio       | -.007       | -.890                 | .375            | 1.629      |
| Equity to total asset ratio | .064*       | 2.718                 | .007            | 1.635      |
| LN total assets             | .004*       | 4.866                 | .000            | 1.072      |
| <i>F</i> -statistics        | 9.401*      | <i>R</i> <sup>2</sup> | .149            |            |
| <i>P</i> -value             | .000        |                       |                 |            |

Note: \*Statistical significance at the 1% level, \*\*Statistical significance at the 5% level,

## 5. Conclusion, Implication, and Limitations of the Study

The purpose of this study was to examine the impact of liquidity, leverage, and total bank size on the bank's profitability. Most of the research conducted in this area has included the US, European countries, Latin American countries, and African countries. In the Nepalese context, as per our own knowledge, very few studies were conducted in this field. The empirical studies conducted by various researchers reveal the contradictory results that affected banks' performance. Therefore, the main aim of the study was to examine the impact of liquidity, leverage, and total size on bank performance. This study employed three ordinary least squares regression models to explain the cause-and-effect relationship between response and predictor variables. The first regression model, which incorporated *ROA* as the dependent variable, was statistically significant ( $F = 28.883, < .01$ )—suggesting that the regression model was best fitted. Similarly, the second regression model, which incorporated *ROE* as the dependent variable, was statistically significant ( $F = 25.361, < .01$ ), suggests that the regression model seemed best fitted. Finally, the third regression model, which included *NIM* as the dependent variable, was statistically significant ( $F = 9.401, < .01$ )—suggesting that the regression model appeared best fitted. The first regression equation reveals that the higher loan to deposit ratio (low level of liquidity) negatively affected on bank's *ROA*, *ROE*, and *NIM*—but *ROE* and *NIM* were not statistically significant. The result of the second regression equation reveals that higher equity to assets ratio (lower leverage) positively affected two profitability measures (*ROA* and *NIM*) and statistically significant—but negatively related to *ROE* and statistically insignificant. The result of the final regression model reveals that the higher bank size was favorable to the Nepalese commercial banks and had a positive effect on all three profitability measures: *ROA*, *ROE*, and *NIM*. This finding could help bankers and policymakers to take an effective action to improve banks' profitability and stability. This study covered only three independent variables—such as liquidity, leverage, and bank size—to show the impact on bank's profitability; therefore, further research needs to be done by including other industry specific factors and macroeconomic variables in the Nepalese context.

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