

**THE DETERMINANTS OF COMMERCIAL BANK'S LIQUIDITY  
RISK IN NEPAL**

A Dissertation submitted to the Office of Dean, Faculty of Management, in partial  
fulfilment of the requirements for the Master's Degree

by

**Aishworya Shrestha**

**Roll No.: 7305/18**

**Registration No.: 7-2-39-15-2013**

**People's Campus**

Kathmandu

September, 2021

**THE DETERMINANTS OF COMMERCIAL BANK'S LIQUIDITY  
RISK IN NEPAL**

A Dissertation submitted to the Office of Dean, Faculty of Management, in partial  
fulfilment of the requirements for the Master's Degree

by

**Aishworya Shrestha**

**Roll No.: 7305/18**

**Registration No.: 7-2-39-15-2013**

**People's Campus**

Kathmandu

September, 2021

## **Certification of Authorship**

I hereby corroborate that I have researched and submitted the final draft of dissertation entitled “The Determinants of Commercial Bank’s Liquidity Risk in Nepal”. The work of this dissertation has not been submitted previously for the purpose of conferral of any degrees nor it has been proposed and presented as part of requirements for any other academic purposes.

The assistance and cooperation that I have received during this research work has been acknowledged. In addition, I declare that all information sources and literature used are cited in the reference section of this dissertation.

---

Aishworya Shrestha

10-09-2021

## **Report of Research Committee**

Ms. Aishworya Shrestha has a defended research proposal entitled “The Determinants of Commercial Bank’s Liquidity Risk in Nepal” successfully. The research committee has registered the dissertation for further progress. It is recommended to carry out the work as per suggestions and guidance of supervisor and submit the thesis for evaluation and viva voce examination.

---

Supervisor

Dissertation Proposal Defended Date:

---

Supervisor

Dissertation Submitted Date:

---

Head of Research Committee

Dissertation Viva Voce Date:

## Approval Sheet

We have examined the dissertation entitled “The Determinants of Commercial Bank’s Liquidity Risk in Nepal” presented by Ms. Aishworya Shrestha for the degree of Masters of Business Studies. We hereby certify that the dissertation is acceptable for the award of degree.

---

Dissertation Supervisor

---

Internal Examiner

---

External Examiner

---

Chairperson Research Committee

Date:

## **Acknowledgements**

This study entitled “The Determinants of Commercial Bank’s Liquidity Risk in Nepal” has been prepared for partial fulfillment of requirements for the degree of Masters of Business Studies. It is directed towards determining the factors that influence the liquidity risk in commercial banks in Nepal. This would not have been possible without the kind support and help of many individuals. Therefore, I would like to acknowledge with gratitude towards Rajan Bilas Bajracharya for giving me the responsibility to prepare this report along with his guidance, valuable advice, continuous encouragement, and motivational support.

I would also like to take this opportunity to express my deep gratitude to all my friends and all those individuals who helped me directly or indirectly throughout this research and helped me to complete this report. I would like to convey my sincere thanks to my parents whose unconditional love and silent prayers encouraged me throughout my tenure at Peoples Campus. Finally, I would like to take the responsibility of any errors in this study. I will be thankful to all those who provided valuable suggestion for its improvements.

Aishworya Shrestha

September, 2021

## Table of Contents

|   |     |
|---|-----|
| Title Page .....  | ii  |
| Certification of Authorship .....                                   | ii  |
| Report of Research Committee .....                                  | iii |
| Approval Sheet .....  | iv  |
| Acknowledgements .....  | v   |
| Table of Contents .....   | vi  |
| List of Tables .....  | ix  |
| List of Figures .....   | x   |
| Abbreviations .....   | xi  |
| Abstract .....  | xii |
| CHAPTER I INTRODUCTION .....  | 1   |
| 1.1 Background of the study .....                                   | 1   |
| 1.2 Problem statement .....   | 3   |
| 1.3 Objectives of the study .....                                   | 3   |
| 1.4 Hypothesis of the study .....                                   | 3   |
| 1.5 Rationale of the study .....                                    | 4   |
| 1.6 Limitations of the study .....                                  | 4   |
| 1.7 Chapter plan .....  | 5   |
| CHAPTER II LITERATURE REVIEW .....                                  | 6   |
| 2.1 Theoretical review .....  | 6   |
| 2.1.1 Liquidity, liquidity risk and liquidity risk management ..... | 6   |
| 2.1.2 Indicators of bank's liquidity risk .....                     | 7   |
| 2.1.3 Capital adequacy and liquidity risk .....                     | 9   |

|  |           |
|--|-----------|
| 2.1.4 Non-performing loans and liquidity risk .....      | 9         |
| 2.1.5 Profitability and liquidity risk.....              | 10        |
| 2.1.6 Economic growth and liquidity risk .....           | 11        |
| 2.1.7 Rate of inflation and liquidity risk.....          | 12        |
| 2.2 Empirical Review .....                               | 12        |
| 2.3 Research Gap .....                                   | 16        |
| <b>CHAPTER III RESEARCH METHODOLOGY .....</b>            | <b>17</b> |
| 3.1 Research framework and definition of variables ..... | 17        |
| 3.1.1 Liquidity of banks.....                            | 18        |
| 3.1.2 Liquid assets to total assets ratio .....          | 18        |
| 3.1.3 Loan to deposits ratio .....                       | 18        |
| 3.1.4 Capital adequacy ratio .....                       | 18        |
| 3.1.5 Non-performing loans.....                          | 19        |
| 3.1.6 Profitability.....                                 | 19        |
| 3.1.7 Economic growth.....                               | 20        |
| 3.1.8 Inflation rate .....                               | 20        |
| 3.2 Research design.....                                 | 21        |
| 3.3 Population and sample technique .....                | 22        |
| 3.4 Nature and sources of data .....                     | 22        |
| 3.5 Methods of analysis.....                             | 23        |
| 3.5.1 Descriptive statistic .....                        | 23        |
| 3.5.2 Pearson's correlation coefficient.....             | 23        |
| 3.5.3 Econometric model.....                             | 23        |
| <b>CHAPTER IV RESULTS AND DISCUSSION .....</b>           | <b>26</b> |
| 4.1 Analysis of data.....                                | 26        |
| 4.1.1 Test of normality .....                            | 26        |



|  |    |
|--|----|
| 4.1.2 Multicollinearity test .....     | 29 |
| 4.1.3 Descriptive statistics .....     | 31 |
| 4.1.4 Correlation analysis .....       | 33 |
| 4.1.5 Regression analysis .....        | 34 |
| 4.2 Discussion .....                   | 37 |
| CHAPTER V SUMMARY AND CONCLUSION ..... | 41 |
| 5.1 Summary .....                      | 41 |
| 5.2 Conclusion.....                    | 42 |
| 5.3 Implications.....                  | 43 |
| References.....                        | 45 |

## List of Tables

|  |    |
|--|----|
| Table 1 Review of empirical studies.....   | 13 |
| Table 2 Summary of dependent variables and indicators .....                                    | 21 |
| Table 3 Summary of independent variables, indicators, and expected outcomes .....              | 21 |
| Table 4 Sample size of commercial bank .....   | 22 |
| Table 5 Correlation matrix of independent variables .....                                      | 29 |
| Table 6 Collinearity between GDP and other independent variables .....                         | 30 |
| Table 7 Collinearity between IFR and other independent variables.....                          | 30 |
| Table 8 Descriptive statistics .....   | 31 |
| Table 9 Correlation of dependent with independent variables .....                              | 33 |
| Table 10 Regression coefficients of LR <sub>1</sub> (model 1) with independent variables ..... | 34 |
| Table 11 Model Summary .....   | 35 |
| Table 12 Analysis of Variance.....   | 35 |
| Table 13 Regression coefficients of LR <sub>2</sub> (model 2) with independent variables ..... | 36 |
| Table 14 Model Summary .....   | 36 |
| Table 15 Analysis of Variance.....   | 37 |
| Table 16 Summary of hypothesis testing.....  | 38 |

## List of Figures

|   |    |
|---|----|
| Figure 1. Conceptual framework of the study .....                     | 17 |
| Figure 2. Normality test of Liquid Asset to Total Asset Ratio .....   | 27 |
| Figure 3. Normality test of Loans to Deposits Ratio .....             | 27 |
| Figure 4. Normal P-P plot for Liquid Asset to Total Asset Ratio ..... | 28 |
| Figure 5. Normal P-P plot for Loans to Deposits Ratio.....            | 28 |

## **Abbreviations**

|          |   |  |
|----------|---|--|
| ANOVA    | : | Analysis of Variance                       |
| CAR      | : | Capital Adequacy Ratio                     |
| COVID-19 | : | Coronavirus Disease of 2019                |
| GDP      | : | Gross Domestic Product                     |
| IFR      | : | Inflation Rate/Rate of Inflation           |
| LATA     | : | Liquid Asset to Total Asset                |
| LR       | : | Liquidity Risk                             |
| LTD      | : | Loans-to-Deposits                          |
| NPL      | : | Non-Performing Loans                       |
| NRB      | : | Nepal Rastra Bank                          |
| P-P      | : | Probability–Probability or Percent–Percent |
| ROE      | : | Return on Equity                           |
| SPSS     | : | Statistical Package for the Social Science |

## **Abstract**

*A strong liquidity position of banking industry is of paramount importance for the smooth functioning of the economy. The failure of the bank to manage its liquidity results to liquidity risk which further increases the probabilities of default in the banking industry. This paper aims to examine the form and pattern of liquidity risk in Nepalese commercial banks. The study is an attempt to study the determinants influencing liquidity risk of banks taking into consideration the target population as the Nepalese Commercial Bank for period covering fiscal year 2015-16 till 2019-20. To assess the impact of the varied determinants on the liquidity risks of the banks, various statistical models including econometric model (regression model) is applied to diagnose data to meet the specific objectives of research. The key findings stated that there is significant relation between numbers of variables that impacts on the liquidity performance and liquidity risk of Nepalese commercial banks.*

*Keywords: Liquidity Risk, Financial Crises, Capital Adequacy, Profitability, Bank-Specific factors, etc.*

# CHAPTER I

## INTRODUCTION

### 1.1 Background of the study

The global financial crisis of 2007-2008 was one of the worst worldwide economic disasters that led the banking and financial sector to raise major concerns regarding their liquidity risk (Helleiner, 2011). This economic crisis left a negative impact in forms of impaired confidence in the banking and financial system, increased non-performing loans, and disclosed a significant liquidity mismatch. Many banks and financial institutions faced liquidity difficulties during the crisis because they failed to manage their liquidity in a prudential way. The global financial crisis emphasized the significance of liquidity to the proper functioning of the banking and financial sectors (Vazquez and Federico, 2015). Prior to the crisis, asset markets were optimistic, and funding was easily available at low cost. The sharp reversal in market conditions illustrated how quickly liquidity can fade away, and that illiquidity, even if it lasts for a brief period, can have an enduring impact in the global economy.

Prior to the COVID-19 recession, the global financial crisis was considered by many economists to have been the most serious financial crisis since the Great Depression of the 1930s (Reinhart and Reinhart, 2020). In the context of these global financial crises, problems with liquidity risk basically emerged due to increased loan-to-deposit ratios and an overwhelming increase in non-performing loans. Similarly, the banking and financial sector may experience certain liquidity risk during the COVID-19 recession due to increased credit risk defaults, lower recoveries due to inactive market for collaterals, reduced cash inflows from loan repayments, fair value losses due to increased credit spread, reduced profit level, capital depletion, and decreased capital adequacy ratio. Hence, it is imperative to address the problem with liquidity and analyze possible internal and external factors that might affect it.

Several studies conducted in the past show that decrease in liquidity in banks during and prior to the crisis is the main driving force behind the failure of the financial institutions. Research suggested that on average liquidity of financial institutions can decline by seven percent during the crises (Boyson et al., 2011). Further, when a crisis is likely to arrive, the financial institutions seem less willing to lend, and tend to hold more liquidity due to

the low level of liquidity in the market. Thus, they depicted the connection between financial crises and liquidity creation. At the same time another study explained a lack of liquidity happens when banks have difficulties to sell off their assets or convert them into cash without incurring a loss due to the drop in value of the assets. Financial institutions that do not hold enough fast selling liquid assets to meet these sudden large withdrawals are forced to sell off their investments and assets at low prices. Moreover, the financial system that has liquidity problems will restrict the economic development because illiquid financial system might reduce providing of loans to the business and households (Ndlovu, 2014). Consequently, economic growth will shrink, and some entities will be pushed to closure, which will reflect on both increasing unemployment rate and non-performing loans and decreasing consumption levels.

Banks are financial institutions, and they play intermediary role in the economy through channeling financial resources from surplus economic units to deficit economic units. They facilitate the saving and capital formation in the economy by collecting short term deposit and issuing loans for long terms. Liquidity is defined as the ability of bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses (Singh and Sharma, 2016). Hence, liquidity risk arises from the fundamental role of banks in the maturity transformation of short-term deposits into long-term loans. It is an agreed fact that all businesses including banks face liquidity risk which is evident from its operations of providing mismatched maturities of deposits and loans. Therefore, banks must maintain an optimal level of liquidity that can maximize their profit and enable them to meet their obligation.

To sum up, the issues of liquidity risk determinants and their impact on financial performance is crucial to the financial sector of Nepal. Further, it is difficult to determine the length of the COVID-19 crisis and the depth of its severity at present. The actions taken by the regulators are meant to be temporary measures. While regulators take every measure to maintain liquidity within the banking and financial sector, the individual institutions should also be prepared for any adjustments and turns that are expected as an aftermath of the crisis. So, to perform well in the market, the financial institutions should be able to maintain their liquidity position. The issues and determinants of liquidity risk in financial management are pointed out as the major focus of this study. Therefore, this paper tries to address those factors affecting liquidity risk of commercial banks in Nepal.

## 1.2 Problem statement

This study attempts to illuminate the factors that affect the commercial bank's liquidity. The fundamental role of banks in the maturity transformation of short-term deposits into long-term loans makes banks inherently vulnerable to liquidity risk, both of an institution-specific nature and that which affects the economy. Liquidity risk can adversely affect both bank's earnings and the capital. Therefore, it is top priority of the bank's management to ensure availability of sufficient funds to meet future demands of providers and borrowers, at reasonable costs. This study compares data from the selected commercial bank and determines the factors affecting their liquidity by answering following research questions:

- ) What are the determinants of the Commercial Banks's liquidity risk in Nepal?
- ) Does the explanatory variable have any relationship with the Commercial Bank's liquidity risk?

## 1.3 Objectives of the study

Liquidity risk is of great concern in the standard banking literature but has gained little attention from the research community in banking sector up to now. Liquidity crisis not only threatens the banking position but also threatens the whole economy. The public confidence on national economy is strongly dependent on how well the banking sector performs. Therefore, the following objectives are considered to analyze the determinants of bank's liquidity:

- ) To identify the influential determinants of the bank's liquidity risks in Nepal.
- ) To analyze the bank's exposure to liquidity risk in the context of Nepal.

## 1.4 Hypothesis of the study

The following hypothesis are tested in this study:

H01: There is no significant relationship between capital adequacy and liquidity risk.

H02: There is no significant relationship between non-performing loans and liquidity risk.



H03: There is no significant relationship between profitability and liquidity risk.

H04: There is no significant relationship between economic growth and liquidity risk.

H05: There is no significant relationship between inflation and liquidity risk.

### **1.5 Rationale of the study**

To bridge the above-mentioned gaps, the present paper aims to thoroughly investigate by analyzing the determinants that affect the commercial bank's liquidity risk in Nepal, adding substantial contribution to existing literature. The study will have multidimensional significance, which can be divided into four broader headings. First, the study will be helpful to aware the shareholders regarding liquidity of the financial institutions they invested in, and factors associated with them. In addition, the outsiders like customers, financing agencies, stock exchange, stock trader, students, etc., are interested in the bank's performance. The information about the liquidity facilitates the customers as well as the investors to identify as to which commercial banks they should go and what factors they should consider. Finally, the study intends to provide information and insights to policymakers on how they can design macroeconomic policies to boost bank liquidity, and particularly the study might help bank managers to better understand, which internal factors influence liquidity levels of a bank in a positive or a negative way.

### **1.6 Limitations of the study**

Since the study has been carried out in a partial fulfillment of the requirements for the degree of Masters of Business Studies, there are several limitations. Some of the basic limitations of faced while conducting the study are illustrated below:

- ) This study is carried out with limited information and time.
- ) There are limited number of prior research conducted on similar topic.
- ) The study has been conducted with secondary data from five commercial banks. Thus, the findings may not be generalizable for the whole commercial banks.
- ) In this study only selected financial and statistical tools are used.

## **1.7 Chapter plan**

This study has been divided into five chapters viz. Introduction, literature review, research methodology, analysis and discussion, and summary and conclusion. The first chapter deals with the introduction part of the study. It includes background of the study, problems statement, objectives of the study, research hypothesis, rationale of the study, limitations of the study, and chapter plan. The second chapter contains review of various literatures. The third chapter describes the research framework and definition of the variables, research design, population and sample, sampling design, nature and sources of data, and the instruments of data collection and methods of analysis. The fourth chapter presents the analysis of the data and discussion in the form of various tables and figures and the fifth chapter summarizes and concludes this research thesis. Finally, an extensive reference and annexure are presented at the end of the study.

## **CHAPTER II**

### **LITERATURE REVIEW**

This chapter provides conceptual framework of the study and deals with review of empirical studies associated with the research topic “the Determinants of Commercial Bank’s Liquidity Risk in Nepal”. In the banking theory and practice, there are no generally accepted indicators measuring the liquidity risk of banks. Despite the lack of conventional indicators for measuring the liquidity risk, different authors offer their own approaches for measuring and expressing the liquidity risk of individual banks and the banking system. The first section presents the review of major literatures while the second section presents empirical review for the study. A literature review is a comprehensive summary of previous research on a topic. The literature review surveys scholarly articles, books, and other sources relevant to a particular area of research. This study reviews contemporary banking liquidity risk theories that have been developed and used by the researchers and discusses their relevance to this study. Further, this chapter consists of review of empirical literature and related theories of the research. The main reason for this review is to know the outcomes of previous research conducted within the same scope of study where similar concepts and methodologies have been used successfully.

#### **2.1 Theoretical review**

The theories reviewed for the purpose of this study are illustrated below:

##### **2.1.1 Liquidity, liquidity risk and liquidity risk management**

Liquidity is defined as the ability of a bank to promptly meet its financial obligations incurred in the process of business operation (Duttweiler, 2009). In this sense, liquidity represents qualitative factors of the banks’ financial strength. Liquidity risk refers to a condition where banks do not have enough capital to meet their obligations without having an impact on its operations. Consequently, banks face a failure to supply sufficient cash for immediate liquidity needs or to raise liquidity at a high cost.

One of the key factors causing liquidity risk is the mismatch between the duration between asset and liabilities of the financial institution, for instance, mobilizing short-terms deposits into long-term credits (Duttweiler, 2009). This discrepancy creates an

imbalance between the source and the use of capital leading to decreased liquidity. Further, liquidity mismatch may compel the banks to increase their borrowings or sell off their assets to meet the liquidity requirements. Hence, due to fire sale of its assets, the value realized might be lower than the actual value that could have been realized provided that the banks have enough time to sell the asset (Duttweiler, 2009). Similarly, liquidity risk is also induced from the bank's assets related to credit commitments. When bank allows its customers to borrow money at any time, it must be in a good financial condition to meet the need without losing liquidity.

Researchers argue that volume of liquid assets in the bank's portfolio plays an important role since banks operate primarily based on the funds received from the depositors in either form of demand or time deposits. Because these deposits represent the obligations of the banks to be paid whenever they are requested, the banks should always allocate their funds in such a way that their portfolios should always contain an adequate level of liquid assets. All things considered; it can be assumed that the bank's liquid asset position is perceived as a crucial financial statement items which have the capacity to maintain the confidence of depositors. When banks fail to maintain an adequate level of liquid asset within their portfolio, they are likely to create panic or a loss of confidence among the depositors, and this fear is contagious, it spreads among the banks through deposits withdrawals or through correspondent relations.

Given this, even though banks are the main providers of liquidity to the economy, they must adequately manage the liquidity risk due to maturity mismatch. Liquid asset often provides a cushion against such maturity gaps between asset and liabilities (Acharya & Skeie, 2011). However, holding high amount of liquid asset comes at the cost of lower returns compared to illiquid asset. On the contrary, not having enough buffer of liquid assets may severely affect the bank's ability to provide liquidity. Consequently, even when banks try their best to hold a portion of liquid asset in form of cash, short-term securities, government bonds, these buffers can never be sufficient to fully secure the bank against sudden liquidity crises.

### **2.1.2 Indicators of bank's liquidity risk**

Before measuring the impact of the determinant on the commercial bank's liquidity risk of commercial, it is better to first identify the commonly used indicators of a bank's

liquidity risk. According to Aspachs et al. (2005), there are some mechanisms that banks can use to insure against liquidity crises. For instance, banks hold buffer of liquid assets on the asset side of the balance sheet. A large enough buffer of assets such as cash, balances with central banks and other banks, debt securities issued by governments and similar securities, somewhat reduce the possibility that liquidity demands threaten the bank's sustainability.

An analysis of balance sheet structure can provide an important insight on banks' liquidity risk. Liquidity risk of banks can be measured by liquidity gap (also referred to as flow approach) or liquidity ratio (also referred to as stock approach). Liquidity gap is focused on determining the value of reserves needed during a period by comparing the variability in the bank's inflows and outflows. At any date, a positive gap between assets and liabilities is equivalent to a deficit that must be filled (Bessis, 2011). Liquidity ratios are centered on the asset and liability part of the financial statements and employs ratios to identify liquidity trends. Comparably, these ratios indicate that low-cost financing can be made available in a short time. This might be represented by portfolio of assets out of total asset of the bank than can be easily sold, for instance, cash reserves, statutory reserves, or investment in government securities.

Different authors like support for the use of various liquidity ratios such as liquid assets to total assets, liquid assets to deposits, loans to total assets, loans to deposits, loans to deposits & short-term borrowings and total loan to total liabilities in measuring bank's liquidity risk (Chagwiza, 2014). The stock approach employs various balance sheet ratios to identify liquidity trends. While both approaches are enticing, the flow approach is far more data intensive and there are no standardized methods to forecast cashflows accurately. Consequently, stock approach is more popularly used in practice and academic research.

Among the above liquidity ratios, this study has used two ratios, namely liquid assets to total assets and loans to deposits ratio. The rationale for computing liquidity ratio in terms of liquid assets to total assets in the Nepalese context is simply to know the amount of liquid assets from bank's total assets. But it is not way of measuring liquidity risk as per the NRB's requirement. Rather NRB directives require all commercial banks to maintain statutory liquidity ratio as prescribed. Therefore, this study employs two liquidity ratios namely liquid assets to total assets and loans to deposits ratio by using stock approach.

The liquid asset to total asset ratio indicates the proportion of liquid assets to the total assets. This indicator gives an overall liquidity situation of the banks and the related capacity to absorb liquidity shocks. Higher the liquid assets in the bank's portfolio, higher the capacity to face the liquidity lacks. In this respect, the ratio of loans to deposits also provides important insights into banks' liquidity risk. When the ratio is high, banks are more sensitive to the deposit withdrawal by customers. This measure helps identify the vulnerability of banks to the funding sources. A lower ratio indicates better bank's ability to absorb liquidity shock.

### **2.1.3 Capital adequacy and liquidity risk**

Previous literatures suggested that bank's capital acted as a cushion for risk absorption including the risk arising due to liquidity crunches, however, recent theories on banking liquidity suggest that the bank's capital can also impact its ability to create liquidity (Berger and Bouwman, 2009). One thread of literature called the liquidity substitution hypothesis that bank capital reduces with higher liquidity creation (Distinguin et al., 2013). On the other hand, the risk absorption hypothesis asserts that higher capital helps to absorb higher risks and enables banks to provide more liquidity to the economy (Von Thadden 2004).

Liquidity substitution hypothesis assert that when banks experience high levels of illiquidity, they may consider certain liquid liabilities, such as deposits, as stable funding sources and thus substitute capital with these stable and more liquid liabilities. As a result, higher liquidity decreases the capital and increases the liquidity risk in liquidity substitution hypothesis. Conversely, the risk absorption hypothesis is based on the risk transformation roles of the bank. It suggests that higher capital boosts liquidity creation. Since greater liquidity creation increases the liquidity risk for banks, the banks tend to strengthen their solvency position by increasing capital because higher capital acts as a buffer against liquidity runs (Horvath et al., 2014).

### **2.1.4 Non-performing loans and liquidity risk**

Non-performing loans are loans that a bank customer fails to meet their contractual obligations on either principal or interest payments exceeding three months (Anbar & Alper, 2011). Non-performing loans are loans that give negative impact to banks in developing the economy. Financial distress in the banking sector can often be attributed

to sudden increase in non-performing loans. A definite fact, financial systems are responsible for managing complex and advance financial transactions. Financial institutions including commercial banks play a central role in mobilizing and allocating resources. These oversee those operations are being run effectively and efficiently. The technical term for this process is referred to as “risk transformation” whereby the financial institutions transform riskless deposits into risky loans. These risky loans generate highest returns for the financial institutions. However, some of these high-risk loans sooner or later become non-performable loans and become irrecoverable. A core substance for sustained and rapid economic progress is financial stability. Among various indicators of financial stability include bank’s non-performing loan reflecting on its asset quality, credit risk and its efficiency in the allocation of resources to productive sectors. Non-performing loans are the main contributor to liquidity risk, which exposes banks to insufficient funds for operations. Liquidity risk is the outcome of credit risk, which is the inability of borrowers to meet their repayment obligation.

### **2.1.5 Profitability and liquidity risk**

Profitability accounts for the impact of better financial soundness on the bank’s risk bearing capacity and ability to perform liquidity transformation (Munteanu, 2012). Loans add to a substantial proportion of the bank’s operating profit, however, are the riskiest asset that a bank can hold. As a result, banks often face liquidity risk because high risk loans are advanced from customer deposits. However, where there is high risk, there is higher returns, and hence, higher profit potentials for commercial banks. At this point, it is also worth noting that banks with a high volume of loans will also be faced with higher liquidity risk. Thus, the commercial banks need to strike a balance between liquidity and profitability. When banks hold high volume of liquid assets in their portfolio, they do so at the cost of some lucrative and high return investment (Kamau, 2009). There is a risk-return trade off that inherently exists between liquidity risk and the rate of returns from bank’s asset. Evidently, a loan raises a bank’s return while simultaneously increasing its liquidity risk and vice versa. So, a higher liquidity ratio can suggest that the bank is less profitable than the others. Consequently, the management is faced with the dilemma of liquidity and profitability. Myers and Rajan (1998) emphasized the adverse effect of increased liquidity for financial institutions. They suggested that although more liquid assets increase the ability to raise cash on short notice, it also reduces the management’s

ability to commit credibly to an investment strategy that protects investor's financial interests which can result in reduction of the firm's capacity to raise external finance. Thus, this indicates the negative relationship between bank profitability and liquidity.

### **2.1.6 Economic growth and liquidity risk**

Economic growth is likely to affect bank activities and investment decisions including the profile of bank liquidity (Shen et al. 2010). For example, the demand for differentiated financial products is higher during economic boom and may improve bank ability to expand its loan and securities portfolios at a higher rate. On the contrary, economic recessions intensify the drops in credit supply.

According to the theory of bank liquidity and financial fragility, the relationship between banks' liquidity preference and the economic growth is fundamental to explain the inherent instability of the capitalist system as an endogenous market process. In periods of economic growth, which are characterized by high degree of confidence of the economic units about their profitability, there is a rise in the level of investment. During this growth period, banks decrease their liquidity preference, inclining toward riskier capital assets with higher return. In this growth environment, banks hold a smaller amount of liquid assets and instead advance short-term debt with higher interest rates (Painceira 2010). Similarly, the loanable fund theory of interest also asserts that the supply for loan i.e., illiquid assets for banks increases when the economy is at boom or going out of recession.

Banks are more likely to accumulate liquidity during periods of economic decline, when lending opportunities are not great. On the other hand, banks drop their liquidity buffers during economic growth when lending opportunities become better (Aspachs et al., 2005). Thus, it can be expected that higher economic growth makes banks run down their liquidity buffer and induce banks to lend more.

Bordo et al. (2001) suggest two explanations on the cause of bank's liquidity run due to an irregular and concurrent increase in withdrawals by customers. They explained that liquidity runs on banks are a function of mass psychology or panic, such that if there are an expectation of financial crisis and people take panic actions in anticipation of the crisis, the financial crisis becomes inevitable. Bordo et al. (2001) asserted that crises are an intrinsic part of the economic growth and result from shocks to fundamentals aspects



of the economy. When the economy goes into a recession or depression, asset returns are expected to fall. Borrowers will have difficulty repaying loans and depositors, anticipating an increase in defaults or nonperforming loans, will try to protect their wealth by withdrawing bank deposits. Banks are caught between the illiquidity of their loans and the liquidity of their deposits and may become insolvent.

### **2.1.7 Rate of inflation and liquidity risk**

A growing theoretical literature describes mechanisms whereby even predictable increases in the rate of inflation interfere with the ability of the financial sector to allocate resources effectively. Recent theories highlight the significance of informational asymmetries in credit markets and explain how increase in the inflation rate can adversely impact the credit market with negative implications on the financial sector's operations and performance. The common feature of these theories is that there is an informational friction whose severity is endogenous. Thus, an increase in the general inflation rate can decrease the real rate of returns, not just on money, but also on assets (Munteanu, 2012). The implied reduction in real returns exacerbates credit market frictions. Since these market frictions lead to the rationing of credit, credit rationing becomes more severe as inflation rises. As a result, the financial sector makes fewer loans, resource allocation is less efficient, and intermediary activity diminishes with adverse implications for capital/long term investment. In turn, the amount of liquid or short-term assets held by economic agents including banks will rise with the rise in inflation (Munteanu, 2012).

## **2.2 Empirical Review**

The study is carried out to demonstrate the factors affecting on firm value among commercial banks. These studies supported that the value of firm depends on various factors such as dividend policy, profitability, company size, company growth. The study has reviewed some of the articles on related subject matter. The summary of the major articles on this subject matter is presented in Table 1. The following section reviews the empirical evidence on factors affecting bank liquidity with a particular focus on those that have been conducted more recently as they are the most likely indicators of the current situation.

Table 1

*Review of empirical studies*

| Study                | Major findings  |
|----------------------|---|
| Iqbal (2012)         | ) Found that profitability, capital adequacy, and non-performing loans have a positive relation with liquidity risk   |
| Munteanu (2012)      | ) Found that capital adequacy, economic growth, and inflation rate had a positive relation with liquidity risk  |
| Vovoda (2013)        | ) Illustrated that banking liquidity is positively related to capital adequacy and profitability while the relation between economic growth rate and liquidity was ambiguous  |
| Ganic (2014)         | ) Revealed that capital and economic growth had a positive impact on liquidity risk   |
| Moussa (2015)        | ) Found that financial performance, GDP growth rate, inflation rate had significant impact on bank liquidity  |
| Muriithi (2014)      | ) Found capital adequacy and non-performing loans to have the most significant negative influence on liquidity risk<br>) Recommended that banks to establish the required level of non-performing loans, capital adequacy and loan book size to reduce liquidity risk |
| Choon et. al. (2013) | ) Found non-performing loan, profitability, and GDP to have significant positive influence on bank's liquidity whereas capital adequacy had insignificant negative effect on liquidity  |

Iqbal (2012) in his journal, "Liquidity Risk Management: A Comparative Study between Conventional and Islamic Banks of Pakistan", investigated the size of the bank, NPL, ROA, ROE, CAR with the liquidity risk of conventional and Islamic banks of Pakistan. The objective of the study was to compare the liquidity risk of the Islamic and the conventional banks in Pakistan from the period of 2007-2010. The sample for the purpose includes 5 Islamic and 5 conventional banks and the methodology used includes ratio analysis, descriptive statistics, regression analysis and Pearson's correlation analysis. The independent variable includes the size of the bank, NPLs ratio, ROE, CAR, and ROA whereas the dependent variable includes liquidity risk which is the measure of the most

liquid assets of the banks. Ratio analysis shows better liquidity position of the Islamic banks as compared to the conventional banks. The NPL ratio of the Islamic banks is in a decreasing trend which means denotes better operations of the Islamic banks as compared to the conventional banks. The ROA along with CAR shows positive relation with liquidity risk. In addition, the size of the bank and the NPL also has positive relation with the liquidity risk.

Munteanu (2012) conducted the research paper with the aim of identifying the factors that influence bank liquidity through a multiple regression model, over a panel of 27 commercial banks in Romania over the period 2002-2010. The pre-crisis years are observed separately from the crisis period (2008-2010). Efficient liquidity management tools such as L1 (Net Loans/Total Assets) and L2 (Liquid Assets/Deposits and short-term funding) were used. The study considered capital adequacy, assets quality, interbank funding, funding cost and cost to income ratio as internal factor and interest rate, credit risk rate, inflation rate, GDP, and unemployment as external factor to be explanatory for the dependent variable. The bank's liquidity was positively related to capital adequacy, interbank funding, cost to income ratio, interest rate, inflation rate and GDP whereas negatively related to assets quality, funding cost, credit risk rate and unemployment as determined using the linear multivariate regression model.

Vodova (2013) aimed to identify determinants of liquidity of Hungarian commercial banks in his study "Determinants of Commercial Banks' Liquidity in Hungary" by analyzing the data for the period of 2001 to 2010. To identify determinants of liquidity of Hungarian commercial banks, panel data regression analysis was used. The study illustrated that bank liquidity is positively related to capital adequacy of banks, interest rate on loans and bank profitability and negatively related to the size of the bank, interest margin, monetary policy interest rate and interest rate on interbank transaction. However, the relation between the growth rate of gross domestic product and bank liquidity is ambiguous.

Ganic (2014) presents the research on liquidity risk and its determinants in banking sector of Bosnia and Herzegovina (B&H). It aims to examine bank's exposure to liquidity risk in the context of 17 commercial banks in the country, by analyzing the data for the period 2002-2012. Multiple regression analysis such as correlation, R-squared, ANOVA and F-test was used to test the statistical significance and power of selected variables using

various data analysis techniques. The model was tested twice, once with L1 risk (Liquid assets to total assets) and once with L2 Risk (Liquid assets to customer deposits and short-term financing) as dependent variables and the independent variables under consideration was capitalization, NPL, ROE, LLR, TOA, GDP, RR, LTD and IRM. The study showed that over the period, the share of liquid assets in total assets has steadily decreased. The most important determinants of liquidity in the banking sector vary, depending on the variable that is selected as the dependent variable. In the model where the dependent variable is L1 Risk, CAP, LLR, TOA and RR have a positive impact on bank's liquidity risk whereas, as per the model measured by L2 Risk, CAP, LLR, TOA, GDP, RR, LTD and IRsp has a positive impact.

Moussa (2015) in his study using a sample of 18 banks to identify the factors that influence bank liquidity in Tunisian context in period (2000-2010). Two measures of liquidity (liquid assets / total assets; total loans / total deposits) are estimated. Through the method of static panel and method of panel dynamic, it was found that (financial performance, capital / total assets, operating costs/ total assets, growth rate of GDP, inflation rate, delayed liquidity) have significant impact on bank liquidity while (size, total loans / total assets, financial costs/ total credits, total deposits / total assets) does not have a significant impact on bank liquidity.

Muriithi (2014) found in his study of 43 Kenyan Bank that non-performing loans influences liquidity risk among commercial banks when banks with high capital had a large amount of non-performing loans. The study found that capital adequacy and non-performing loans was found to have the most significant negative influence on liquidity risk. The study recommended that banks should establish the required level of non-performing loans, capital adequacy and loan book size which will help in reducing the liquidity risk. Commercial banks should have a mechanism of identifying loan defaulters and take the necessary action against them.

Choon et al. (2013) identify the factors significant to explain Malaysia commercial Banks' liquidity. This study has categorized the independent factors into bank specific factors and macroeconomic factors. The bank specific factors include Bank Size, Capital Adequacy, Profitability, Non-Performing Loans, while the macroeconomic factors include Gross Domestic Product, Inter-Bank Rate and Financial Crisis. This study obtained secondary data from 15 Malaysia commercial banks from the year 2003 to 2012.

This study concludes the results based on panel data, fixed effect model using annual data. The analytical tools used are E-view 6 and Stata 11. The empirical findings of this research paper state that all the factors included are significant except inter-bank rates. The factors with positive influence on bank liquidity are Non-Performing Loan, Profitability and Gross Domestic Product. On the other hand, factors to bring negative effect to bank liquidity are Bank Size, Capital Adequacy, Financial Crisis, and Interbank Rate but turned out insignificant.

### **2.3 Research Gap**

Given the objectives and limitations of this study, the outcomes and conclusions should help to minimize the existing gaps in the related literature. The output of this study will contribute to new knowledge in the banking industry in Nepal.

Review of various literatures showed that most of the empirical studies done on the area of bank's liquidity were done following the financial crisis of 2008. The global financial crisis reemphasized the importance of liquidity in proper functioning of financial markets and the banking sector. However, there still exists a significant gap in the empirical literature about liquidity risk and its indicators of liquidity risk. Only a handful of studies aimed to identify the determinants of liquidity risk in the commercial banking industry in Nepal. Studies mentioned above suggests that commercial bank's liquidity risk is determined by both bank specific (such as capital adequacy, profitability) and macroeconomic factors (such as different types of interest rates and indicators of economic environment) as well as the central bank decisions.

At the time of undertaking this study, there have been almost little to no empirical studies done on the determinants of commercial bank's liquidity in Nepal. Since the banking industry is constantly growing and evolving in Nepal, it is important to identify the important determinants of banking liquidity risk by making empirical investigation on the existing commercial banks in Nepal. Therefore, this study has identified and investigated some determinants affecting the bank's liquidity.

## CHAPTER III

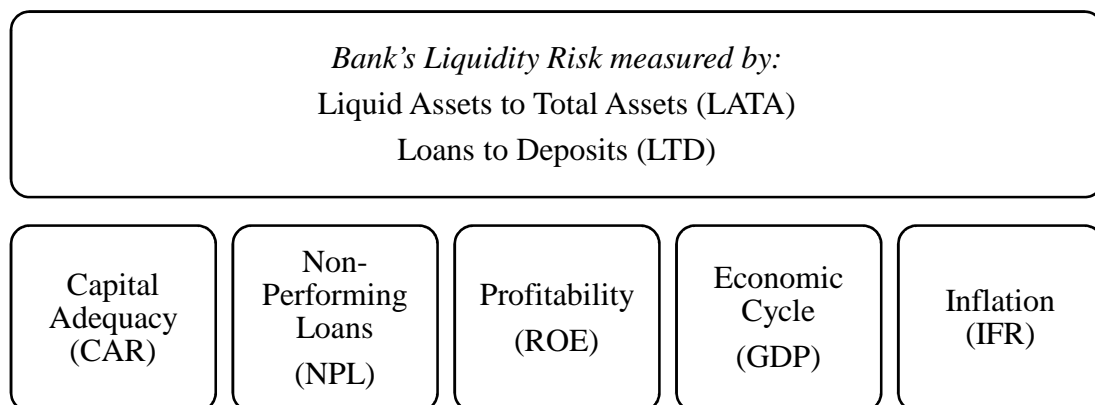
### RESEARCH METHODOLOGY

Research methodology is a sequential procedure and collection of scientific methods to be adopted in a systematic study. In other words, research methodology describes the methods and process applied in the entire study. It is a way to systematically solve the research problem. It may be understood as a science of studying how research is done scientifically. The research methodology is divided into five parts.

#### 3.1 Research framework and definition of variables

The research framework shown below is the foundation on which the entire research “The Determinants of Commercial Bank’s Liquidity Risk in Nepal” is based on. The figure illustrated below elaborates the relationship among different variables and explains the theory underlying the relations between different independent and dependent variables.

#### Dependent Variables



#### Independent Variables

*Figure 1. Conceptual framework of the study*

Based on this research framework and the objectives, the study aims to determine the impact of selected variable including capital adequacy, non-performing loans, profitability, economic growth, and inflation on the commercial bank’s liquidity. This research work attempts to understand the relationship between dependent and independent variables by testing the hypothesis regarding the relationship between liquidity risks and its determinants. The following variables are used:

### **3.1.1 Liquidity of banks**

A liquidity ratio refers to the amount of cash and cash assets that a banking institution has on hand for conversion. The ratio itself measures the amount of liquid assets against the financial obligations that the bank must meet within that defined window of time. In other words, it assesses whether the bank would have enough asset to honor obligation to depositors as well as creditors if they were to be immediately called for payment. The following ratios were used:

### **3.1.2 Liquid assets to total assets ratio**

This ratio (LR1) gives us information about the general liquidity shock absorption capacity of a bank. As a rule, the higher the share of liquid assets in total assets, the higher the capacity to absorb liquidity shock, given that market liquidity is the same for all banks in the sample. Nevertheless, high value of LR1 may be also interpreted as inefficiency, since liquid assets yield lower income, liquidity bears high opportunity costs for the bank. Therefore, it is necessary to optimize the relation between liquidity and profitability.

### **3.1.3 Loan to deposits ratio**

The liquidity ratio LR2 relates illiquid assets with liquid liabilities. It indicates what percentage of the volatile funding of the bank is tied up in illiquid loans. The loan-to-deposit ratio is used to assess a bank's liquidity by comparing a bank's total loans to its total deposits for the same period. If the ratio is too high, it means that the bank may not have enough liquidity to cover any unforeseen fund requirements. Conversely, if the ratio is too low, the bank may not be earning as much as it could be. The total deposits used in this study includes saving deposits, time/fixed deposits, and demand deposits.

### **3.1.4 Capital adequacy ratio**

Bank capital serves as cushion to absorb the unexpected losses and a source of fund to deal with liquidity risks. Two hypotheses are used to explain the relationship between bank's capital and liquidity. The first one supposes that the capital level has a positive impact on bank liquidity. Khoury (2015) studied the determinants of liquidity in the Lebanese banking sector. She confirmed the risk absorption hypothesis and found that the

capital level has a positive and statistically significant impact on both liquid assets to total assets ratio and liquid assets to deposits ratio. Many other scholars found the same positive association between liquid assets to total assets ratio and a banks' capital level. The second hypothesis indicates that a higher capital level may disrupt liquidity creation, i.e., negative relationship (Bhatia et al., 2012). Consequently, the study expects a positive association between capital level and liquidity.

### **3.1.5 Non-performing loans**

Asset's quality is mainly the quality of bank loans, and it is considered the first internal factor that may influence the liquidity of banks. Non-performing loan is considered when the borrower does not pay the instalments for three months or more. Unsurprisingly, many studies have confirmed the negative association between assets quality and bank liquidity (Munteanu, 2012 and El-Chaarani, 2019). The most surprising result came out from (Roman et al., 2015). They studied the determinants of liquidity in Central and Eastern Europe countries between 2004 and 2011. They expected that assets quality as measured by nonperforming loans to the total loan's ratio would negatively and significantly affect bank liquidity. Surprisingly, negative relationship was not proved in any country. Moreover, they found out in the same study a significant positive association between assets quality and bank liquidity in the Czech Republic, Lithuania, and Romania. They also revealed that the regulators of these countries obliged banks to increase their liquidity ratios during the global crisis. Consequently, the study expects a negative association between nonperforming loans and liquidity.

### **3.1.6 Profitability**

It is the ability of the business to earn profit and one of the main measurements of efficiency. Vodova (2013) found out that the performance level has a significant negative impact on bank liquidity. According to the risk and return theory, which states that the higher the risk, the higher the return and vice versa, profitability and liquidity are not in the same line, meaning that they have an inverse relationship, because the more liquid a company is, it indicates the funds are confined to liquid assets, making the inaccessible for productive activities that generate profit or for investments. Hence, the study expects a negative association between profitability and liquidity.



### **3.1.7 Economic growth**

It is a particularly important indicator that measures the health of nation's economy. To put it simply, GDP shows the monetary value of finished goods and services within a country in a certain period. During economic growth, business activities develop and thus the demand for loans will expectedly increase. As a result, banks will have more opportunities to give loans when they decrease their liquid assets. This can lead to a negative association between economic growth and liquidity. Trenca et al. (2015) studied the macroeconomic determinants of 40 commercial banks in 6 Southern Europe countries from 2005 to 2011. They found out that economic growth as measured by GDP has a negative and statistically significant impact on bank's liquidity. Further, Singh and Sharma (2016) also proved by performing OLS regression on a set of 59 banks in India that GDP affect in a negative direction the bank liquidity. On the other hand, other scholars found out that banks prefer to preserve a prominent level of liquidity during an economic upturn, since they have low confidence in the ability of their customers to repay instalments during an economic downturn. Ahmad and Jan (2017) discovered a positive relation between GDP and bank liquidity by studying 31 Pakistani banks for the period of 10 years, starting from 2005 up to 2014. In consequence, the study expects a negative association between economic growth and liquidity.

### **3.1.8 Inflation rate**

It is a quantitative measure of the rate at which the general level of prices for certain goods and services is rising and, consequently, the purchase power of currency is falling. Some authors implied that an increase of the inflation rate will lower the purchasing power of individuals, who will then need more money to buy the same products. As a result, the demand for loans will increase and thus, bank liquidity will decrease (Trenca et al., 2015; Bhatia et al, 2012). Moreover, higher inflation rates deteriorate overall macroeconomic conditions and lower liquidity (Vodova, 2013). While other researchers discovered a positive relation. (El-Chaarani, 2019) used WLS regression on 183 banks from Middle east during a period of 3 years and found out that with climbing of inflation, liquidity also increases. Similar findings were discovered by (Singh and Sharma, 2016). Consequently, the study expects a positive association between inflation rate and liquidity.

The tables below present information about dependent and independent variables chosen for the study, proxy, and expected outcomes.

Table 2

*Summary of dependent variables and indicators*

| Dependent Variable     |                 |                                 |
|------------------------|-----------------|---------------------------------|
| Liquidity Risk Model 1 | LR <sub>1</sub> | $\frac{L}{T} \quad \frac{A}{A}$ |
| Liquidity Risk Model 2 | LR <sub>2</sub> | $\frac{L}{D}$                   |

Table 3

*Summary of independent variables, indicators, and expected outcomes*

| Independent Variables |     |   |
|-----------------------|-----|---|
| Capital Adequacy      | CAR | Capital Adequacy Ratio as per Basel III (+) |
| Non-Performing Loans  | NPL | Non-Performing Loan to Total Loan (-)       |
| Profitability         | ROE | Net Profit/Total Shareholder's Equity (-)   |
| Economic Growth       | GDP | GDP growth rate (-)                         |
| Inflation             | IFR | CPI inflation rate (+)                      |

### 3.2 Research design

This research was an applied research as existing theories and concepts were used to fulfil the objectives of the research. This study was performed using quantitative approach by collecting, evaluating, verifying, and synthesizing past evidence systematically and objectively to reach a conclusion regarding the performance of the leading Nepalese commercial bank. The top five private commercial banks were selected based on their paid-up capital. The data was mostly collected from secondary sources such as the published Annual Report and Basel-III disclosures report for the period year 2015-16 to 2019-20 (i.e., five years). This research used analytical and descriptive study methods with the help of appropriate statistical or financial tools. The descriptive statistics such as mean, standard deviations, minimum and maximum values of the variables have been used to describe the characteristics of sample during the period. Inferential research has used the Pearson's Correlation Coefficient, Regression of the econometric model. Thus, it helps to find the relationship between the variables used in the research i.e., how several independent variables might explain the dependent variable and helps to draw inference from a sample of the population.

### 3.3 Population and sample technique

The study was confined to the private commercial banks operating in Nepal. There were 27 commercial banks in operation in Nepal during the time of the study, with their branches located in different parts of the country. Out of the total population, five leading private commercial banks were selected based on their paid-up capitals which comprised 18.5 percent of the total population of commercial banks in Nepal. The samples are also chosen according to the availability of data. As a carefully chosen sample can be used to represent the population, the sample reflects the characteristics of the population from which it is drawn. The sample banks selected for this research were as follows:

- ) Global IME Bank
- ) Nepal Investment Bank
- ) NMB Bank
- ) Mega Bank
- ) Kumari Bank

The secondary data was employed to analyze the determinants of Nepalese commercial banks. Table 4 shows the sample size of commercial bank for this study.

Table 4

*Sample size of commercial bank*

| Banks                 | Study Period | Observation |
|-----------------------|--------------|-------------|
| Global IME Bank       | 2016-2020    | 5           |
| Nepal Investment Bank | 2016-2020    | 5           |
| NMB Bank              | 2016-2020    | 5           |
| Mega Bank             | 2016-2020    | 5           |
| Kumari Bank           | 2016-2020    | 5           |
| Total Sample          |              | 25          |

### 3.4 Nature and sources of data

The data necessary to conduct the research were mainly collected from secondary sources. The required financial statements for this study such as balance sheet, profit & loss account etc. were collected from the published annual reports and accounts of the five banks from fiscal year 2015-16 to 2019-20. In other words, all the necessary data were collected from various sources includes annual reports of respective banks, Nepal Rastra Bank official sites, Security Board of Nepal, Ministry of Finance, Nepal Stock

Exchange, professional associations and different publications and online database of the selected banks were taken for the purpose of this study.

### **3.5 Methods of analysis**

SPSS software was used primarily to analyze the collected data. The collected data was systematically entered into the SPSS software and analysis of descriptive, Pearson's correlation coefficient, and multiple regression was done as per the framework of study. The research used different methods namely Descriptive Statistics, Pearson's Correlation Coefficient and Regression of the econometric model.

#### **3.5.1 Descriptive statistic**

The descriptive statistics like maximum, minimum, mean, and standard deviation of the variables of the sampled commercial banks is found, presented, and analysed accordingly in this study. The value of the mean reports the arithmetical average of the variables which are included in the study. The minimum and maximum values indicate the lower and the highest value of the variable. The standard deviation exhibits the diversity or variability in the data set of each variable. A small standard deviation points towards that the data points are inclined to be extremely close to the mean, while high values of standard deviation points that the data set is broaden out over an extensive range of values.

#### **3.5.2 Pearson's correlation coefficient**

Correlation is a way to index the degree to which two or more variables are associated with or related to each other. The most widely used bi-variant correlation statistics is the Pearson product-movement coefficient, commonly called the Pearson correlation which is used in this study. Correlation coefficient between two variables ranges from +1 (i.e., perfect positive relationship) to -1 (i.e., perfect negative relationship).

#### **3.5.3 Econometric model**

Multiple regression will be used as the econometric model. An analysis where more than one independent variable is jointly regressed against the dependent variable is known as multiple regressions. The regression coefficient describes how the changes in the independent variables affect the value of the dependent variable estimate. In other words,

the regression coefficient of each independent variable indicates the marginal relationship between that variable and the value of the dependent variable, the effect of all other independent variables in the regression model holding constant. For the analysis of the performance of ten leading commercial banks, it requires various financial and statistical tools which help the researcher to reach the conclusion by evaluating financial statements such as balance sheet, profit & loss accounts etc.

The functional form:

$$LR_{it} = \beta_0 + \beta_1 x_{it} + e_{it} \dots \dots \dots (i)$$

With subscript 'i' that denotes observation of each bank at the point in time and 't' representing the time-series dimension. The left-hand variable  $LR_{it}$  is the dependent variable,  $\beta_0$  is the intercept term,  $\beta_1$  is a  $k \times 1$  vector of parameters to be estimated on the explanatory variables, and  $x_{it}$  is a  $1 \times k$  vector of observations on the explanatory variables,  $t = 1, \dots, T$ ;  $i = 1, \dots, N$ .

Our models can be represented by the following equations:

$$LR_{it} = f(CAR, NPL, ROE, LNTA, GDP, INF)$$

$$LR1_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 NPL_{it} + \beta_3 ROE_{it} + \beta_4 GDP_{it} + \beta_5 IFR_{it} + e_{it}$$

$$LR2_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 NPL_{it} + \beta_3 ROE_{it} + \beta_4 GDP_{it} + \beta_5 IFR_{it} + e_{it}$$

Where,

$$LR1_{it} = LR2 \text{ (Liquid Assets to Total Assets Ratio)}$$

$$LR2_{it} = LR2 \text{ (Liquid Assets to Total Deposit and Short-Term Financing Ratio)}$$

$CAR_{it}$  = Capital adequacy of  $i$ th bank on the year  $t$ .

$NPL_{it}$  = Non-performing loan of  $i$ th bank on the year  $t$ .

$ROE_{it}$  = Return on Equity of  $i$ th bank on the year  $t$ .

$GDP_{it}$  = the real domestic product/GDP growth of Nepal on the year  $t$ .

$IFR_{it}$  = the inflation rate of Nepal on the year  $t$ .

$eu = \text{Error/ Stochastic term}$

## CHAPTER IV

### RESULTS AND DISCUSSION

The main objective of data analysis is to analyze the magnitude and direction of the effects of internal and external variable on the liquidity risk in the case of Nepalese commercial banks. Thus, this section deals with statistical and econometric models used for the purpose of analysis of secondary data. The methods of data analysis used in this study have been divided into two subsections. First section deals with the analysis of secondary data. This includes descriptive statistics, correlation analysis, regression analysis, etc. Second section describes the results of these analysis. Regression model is used in this study to analyze the effect of internal and external factors effecting liquidity risk. The effects of these factors on the liquidity risk of Nepalese commercial banks were analyzed by computing regression equations.

#### 4.1 Analysis of data

Different tests were run to make the data ready for analysis and to get reliable output from the research. These tests were intended to check whether the classical linear regression model assumptions, i.e., the ordinary least square assumptions, are fulfilled when the explanatory variables are regressed against the dependent variables. Accordingly, the following sub-section presents tests of classical linear regression model.

##### 4.1.1 Test of normality

Normality test of data is applied to determine whether a data is well-modeled by a normal distribution or not, as well as to compute how likely an underlying random variable is to be normally distributed. Graphical (histogram and dot plot) test was conducted to know if the variables are normally distributed.

**Graphical tests for normality.** The best way to evaluate how far the used data are from Gaussian (normal) is to look at a graph and see if the distribution grossly deviates from a bell-shaped normal distribution. By looking at the graphs, it can be realized that the histogram looks symmetric, and the normal p-p plot showed consistent with that of the line and the residuals are normally distributed.

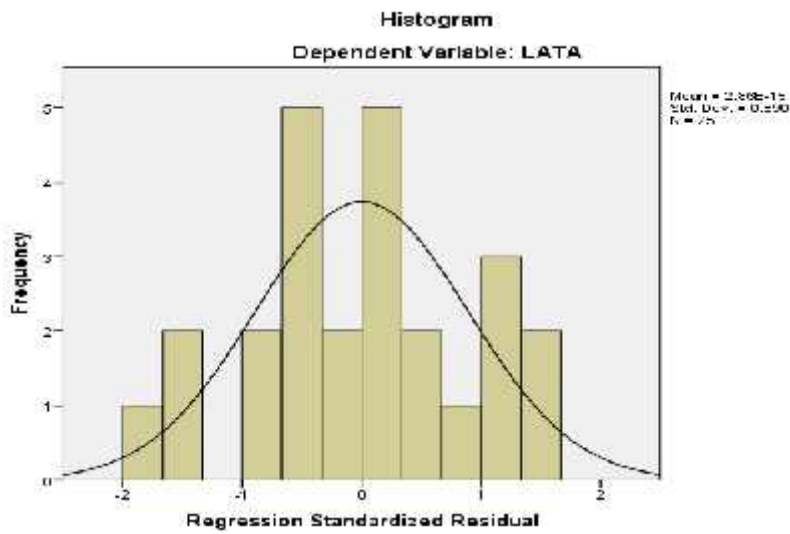


Figure 2. Normality test of Liquid Asset to Total Asset Ratio

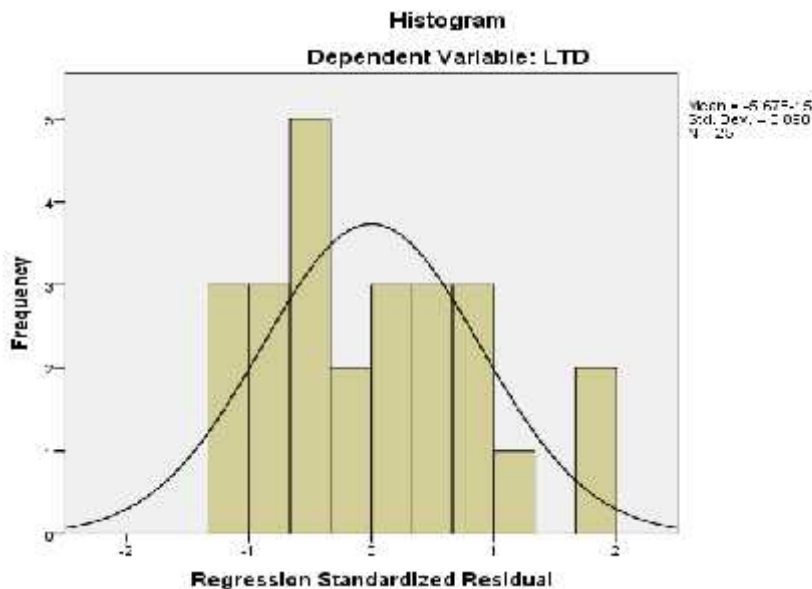


Figure 3. Normality test of Loans to Deposits Ratio

In Figure 2 and Figure 3, we can see there is normal distribution curve. Hence, the normality assumption is fulfilled as required based on the above figures. The histogram is bell-shaped which reveals that the residuals are normally distributed around its mean of zero.

In addition, to test the normality of data, the normal probability plots were used as shown in the Figure 4 and Figure 5.



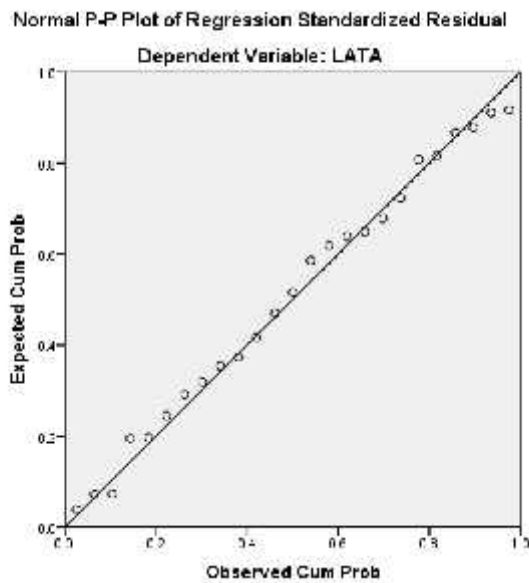


Figure 4. Normal P-P plot for Liquid Asset to Total Asset Ratio

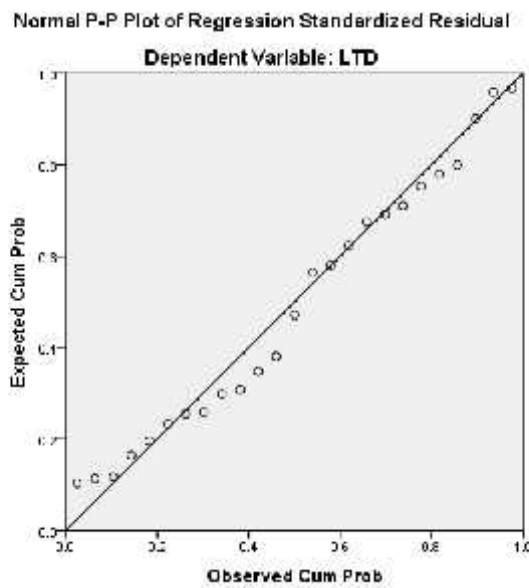


Figure 5. Normal P-P plot for Loans to Deposits Ratio

The above Figure 4 and Figure 5 reveal that the dots lie somewhat straight on the line, confirming the normality assumption. Hence, it can be concluded that the inferences made within this study about the population parameter from the sample are valid.

#### 4.1.2 Multicollinearity test

Collinearity is a linear association between two predictors. Multicollinearity is a situation where two or more predictors are highly linearly related. Multicollinearity is an issue that may arise in multiple regression. If an independent variable is an exact linear combination of the other independent variables, then we say the model suffers from perfect collinearity (Nadarajah, 2008). Multicollinearity condition exists where there is high, but not perfect correlation between two explanatory variables (Wooldridge et. al, 2016). In general, an absolute correlation coefficient greater than 0.7 among two or more independent variables indicates the presence of multicollinearity.

Table 5

*Correlation matrix of independent variables*

| Independent Variables |                     | CAR     | NPL     | ROE   | GDP      | IFR   |
|-----------------------|---------------------|---------|---------|-------|----------|-------|
| CAR                   | Pearson Correlation | 1.000   |         |       |          |       |
|                       | Sig. (2-tailed)     |         |         |       |          |       |
| NPL                   | Pearson Correlation | - 0.098 | 1.000   |       |          |       |
|                       | Sig. (2-tailed)     | 0.641   |         |       |          |       |
| ROE                   | Pearson Correlation | - 0.306 | - 0.314 | 1.000 |          |       |
|                       | Sig. (2-tailed)     | 0.137   | 0.126   |       |          |       |
| GDP                   | Pearson Correlation | 0.171   | - 0.190 | 0.124 | 1.000    |       |
|                       | Sig. (2-tailed)     | 0.413   | 0.363   | 0.553 |          |       |
| IFR                   | Pearson Correlation | - 0.279 | 0.065   | 0.145 | - .897** | 1.000 |
|                       | Sig. (2-tailed)     | 0.177   | 0.756   | 0.489 | 0.000    |       |

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Kennedy (2008) stated that multicollinearity problem exists when the correlation coefficient among the variables is greater than 0.70. Conclusively, there may be a problem of multicollinearity in this study which could have an impact on the reliability of regression analysis. The correlation matrix of predictors, as mentioned above, may indicate the presence of multicollinearity. Though correlation talks about bivariate linear relationship whereas multicollinearity is multivariate, if not always, correlation matrix can be a good indicator of multicollinearity and indicate the need for further investigation. Correlation matrix between independent variables is presented in Table 5. The results of correlation matrix indicates that there were low data correlations among the independent variables. However, there is significant negative correlation between the

external determinants represented by inflation rate (IFR) and gross domestic product (GDP) the coefficient of which is 0.897.

Table 6

*Collinearity between GDP and other independent variables*

| Model |     | Collinearity Statistics |       |
|-------|-----|-------------------------|-------|
|       |     | Tolerance               | VIF   |
| 1     | IFR | .914                    | 1.094 |
|       | CAR | .819                    | 1.221 |
|       | NPL | .856                    | 1.168 |
|       | ROE | .781                    | 1.280 |

a. Dependent Variable: GDP

Table 7

*Collinearity between IFR and other independent variables*

| Model |     | Collinearity Statistics |       |
|-------|-----|-------------------------|-------|
|       |     | Tolerance               | VIF   |
| 1     | GDP | .923                    | 1.083 |
|       | CAR | .832                    | 1.202 |
|       | NPL | .848                    | 1.179 |
|       | ROE | .772                    | 1.295 |

a. Dependent Variable: IFR

A correlation plot can be used to identify the correlation or bivariate relationship between two independent variables whereas Variance Inflation Factor (VIF) is used to identify the correlation of one independent variable with a group of other variables. It is preferred to use VIF for better understanding. Hence, this study has further examined the problem of multicollinearity between GDP and IFR using the VIF. VIF measures how much of the variation in one variable is explained by the other variable. This is done by running a regression using one of the correlated variables as the dependent variable against the other variables as predictor variables. VIF is calculated as one divided by the tolerance, which is defined as one minus R-squared. According to the rule of thumb, VIF exceeding 10 indicates the possibility of multi-collinearity. In Table 6 and Table 7, the VIF values for each variable is less than 2 which means there is no instances of multicollinearity between the independent variables taken in the study.

### 4.1.3 Descriptive statistics

The descriptive statistics for the dependent variables and independent variables are presented here. The dependent variables are liquidity measured by Liquid Assets to Total Assets Ratio (LR1) and Loans to Deposits Ratio (LR2). The others are independent variables measured by Capital Adequacy Ratio (CAR), Non-Performing Loan (NPL), Return on Equity (ROE), gross domestic product (GDP), and inflation rate (IFR). The total observation for each dependent and explanatory variable was 25. Table 6 summarizes the results of the descriptive statistics of the variables.

Table 8

#### *Descriptive statistics*

| Variables       | N  | Minimum | Maximum | Mean   | Std. Deviation |
|-----------------|----|---------|---------|--------|----------------|
| LR <sub>1</sub> | 25 | 0.1017  | 0.2339  | 0.1743 | 0.0387         |
| LR <sub>2</sub> | 25 | 0.7933  | 1.0475  | 0.9032 | 0.0607         |
| CAR             | 25 | 0.1098  | 0.1791  | 0.1356 | 0.0169         |
| NPL             | 25 | 0.0055  | 0.0291  | 0.0138 | 0.0066         |
| ROE             | 25 | 0.0799  | 0.2196  | 0.1434 | 0.0346         |
| GDP             | 25 | 0.0059  | 0.0822  | 0.0495 | 0.0303         |
| IFR             | 25 | 0.0415  | 0.0993  | 0.0586 | 0.0219         |

Table 8 describes the descriptive statistics for both dependent and independent variables. The dependent variables are liquidity risk measured by liquid assets to total assets ratio (LR1) and loans to deposits ratio (LR2). Liquidity measures the ability of the bank to manage assets to meet obligations as they come due without incurring unacceptable losses. The remaining variables are the independent variables including capital adequacy, non-performing loans, profitability, gross domestic product, and inflation rate. The table shows the minimum, maximum, mean, and standard deviation for each variable. The mean is the sum of the observations divided by the total number of observations. The standard deviation is the squared root of the variance. It indicates how close the data is to the mean. Minimum is the lowest value in the variable. Maximum is the largest value in the variable.

The mean value of liquid asset to total asset ratio was 10.17 percent during the period 2015-16 to 2019-20. The standard deviation of 3.87 percent shows a moderate dispersion of liquid assets to total assets ratio from its mean for the commercial banks in Nepal. The maximum and minimum values of liquid asset to total assets ratio were 23.39 percent and

17.43 percent, respectively. Similarly, the loans to deposits ratio for the sample were ranging from 79.33 percent to 104.75 percent. Typically, the ideal loan-to-deposit ratio is 80 percent to 90 percent. However, loan to deposit ratio seems to have been highly dispersed from its mean value of 90.32 percent with standard deviation of 6.07 percent. The main reason behind the deviation is due to the high loans-to-deposit ratio of Kumari Bank in the year 2018 and 2019. The other commercial banks seem to have appropriately maintained ratio below 100 percent while Kumari Bank failed to do so resulting in the highest loans-to deposits ratio among the sample group.

Among the independent variables, the mean value and standard deviation of capital adequacy ratio was 13.56 percent and 1.69 percent respectively, with the data ranging from NMB Bank's 10.98 percent in the year 2016 to Mega Bank's 17.91 percent in the year 2018. The other determinant of liquidity risk of commercial banks was non-performing loans that measures the loan quality of banks. The mean value of the percentage of non-performing loans in the total amount of loans and advances to customers was 1.38 percent with the minimum and maximum values of 0.55 percent and 2.91 percent, respectively. The maximum value was of Nepal Investment Bank in the year 2020 which indicated the presence of increased credit risk in the bank. There was very low dispersion of non-performing loans among banks in Nepal that is shown by the standard deviation of 0.66 percent.

Similarly, profitability, measured by Return on Equity (ROE), has a mean of 14.34 percent and standard deviation of 3.46 percent. Return on Equity of different sample bank ranged from 7.99 percent to 21.96 percent. This shows the existence of a huge variation in profit among banks in Nepal.

The remaining independent variables were the macroeconomic indicators that can affect banks liquidity position over time. The mean value of real GDP growth rate was 4.95 percent indicating the average real growth rate of the country's economy over the past five years. The maximum growth of the economy was recorded in the year 2017 at 8.22 percent and the minimum was in the year 2016 at just 0.59 percent with little dispersion towards the average over the period under study with the standard deviation of 3.03 percent. Finally, the average inflation rate for the five-year period extending from 2016 to 2020 was 5.86 percent with a standard deviation of 2.19 percent. The highest value of

inflation rate was in the year 2016 at 9.93 percent whereas the lowest was in the year 2018 at 4.15 percent.

#### 4.1.4 Correlation analysis

A correlation matrix is prepared to analyze the association between two or more variables. It is the statistical tool which is used to describe the degree to which one variable is linearly related to another. According to Brooks (2008), if it is stated that y and x are correlated, it means that y and x are being treated in a completely symmetrical way. Thus, it is not implied that changes in x cause changes in y, or indeed those changes in y cause changes in x rather, it is simply stated that there is evidence for a linear relationship between the two variables, and that movements in the two are on average related to an extent given by the correlation coefficient.

The bi-variant correlation statistics used under the study is the Pearson's correlation. Thus, correlation analysis is done to detect the problem of multicollinearity and to find out whether any relation exists between independent and dependent variables. Table 9 shows the correlation between dependent and independent variables.

Table 9

##### *Correlation of dependent with independent variables*

| Independent Variables |                     | CAR   | NPL     | ROE     | GDP     | IFR     |
|-----------------------|---------------------|-------|---------|---------|---------|---------|
| LR <sub>1</sub>       | Pearson Correlation | 0.112 | 0.132   | 0.253   | - 0.192 | 0.393   |
|                       | Sig. (2-tailed)     | 0.596 | 0.530   | 0.223   | 0.357   | 0.052   |
| LR <sub>2</sub>       | Pearson Correlation | 0.165 | - 0.355 | -.556** | 0.139   | - 0.251 |
|                       | Sig. (2-tailed)     | 0.430 | 0.082   | 0.004   | 0.508   | 0.226   |

\*\* Correlation is significant at the 0.01 level (2-tailed).

Liquidity ratio LR1 i.e., liquid asset to total asset had positive correlation with CAR, NPL, ROE, and IFR with coefficient of correlation 0.112, 0.132, 0.253, and 0.393 respectively whereas it had a negative correlation with one independent variable i.e., GDP having coefficient of correlation of 0.192. None of the independent variables were found to have significant relationship with the bank's liquidity at 0.01 level.

The result of liquidity ratio LR2 i.e., loans to deposit is rather contradictory to that the results of LR1. The loans to deposits ratio was positively correlated with CAR and GDP with coefficient of correlation of 0.165 and 0.139, respectively. And it was negatively

correlated with other independent variables, namely NPL, ROE, and IFR having coefficient of correlation of 0.355, 0.556, and 0.251, respectively. The correlation between Loans-to-deposit ratio and ROE was significant at 0.01 level of significance. None of the independent variables were found to have significant relationship with liquidity at 0.01 level. However, it should be noted that correlation between independent and dependent variables does not mean independent variables will be significant in regression.

#### 4.1.5 Regression analysis

Under the regression outputs, the coefficients may be negative or positive; they indicate each variable's level of influence on the dependent variable. R-square is to measure the proportion of the total variation in the dependent variable (Y) that is explained by the variation in the independent variable (X). The range of R square is from 1 to 100%. If the R-square value is close to 1%, it means that less variation of Y can be explained by the variation of X. If R-square is close to 100%, it means that high variation of Y can be explained by the variation of X. R<sup>2</sup> values indicate the explanatory power of the model and in this study adjusted R<sup>2</sup> value which considers the loss of degrees of freedom associated with adding extra variables were inferred to see the explanatory power of the models. Thus, for all model's multivariate regression analysis was done. The significance of models was tested using ANOVA table and R<sup>2</sup> value. If the "sig." value is lesser or equal to 0.05, it can be concluded that the regression model fit the data. The Durbin Watson statistic ranges in value from 0 to 4. The value near 2 denotes autocorrelation, towards 0 indicates positive correlation, and towards 4 indicates negative correlation.

#### Regression Analysis for Model 1

In model 1, liquid asset to total asset (LR1) was used as the dependent variable. It depicts the picture of whether the regression model fit the data and the type of relationship that exist between dependent variable and all other explanatory variables.

Table 10

*Regression coefficients of LR<sub>1</sub> (model 1) with independent variables*

| Model    | Unstandardized Coefficients |            | Standardized Coefficients | t       | Sig.  |
|----------|-----------------------------|------------|---------------------------|---------|-------|
|          | B                           | Std. Error | Beta                      |         |       |
| Constant | - 0.204                     | 0.105      |                           | - 1.944 | 0.067 |
| CAR      | 0.909                       | 0.425      | 0.397                     | 2.140   | 0.046 |

|     |       |       |       |       |       |
|-----|-------|-------|-------|-------|-------|
| NPL | 1.870 | 1.070 | 0.320 | 1.749 | 0.096 |
| ROE | 0.171 | 0.246 | 0.153 | 0.694 | 0.496 |
| GDP | 1.280 | 0.604 | 1.002 | 2.119 | 0.047 |
| IFR | 2.403 | 0.839 | 1.360 | 2.863 | 0.010 |

a. Dependent Variable: LATA

Table 10 presents the result of regression analysis of liquid asset to total asset ratio as dependent variable and five explanatory variables for the sample of five commercial banks in Nepal. Beta indicates each variable's level of influence on the dependent variable. By using the coefficients obtained from the regression analysis, the regression model is given below:

$$LR1 = -0.204 + 0.909 (CAR) + 1.870 (NPL) + 0.171 (ROE) + 1.280 (GDP) + 2.403 (IFR)$$

Table 11

*Model Summary*

| R      | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|--------|----------|-------------------|----------------------------|---------------|
| 0.683a | 0.467    | 0.327             | 0.032                      | 1.994         |

a. Predictors: (Constant), IFR, NPL, CAR, ROE, GDP

b. Dependent Variable: LATA

Table 11 provides a summary of the result of regression. The R square values indicate the explanatory power of the model and in this study adjusted R square value which considers the loss of degrees of freedom associated with adding extra variables. The coefficient of determination R<sup>2</sup> for the model was found to be 0.467. This indicated that variations in capital adequacy ratio, non-performing loan, profitability, rate of economic growth, and inflation rate jointly explained 4.67 percent of variation in liquid asset to total asset ratio.

Table 12

*Analysis of Variance*

| Model      | Sum of Squares | df | Mean Square | F     | Sig.  |
|------------|----------------|----|-------------|-------|-------|
| Regression | 0.017          | 5  | 0.003       | 3.330 | .025b |
| Residual   | 0.019          | 19 | 0.001       |       |       |
| Total      | 0.036          | 24 |             |       |       |

a. Dependent Variable: LATA



b. Predictors: (Constant), IFR, NPL, CAR, ROE, GDP

Table 12 provides the result of analysis of variance (ANOVA). F-statistics value test the null hypothesis that all the slope parameters are jointly zero. F-statistics attached to the test statistics show that null hypothesis should be rejected even at 0.01 level of significance. From the table, the F-statistic for the model was found to be 3.330 with a significance level of 0.025. Because 0.025 is less than 0.05, the regression is statistically significant at the 0.05 level of significance.

### Regression Analysis for Model 2

In model 2, loans to deposits ratio (LR2) was used as the dependent variable. It depicts the picture of whether the regression model fit the data and the type of relationship that exist between dependent variable and all other explanatory variables.

Table 13

*Regression coefficients of LR<sub>2</sub> (model 2) with independent variables*

| Model    | Unstandardized Coefficients |            | Standardized Coefficients | t       | Sig.  |
|----------|-----------------------------|------------|---------------------------|---------|-------|
|          | B                           | Std. Error | Beta                      |         |       |
| Constant | 1.253                       | 0.131      |                           | 9.552   | 0.000 |
| CAR      | - 0.611                     | 0.532      | - 0.170                   | - 1.148 | 0.265 |
| NPL      | - 5.482                     | 1.340      | - 0.599                   | - 4.092 | 0.001 |
| ROE      | - 1.426                     | 0.308      | - 0.813                   | - 4.636 | 0.000 |
| GDP      | 0.296                       | 0.756      | 0.148                     | 0.391   | 0.700 |
| IFR      | - 0.024                     | 1.051      | - 0.009                   | - 0.023 | 0.982 |

a. Dependent Variable: LTD

Table 13 presents the result of regression analysis of loans to deposits ratio as dependent variable and five explanatory variables for the sample of five commercial banks in Nepal. Beta indicates each variable's level of influence on the dependent variable. By using the coefficients obtained from the regression analysis, the regression model is given below:

$$LR_1 = 1.253 - 0.611 (\text{CAR}) - 5.482 (\text{NPL}) - 1.426 (\text{ROE}) + 0.296 (\text{GDP}) - 0.024 (\text{IFR})$$

Table 14

*Model Summary*

| R | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|---|----------|-------------------|----------------------------|---------------|
|---|----------|-------------------|----------------------------|---------------|

|       |       |       |       |       |
|-------|-------|-------|-------|-------|
| .812a | 0.660 | 0.570 | 0.040 | 1.536 |
|-------|-------|-------|-------|-------|

a. Predictors: (Constant), IFR, NPL, CAR, ROE, GDP

b. Dependent Variable: LTD

Table 14 provides a summary of the result of regression. The R square values indicate the explanatory power of the model and in this study adjusted R square value which considers the loss of degrees of freedom associated with adding extra variables. The coefficient of determination R<sup>2</sup> for the model was found to be 0.660. This indicated that variations in capital adequacy ratio, non-performing loan, profitability, rate of economic growth, and inflation rate jointly explained 6.60 percent of variation in liquid asset to total asset ratio.

Table 15

*Analysis of Variance*

| Model      | Sum of Squares | df | Mean Square | F     | Sig.              |
|------------|----------------|----|-------------|-------|-------------------|
| Regression | .058           | 5  | .012        | 7.370 | .001 <sup>b</sup> |
| Residual   | .030           | 19 | .002        |       |                   |
| Total      | .088           | 24 |             |       |                   |

a. Dependent Variable: LTD

b. Predictors: (Constant), IFR, NPL, CAR, ROE, GDP

Table 15 provides the result of analysis of variance (ANOVA). F-statistics value test the null hypothesis that all the slope parameters are jointly zero. F-statistics attached to the test statistics show that null hypothesis should be rejected even at 0.01 level of significance. From the table, the F-statistic for the model was found to be 7.370 with a significance level of 0.001. Because 0.001 is less than 0.05, the regression is statistically significant at the 0.05 level of significance.

## 4.2 Discussion

The regression equation for the risk models 1 and 2 had liquid asset to total asset and loans to deposits as dependent variable and capital adequacy (CAR), non-performing loan (NPL), profitability (ROE), economic growth (GDP), and inflation (IFR) as explanatory variables.

Table 16

*Summary of hypothesis testing*

| Independent Variables     | LR1 Risk |           | LR2 Risk |           |
|---------------------------|----------|-----------|----------|-----------|
|                           | Sign     | Reject H0 | Sign     | Reject H0 |
| Capital Adequacy (CAR)    | +        | Yes       | -        | No        |
| Non-Performing Loan (NPL) | +        | No        | -        | Yes       |
| Profitability (ROE)       | +        | No        | -        | Yes       |
| Economic Cycle (GDP)      | +        | Yes       | +        | No        |
| Inflation (IFR)           | +        | Yes       | -        | No        |

**Capital Adequacy.** Capital adequacy had positive impact on bank's liquidity measured by LR1 whereas it had a negative impact on the liquidity measured by LR2. This is based on the argument of risk absorption. According to this argument, the higher capital adequacy ratio of a banks, the higher the capacity of the bank to absorb risks and create higher level of liquidity to the external public through deposits and loans. In other words, higher capital adequacy ratio of banks creates positive signal to the external public and attract more deposits. In turn this enable banks to hold more liquid assets that create better potential to liquidity creation to the external public. However, the coefficient value of the variable indicates a percentage change in capital adequacy ratio of banks result in less proportionate (i.e., 0.909 percent in LR1 and - 0.611 percent in LR2) rise/decline in liquidity position of commercial banks in Nepal. LR1 shows significant relationship, whereas LR2 shows insignificant relationship with CAR.

**Non-Performing Loan.** The percentage of non-performing loan in the total volume of loan has statistically insignificant relationship with banks' liquidity in case of liquidity model 1 whereas it has a significant relationship with liquidity model 2. LR1 show positive impact which could be a sign of prudent policy of banks; they offset the higher credit risk with cautious liquidity risk management while LR2 shows NPL to have negative relationship with liquidity that reflects the reckless lending practice of some commercial banks. The coefficient value of the variable was 1.870 in model 1 and -5.482 in model 2.

**Profitability.** ROE has insignificant and positive relation with the liquidity risk in the Model 1. The table shows that 1 percent increase in ROE results in the liquidity position measured by the liquid asset to total asset to change by 1.5 percent. It indicates the adjustment of banks liquidity position with the rise/decline in ROE. The result of positive relationship between liquidity ratio LR1 and ROE in case of Nepal may be because of the

increased goodwill that profitable banks have in the eyes of the public, which in turn resulted in an increased level of deposits for them. On the other hand, the result of ROE is opposite in case of Model 2. The reason for this is because increase in loan disbursed is directly proportional to the bank's profitability. Correspondingly, more loans disbursed out of total deposits means that the bank is holding less liquid asset in its balance sheet. Consequently, ROE has a significant and negative relation with the liquidity ratio LR2 measured by loans to deposits ratio.

**Economic growth.** Real GDP growth rate had statistically significant positive impact on liquidity of commercial banks measured by LR1 while it had insignificant positive impact on liquidity ratio LR2 in Nepal with the beta coefficient of 1.280 with a p-value of 0.047 for model 1 and beta coefficient of 0.296 with a p-value of 0.7 for model 2. The positive impact of real GDP growth rate could be due to the high level of inflation rate. Also, the positive effect on GDP growth rate signals that liquidity tends to be inversely related to the business cycle. Most borrowers want to take a loan during expansion when they have valuable investments projects. Banks which want to satisfy the growing demand for loans would face lower liquidity. During economic downturn, lending opportunities are not so good, so banks hold higher share of liquid assets.

**Inflation rate.** The study found a beta value of 2.403 for LR1 implying there is a positive relationship between inflation rate and liquidity ratio of commercial banks. It implies that if inflation rate increases by 1 percent, liquidity ratio of the banking industry increases by an average value of 2.40 percent. Further, on conducting a t-test on the results, the relationship was found to be significant at 0.05 level of significance since the p-value is 0.010 which is less than 0.05, the level of significance. On the other hand, the study showed a statistically insignificant impact on liquidity risk of commercial bank measured by LR2. The beta coefficient for liquidity risk model 2 was 0.024 with p-value of 0.982, which is greater than 0.05, the level of significance. An increase in the rate of inflation drives down the real rate of return not just on money, but on assets in general. The implied reduction in real returns exacerbates credit market frictions. Since these market frictions lead to the rationing of credit, credit rationing becomes more severe as inflation rises. As a result, the financial sector makes fewer loans, resource allocation is less efficient, and intermediary activity diminishes with adverse implications for capital/long term investment. In turn, the amount of liquid or short-term assets held by economic

agents including banks will rise with the rise in inflation. Hence, the inflation rate has exhibited positive relationship with bank liquidity.

## CHAPTER V

### SUMMARY AND CONCLUSION

#### 5.1 Summary

This research mainly focused on the determinants of the liquidity risk of the banking sector of Nepal. The research included five commercial banks of Nepal. The descriptive analysis found the minimum, maximum, mean, and standard deviation of bank's liquid assets to total assets to be 0.1017, 0.2339, 0.1743 and 0.0387 respectively and that of loans to deposits to be 0.7933, 1.0475, 0.9032 and 0.0607, respectively. The descriptive analysis found the minimum, maximum, mean, and standard deviation of bank's CAR to be 10.98 percent, 17.91 percent, 13.56 percent, and 1.69 percent, respectively. NPL had minimum, maximum, mean, and standard deviation of 0.55 percent, 2.91 percent, 1.38 percent, and 0.66 percent, respectively. The minimum, maximum, mean, and standard deviation of ROE was 7.99 percent, 21.96 percent, 14.34 percent, and 3.46 percent, respectively. The macro-economic factor GDP rate had minimum, maximum, mean, and standard deviation of 0.59 percent, 8.22 percent, 4.95 percent, and 3.03 percent, respectively. Finally, Inflation rate had 4.15 percent, 9.93 percent, 5.86 percent, and 2.19 percent as minimum, maximum, mean, and standard deviation, respectively.

The correlation showed that the dependent variable measured by LR1 i.e., liquid assets to total assets ratio had a moderately positive correlation with CAR, NPL, ROE, and IFR while having a negative correlation with GDP. None of the correlations were significant for liquidity risk model 1. On the other hand, the correlation matrix showed that the dependent variable measured by LR2 i.e., loans to deposits ratio was positively correlated with CAR and GDP only while it had a negative correlation with NPL, ROE, and IFR. It was found that there was significant negative correlation between LR2 and ROE (0.556) with a p-value of 0.004.

The regression coefficients of the determinants of liquidity risk of commercial banks in Nepal showed by the multiple regression analysis were 0.909, 1.870, 0.171, 1.280, and 2.403 for CAR, NPL, ROE, GDP, and IFR respectively for liquidity risk model 1, whereas the regression coefficients of the determinants of liquidity risk of commercial banks in Nepal measured by liquidity risk model 2 were -0.611, -5.482, -1.426, 0.296, and -0.024 for CAR, NPL, ROE, GDP, and IFR respectively. The result of regression

analysis showed that CAR, GDP, and IFR had a significant impact in LR1 (i.e., liquid asset to total assets ratio) and NPL and ROE had a significant impact in LR2 (i.e., loans to deposits ratio) only.

## **5.2 Conclusion**

According to the Bank for International Settlements/BIS (2008), liquidity is defined as bank's ability to acquire funds required to meet obligations when due without incurring any substantial losses. It is an agreed fact that all businesses including banks face liquidity risk. The banks' liquidity risk is evident from its operations of providing mismatched maturities of deposits and loans (short-term deposits for long-term loan). In addition, the optimal level of liquidity is strongly linked to effective banking operations if liquidity is not generated properly, which can lead to insolvency (in case of low liquidity) and low profitability (in the case of high liquidity).

Banks should always remain liquid to prevent falling into liquidity crisis and cause distress in the overall economy. Thus, this study attempts to identify the determinants of liquidity of banking industry in Nepal and analyses the relationship between the dependent variable in the two estimated models LR1 (liquid assets to total assets ratio) and LR2 (loans to deposits ratio) and the explanatory variable namely capital adequacy ratio, nonperforming loans, return on equity, GDP rate, and inflation rate.

Secondary data was used for the sample of five commercial banks in Nepal from 2016 to 2020. Quantitative approach was used to achieve the intended objective. The quantitative data were collected from a sample of five banks from their respective websites over the period from 2016-2020. The collected data were analyzed by employing regression model using statistical package SPSS. After carrying out the hypothesis testing, the following conclusion has been formed.

The mean value of LR1 was 17.43 percent with a standard deviation of 3.87 percent which shows little dispersion of liquid assets to total assets ratio from its mean for the commercial banks in Nepal. The mean value of LR2 was 90.32 percent and the standard deviation was 6.07 percent.

It is found that CAR, GDP, and IFR have significant effects on bank's liquid assets holdings whereas NPL and ROE are proven to be insignificant in this research. On the

contrary, CAR, GDP, and IFR are found to have an insignificant effect on the bank's loans to deposit ratio liquidity whereas NPL and ROE have significant effect as per model 2 of liquidity risk used in this study.

Concerning the correlation between variables in the study, there is a positive correlation of liquidity risk model 1 with CAR, NPL, ROE, and IFR, and a negative correlation with GDP. On the other hand, a negative correlation is obtained for liquidity risk model 2 with NPL, ROE and IFR whereas CAR and GDP had a positive correlation with LR2. Among all the independent variables, only ROE had a significant correlation with LR2 (i.e., loans to deposits ratio).

The relationship between capital adequacy and liquidity risk in both models was positive as higher capital ratio of banks create positive signal to the external public and attract more deposits. It showed insignificant impact as in both LR1 and LR2. NPL revealed positive impact as per LR1 which could be a sign of prudent policy of banks; they offset the higher credit risk with cautious liquidity risk management. On the contrary, negative relationship with liquidity risk as per LR2 which reflects the hasty loans to deposits ratio of the commercial bank in the year 2017-18 and 2018-19. The result of positive relationship between liquidity and ROE in case of Nepal may be because of the increased goodwill that profitable banks have in the eyes of the public, which in turn resulted in an increased level of deposits for them. Bank liquidity increases with higher bank size. GDP shows mixed relationship with liquidity. During economic downturn, lending opportunities are not so good, so banks hold higher share of liquid assets. While economic growth is good, bank lend out more money and hold less liquid asset resulting in higher loans to deposits ratio.

In brief, this research has reached its objective in studying about the liquidity risk and finding the determinants of liquidity of commercial banks in Nepal. It has also examined the relationship between the dependent and independent variables. Hence, it can be used as a referral for future researchers who are interested to study on this topic.

### **5.3 Implications**

Based on the analysis, discussions, and conclusions of this research, there appears to be a need for further research on the area of factors affecting banking liquidity in Nepal by incorporating regulatory, economic, social factors and other bank specific and



macroeconomic factors. The determinants of liquidity risk may vary from one period to another period, from one bank to another as well. Hence, the bank's management need to study and identify the determinants of liquidity risk for each individual bank. This study is designed to give an elaborate and contemporary evidence that is supportive to the banking professionals when formulating corporate policies that are focused on liquidity risk management. It will help the banks to minimize liquidity risk by helping them understanding the major factors that affects the banking liquidity and finding a way to minimize those risks. Further research is required in this area focusing on diverse bank specific as well as macroeconomic factors to gain a deeper understanding of the determinants of commercial bank's liquidity risk in Nepal.

## References

- Acharya, V. V., & Skeie, D. (2011). A model of liquidity hoarding and term premia in inter-bank markets. *Journal of Monetary Economics*, 58(5).
- Ahmad, I., & Jan, F. A. (2017). Liquidity risk and its impact on financial performance of financial institutions in Pakistan. *Sarhad Journal of Management Sciences*, 3(02).
- Anbar, A., & Alper, D. (2011). Bank specific and macroeconomic determinants of commercial bank profitability: Empirical evidence from Turkey. *Business and economics research journal*, 2(2).
- Aspachs, O., Nier, E. W., & Tiesset, M. (2005). Liquidity, banking regulation and the macroeconomy.
- Berger, A. N., & Bouwman, C. H. (2009). Bank liquidity creation. *The review of financial studies*, 22(9).
- Bessis, J. (2011). Liquidity risk: A risk left to be tamed.
- Bhatia, A., Mahajan, P., & Chander, S. (2012). Determinants of profitability of private sector banks in India. *Indian Journal of Accounting*, 42(2).
- Bordo, M., Eichengreen, B., Klingebiel, D., & Martinez Peria, M. S. (2001). Is the crisis problem growing more severe?. *Economic policy*, 16(32).
- Boyson, N. M., Helwege, J., & Jindra, J. (2011). Crises, liquidity shocks, and fire sales at financial institutions.
- Brooks, C. (2008). *RATS Handbook to accompany introductory econometrics for finance*. Cambridge Books.
- Chagwiza, W. (2014). Zimbabwean commercial banks liquidity and its determinants. *International Journal of Empirical Finance*, 2(2).
- Distinguin, I., Roulet, C., & Tarazi, A. (2013). Bank regulatory capital and liquidity: Evidence from US and European publicly traded banks. *Journal of Banking & Finance*, 37(9).

- Duttweiler, R. (2009). The meaning of liquidity risk.
- El-Chaarani, H. (2019). Determinants of bank liquidity in the Middle East region. *International Review of Management and Marketing*, 9(2).
- El Khoury, R. (2015). Liquidity in Lebanese commercial banks and its determinants. *Academy of Accounting and Financial studies journal*, 19(3).
- Ganic, M. (2014). Liquidity risk and its determinants in Bosnia and Herzegovina. *The Romanian Economic Journal*, Year XVII no, 52.
- Helleiner, E. (2011). Understanding the 2007–2008 global financial crisis: Lessons for scholars of international political economy. *Annual review of political science*, 14.
- Horváth, R., Seidler, J., & Weill, L. (2014). Bank capital and liquidity creation: Granger-causality evidence. *Journal of Financial Services Research*, 45(3).
- Iqbal, A. (2012). Liquidity risk management: a comparative study between conventional and Islamic banks of Pakistan. *Global journal of management and business research*, 12(5).
- Kamau, A. W. (2009). Efficiency in the banking sector: An empirical investigation of commercial banks in Kenya (Doctoral dissertation).
- Kennedy, P. (2008). *A guide to econometrics*. John Wiley & Sons.
- Moussa, M. A. B. (2015). The determinants of bank liquidity: Case of Tunisia. *International Journal of Economics and Financial Issues*, 5(1).
- Munteanu, I. (2012). Bank liquidity and its determinants in Romania. *Procedia Economics and Finance*, 3.
- Muriithi, J. (2010). The effect of non-performing loans on liquidity risk of commercial banks in Kenya. University of Nairobi.
- Myers, S. C., & Rajan, R. G. (1998). The paradox of liquidity. *The Quarterly Journal of Economics*, 113(3).

- Nadarajah, S. (2008). Exact distribution of the linear combination of p Gumbel random variables. *International Journal of Computer Mathematics*, 85(9).
- Ndlovu, G. (2013). Financial sector development and economic growth: Evidence from Zimbabwe. *International Journal of Economics and Financial Issues*, 3(2).
- Painceira, J. P. (2010). The financial crisis of 2007–09 and emerging countries: The political economy analysis of central banks in the Brazilian and Korean economies. *Competition & Change*, 14(3-4).
- Reinhart, C., & Reinhart, V. (2020). The pandemic depression: The global economy will never be the same. *Foreign Aff.*, 99.
- Roman, A., & Sargu, A. C. (2015). The impact of bank-specific factors on the commercial banks liquidity: Empirical evidence from CEE countries. *Procedia Economics and Finance*, 20.
- Shen, J., Deng, Y., Jin, X., Ping, Q., Su, Z., & Li, L. (2010). Thiolated nanostructured lipid carriers as a potential ocular drug delivery system for cyclosporine A: improving in vivo ocular distribution. *International journal of pharmaceutics*, 402(1-2).
- Singh, A., & Sharma, A. K. (2016). An empirical analysis of macroeconomic and bank-specific factors affecting liquidity of Indian banks. *Future Business Journal*, 2(1).
- Toby, A. J. (2008). Liquidity Performance Relationship in Nigerian Manufacturing Companies (1990-2002). *Finance India*, 22(1).
- Trenca, I., Petria, N., & Corovei, E. A. (2015). Impact of macroeconomic variables upon the banking system liquidity. *Procedia Economics and Finance*, 32.
- Vazquez, F., & Federico, P. (2015). Bank funding structures and risk: Evidence from the global financial crisis. *Journal of banking & finance*.
- Vodová, P. (2013). Determinants of commercial bank liquidity in Hungary. *Finansowy Kwartalnik Internetowy e-Finanse*, 9(4).

Von Thadden, E. L. (2004). Asymmetric information, bank lending and implicit contracts: the winner's curse. *Finance Research Letters*, 1(1).

Wooldridge, J. M., Wadud, M., & Lye, J. (2016). *Introductory Econometrics: Asia Pacific Edition with Online Study Tools 12 Months*. Cengage AU.

## Appendix

### Appendix 1

#### *Descriptive data of sample banks*

| Year | Bank | LATA   | LTD    | CAR    | NPL    | ROE    | GDP    | IFR    |
|------|------|--------|--------|--------|--------|--------|--------|--------|
| 2016 | GIME | 0.1700 | 0.8112 | 0.1235 | 0.0189 | 0.1699 | 0.0059 | 0.0993 |
| 2017 | GIME | 0.2107 | 0.7933 | 0.1137 | 0.0160 | 0.1933 | 0.0822 | 0.0445 |
| 2018 | GIME | 0.1017 | 0.8808 | 0.1147 | 0.0077 | 0.1619 | 0.0670 | 0.0415 |
| 2019 | GIME | 0.1376 | 0.9346 | 0.1231 | 0.0055 | 0.1847 | 0.0699 | 0.0464 |
| 2020 | GIME | 0.1487 | 0.9298 | 0.1248 | 0.0176 | 0.1284 | 0.0227 | 0.0615 |
| 2016 | NIB  | 0.2142 | 0.8667 | 0.1492 | 0.0068 | 0.1566 | 0.0059 | 0.0993 |
| 2017 | NIB  | 0.1972 | 0.8878 | 0.1302 | 0.0083 | 0.1665 | 0.0822 | 0.0445 |
| 2018 | NIB  | 0.1050 | 0.8846 | 0.1266 | 0.0136 | 0.1471 | 0.0670 | 0.0415 |
| 2019 | NIB  | 0.1793 | 0.8511 | 0.1326 | 0.0278 | 0.1300 | 0.0699 | 0.0464 |
| 2020 | NIB  | 0.1476 | 0.8416 | 0.1354 | 0.0291 | 0.0892 | 0.0227 | 0.0615 |
| 2016 | NMB  | 0.2339 | 0.8421 | 0.1098 | 0.0181 | 0.2196 | 0.0059 | 0.0993 |
| 2017 | NMB  | 0.2240 | 0.8540 | 0.1361 | 0.0168 | 0.1649 | 0.0822 | 0.0445 |
| 2018 | NMB  | 0.1762 | 0.8957 | 0.1575 | 0.0088 | 0.1354 | 0.0670 | 0.0415 |
| 2019 | NMB  | 0.2192 | 0.9499 | 0.1545 | 0.0082 | 0.1332 | 0.0699 | 0.0464 |
| 2020 | NMB  | 0.2213 | 0.9140 | 0.1508 | 0.0268 | 0.0894 | 0.0227 | 0.0615 |
| 2016 | MEGA | 0.2112 | 0.8967 | 0.1295 | 0.0079 | 0.1724 | 0.0059 | 0.0993 |
| 2017 | MEGA | 0.1674 | 0.8900 | 0.1480 | 0.0136 | 0.1692 | 0.0822 | 0.0445 |
| 2018 | MEGA | 0.1965 | 0.8995 | 0.1791 | 0.0082 | 0.1656 | 0.0670 | 0.0415 |
| 2019 | MEGA | 0.1217 | 0.9219 | 0.1527 | 0.0098 | 0.1282 | 0.0699 | 0.0464 |
| 2020 | MEGA | 0.1446 | 0.8900 | 0.1324 | 0.0115 | 0.1465 | 0.0227 | 0.0615 |
| 2016 | KBL  | 0.1984 | 0.9390 | 0.1169 | 0.0115 | 0.1052 | 0.0059 | 0.0993 |
| 2017 | KBL  | 0.1816 | 0.9372 | 0.1450 | 0.0186 | 0.1277 | 0.0822 | 0.0445 |
| 2018 | KBL  | 0.1218 | 1.0475 | 0.1336 | 0.0105 | 0.1108 | 0.0670 | 0.0415 |
| 2019 | KBL  | 0.1770 | 1.0390 | 0.1175 | 0.0101 | 0.1105 | 0.0699 | 0.0464 |
| 2020 | KBL  | 0.1516 | 0.9826 | 0.1535 | 0.0139 | 0.0799 | 0.0227 | 0.0615 |